

# The Hedonics of Disgust

by

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A dissertation submitted in partial fulfillment  
of the requirements for the degree of  
Doctor of Philosophy  
(Psychology)  
in The University of Michigan  
2013

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For John Waters and Paul Rozin  
Patron saints of disgust

## ACKNOWLEDGEMENTS

I am from Baltimore, born and raised.

The cultural heros of my hometown are a strange set. They are outsiders and depressives, lovers of refuse, contemplators of atrocity, and curators of camp. It was only after leaving that I came to realize how much the city had influenced me.

Foremost among Baltimore's cultural icons is the poet and critic Edgar Allan Poe. While he scoffed at didacticism and allegory (a literary device about which "there is scarcely one respectable word to be said"), Poe is best known today for works containing strong didactic and allegorical overtones (*The Tell-Tale Heart*, *The Raven*). His penchant for the gothic could verge on the maudlin:

Let the bell toll ! — a saintly soul floats on the Stygian river ;  
And, Guy De Vere, hast thou no tear ? — weep now or never more !  
See ! on yon drear and rigid bier low lies thy love, Lenore !

We are, nonetheless, proud to claim him as our own. (While Poe was born in Boston and spent his life in several cities along the eastern seaboard, he did at least die in Baltimore, after taking the wrong train.) The Baltimore Ravens remain the only football team named after a poem.

Next there is H.L. Mencken, newspaperman for *The Baltimore Sun* and sourpuss extraordinaire. A satirist at heart, Mencken delighted in the well-placed jab (he dubbed the Scopes case "the Monkey Trial"), and relished the bile directed his way even more (it takes a special kind of man to publish an anthology containing nothing but criticism written about you, yet there it is, *A Mencken Schimphlexikon*). His

essay *The Sahara of the Bozart*, which laments the intellectual death of the South, is one of the finest examples of philippics in the English language.

Then of course there is the filmmaker John Waters: ironic, smirking, smutty. Waters' path to legitimacy was paved with *épater la bourgeoisie* cinematic moments: a singing asshole, a couple crushing a chicken between their bodies during sex, a transvestite eating dog shit (and that's just one movie). In memoirs, he deadpans, "If someone vomits watching one of my films, it's like getting a standing ovation."

The specter of John Waters hung particularly low over our town, perhaps because he was not dead. In fact, he lived in my neighborhood, and I would sometimes see him at Eddie's supermarket, with his pencil mustache, squeezing peaches in the produce aisle.

One of the members of Waters' band of Dreamlanders was my art teacher in elementary school. When I was eight, she tore up a drawing I made of people of all races holding hands under a rainbow, dismissing it as "too cliché." I was forbidden from drawing rainbows in class again. She also did not like the Madonnas I would paint (I went to an ecclesiastical school). "Honey," she'd say, taking the brush from my hand. "It's been done before."

By the time I was a teenager I'd graduated to harder stuff. One day a flannel-clad slacker at the local video store (Video Americain, pronounced "Video Ameri-cahhhn") handed me a shopworn copy of *Pink Flamingos*. "Try it. You'll like it," he said.

I came of age in the 1990s, an era of winking, self-deprecating enthusiasm for the idea that Baltimore was not merely awful, but phenomenally awful, inspirationally awful. (Previous attempts by city officials to bill it as a place that could compete by normal standards of excellence were laughed off by its own citizenry; in the late 1980s, a citywide fleet of sky-blue benches with the motto "Baltimore: The City That Reads" were swiftly defaced: "The City That Breeds" or, for the darker humored, "The City That Bleeds.") The American Visionary Arts Museum, a national mecca

for outsider art, opened in 1995. Popular and critically acclaimed television series *Homicide*, *The Corner*, and *The Wire* were all based on true crime books from this decade.

We were taught to love what was terrible about Baltimore, delight in it. Every Tuesday my father would eat breakfast at Cafe Hon (est. 1992), a restaurant that embodies, and embraces, John Waters' vision of the city. An 18-foot lawn flamingo looms over the door. Inside, the walls are lined with tchotchkes, and waitstaff cultivate the Tracy Turnblad look. True to form, the food is greasy and indifferent. This is all part of its charm, of course; Cafe Hon, perhaps more than any other city landmark, capitalizes on the idea that Baltimore's central outstanding feature is its kitsch.

From my earliest years, I was steeped in the notion that sometimes things are so bad they are good again, that the terrible can be a source of genuine, posy-eyed joy. Camp has market value, as does acid-tongued curmudgeonry (Mencken), and paranoid, absinthe-laced melancholia (Poe). To think that pleasure only derives from the straightforwardly nice would mean leaving out a substantial piece of the human capacity for enjoyment.

I owe Baltimore, and its ragtag team of misfits, a great debt for this insight.



Debts are owed elsewhere, as well.

Ann Arbor, for all of her midwestern standoffishness and poly-seasonal winters, is home to a rotating set of smart, interesting people who don't quite know how they got there. It is difficult to imagine how I would have survived here were it not for my friends and classmates, particularly the following excellent band of human beings: Plakias, Parkhurst, Garfinkel, DeSimone, Bartek, Demiralp, Armstrong, M. Meyer, and Carp.

I am indebted to my advisors and committee, both for their pedagogical guidance and for being tolerant of my desire to tackle unusual and difficult projects. To Nor-

bert, for giving me and my research interests a sense of belonging; Phoebe, for her priceless combination of warmth and crankiness; Randy, for boundless discussion and bottomless tea. Special thanks are due to Rick and Dave, for taking me under their wing in my second year, even if we did not always see eye to eye (I still disagree with Dave's assessment that Elvis was the greatest singer of the twentieth century).

I must thank the research assistants who worked with me: Garrett Marks-Wilt, Lizzie Cushing, Allie Seekely, Jeff Chang, Liz Palmieri, Matt Gilles, Annalyn Ng, Sam Caronongan, Angie Trush, Deepti Joshi, Aubree Sepler, Nina Tocco, Yuching Lin, Sandya Simhan, Mohini Bhargava, Mehgha Shyam, Billy Diaz, May Chow, Alessandra Boufford, Meredith Dennis, Priyanka Bikkina, Elise Darling, Patrick Julius, and Andria Robins.

I would also like to thank the subjects who have participated in my studies over the past five years. I cannot thank you by name, but I can thank you by number. At last estimate is there were over 2,000 of you. Thanks for being my guinea pigs.

I am grateful to my parents, who sacrificed to send me to good schools, and kept a house well-stocked with books and art supplies. They exposed me to enough of Baltimore to be inspired by it, but not so much that I could never leave.

I owe a great intellectual debt to Paul Rozin. As my thesis progressed, I was continually surprised to find so many of my plans already earmarked for further study in his papers. He is also an excellent role model: his work is never boring, and unafraid of being weird or unpopular. It's gratifying to see him being rewarded for this approach in the end. This dissertation is dedicated to him, and to John Waters, whose marks on this work will be evident to those familiar with either oeuvre.

Thanks, finally, to previous generations of nerds who put together the Rackham-friendly L<sup>A</sup>T<sub>E</sub>X template, which was used to format this dissertation.



## PREFACE

This dissertation's frontispiece is an engraving by F. W. Fairholt, based on an ancient Egyptian painting found at Thebes. It depicts an upper-class woman whose excesses have gotten the better of her. According to Thomas Wright, the author of the book where the engraving appears, "the early Egyptian artists cannot always conceal their natural tendency to the humorous, which creeps out in a variety of little incidents" (1875, p. 3).

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# ABSTRACT

The Hedonics of Disgust

by

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Disgust is a negative emotion, and as such, it is frequently assumed that its only function is to generate negative evaluations. This dissertation aims to demonstrate that disgust can generate positive evaluations in the right context.

In Chapter I, we show how the existence of hedonic disgust would be both empirically novel and counter to predictions made by many current theories of emotion. We suggest that the impact of disgust depends on context, consistent with feelings-as-information theory (Schwarz, 2012). To this end, we lay out potential circumstances under which disgust may be experienced as enjoyable.

In Chapter II, we show that priming disgust with verbal stimuli leads people to rate both cartoons and moral violations as funnier, and food pictures as less appetizing. We also find that sad verbal stimuli enhance cartoon ratings, helping to rule out arousal level as the sole explanation for these effects.

In Chapter III, we show that disgusting verbal stimuli enhance enjoyment of abstract and grotesque art, but not landscape art. We further demonstrate that the effect of these disgust primes changes depending on the probe, with disgust increas-

ing both the likability and offensiveness of judged paintings, while leading to lower ratings of prettiness.

In Chapter IV, we use two additional methods of inducing disgust—a noxious odor, and a filthy environment—to see whether this would enhance enjoyment of stand-up comedy and adventurous eating shows. We find that both of these disgust manipulations decrease enjoyment of traditional cooking shows, and increase enjoyment of adventurous eating shows. The experimental condition had no impact on humor judgments, counter to both feelings-as-information theory and congruency-based emotion theories.

In Chapter V, we discuss the scope and limitations of the current studies. While these studies demonstrate that disgust stimuli can have a positive effect on judgments, this effect is contingent on a variety of factors which are not yet fully understood. Furthermore, the precise mechanism by which incidental disgust leads to enjoyment remains unclear. Overall, this work shows that the influence of disgust is highly context-sensitive, and occasionally favorable, opening up a previously unexplored avenue for emotions research.

# CHAPTER I

## Introduction

### 1.1 Two related problems

Disgust fuels many of our most negative judgments. The emotion is unleashed by rotting food and open wounds, traitors and pedophiles. In such cases, disgust sends a powerful signal to avoid the offending stimulus, a physical if not moral contaminant. Curiously though, disgust is also present in many enjoyable cultural phenomena. Dirty jokes, modern art, even gross-out television programming, all seem to derive some of their power from their ability to disgust us.

This poses a bit of a puzzle for current models of emotion, most of which rely on the assumption that emotions lead to behavior that is congruent with the original emotion. How is it that the same stimuli that give rise to negative evaluations can also delight us in certain contexts? Do we like these experiences because of the negative feelings they engender, or in spite of them?

In light of these questions, this thesis has two overarching goals. The first is to revise models of how incidental feelings influence judgment, in order to account for cases where negative emotions lead to positive evaluations (and vice versa). The second is to provide a more accurate picture of how a specific emotion, disgust, operates across different contexts. In the past, these two kinds of question have been considered independently: trying to cram a ‘grand theory’ of emotional influence

into one set of rules without looking at the specific instances of how each emotion functions in context. Taking a more careful look at the specific case of disgust may help illuminate the mechanisms in place for emotional influence more generally.

## 1.2 A jargon primer

Before continuing, a crash course in the most important terminology that will be used here. Sadly, one finds that this vocabulary is anything but scientifically deployed in the field, so I want to make sure we dispel with any lexical ambiguities from the start.

### 1.2.1 Feelings, emotions, and their friends

Broadly speaking, *affect* is the way an experience feels. *Valence*, which refers to pleasantness or unpleasantness, is a type of affect. However, affective experiences are not limited to valence—sadness feels different than anger, for example.

Following the convention of Thayer (1989), a *mood* is an affective experience of low intensity and high temporal extension, compared to an *emotion*. Emotions typically involve evaluations in relation to some target—they are ‘about’ something. In this sense, emotions have an explicit cognitive component, whereas moods are relatively cognitively bare. This will become relevant when thinking about emotion priming, as there are affective and cognitive parts of the emotion that may be doing the work during priming.

Feelings refer to the superset of phenomena that contains moods, emotions, metacognitive experiences, and any other affectively-charged experiences.

### 1.2.2 Incidental versus integral

We can distinguish between two different ways that feelings influence judgment. *Integral* feelings are those which are incited by the stimulus itself. A trashpail of

maggots elicits disgust, so we avoid it. *Incidental* feelings linger after the initial elicitor to affect subsequent behavior. Seeing maggots in the garbage may ruin our appetite for lunch.

There are two reasons to be interested in incidental feelings. The first is to learn more about how feelings which have a serendipitous relationship to our decisions are capable of impinging on them. The second reason is methodological: incidental feelings can be controlled more easily than integral feelings. Incidental feelings allow for experimental manipulation. Thus, the fact that our behavior is influenced by incidental feelings is a useful quirk of human psychology for studying emotions.

The studies proposed here all make use of incidental emotion priming paradigms. The conclusions we can draw from them, however, can be extended to discussions of how emotions operate in general.<sup>1</sup>

### 1.2.3 Priming versus induction

*Priming* and *induction* are both loosely used in the context of psychological methods that involve systematically changing an affective or mental state. Although the two words have slightly different connotations (for example, ‘priming’ comes up more often in subliminal methods as well as non-affective manipulations, such as semantic priming), the key distinction here is the aspect of the manipulation they emphasize. Induction refers to the creation of the feeling state itself. Priming refers to the increase in knowledge accessibility, which can lead to a change in behavior (Higgins, 1996). So, a manipulation that *induces* a state can *prime* concepts which influence subsequent behavior.

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<sup>1</sup>It has been suggested that there may be important, systematic ways in which incidental and integral feelings differ, so we should exercise caution in blindly conflating them (Ellsworth, personal communication). However, the extent of these differences remains largely untested, so for the purposes of this research, we will treat them as comparable.

#### 1.2.4 Congruent versus diagonal

Although discussed in greater detail below, *congruent* effects are those which exhibit a matching between the feeling and the behavior. Typically, this matching is at the level of valence, with positive feelings begetting positive behavior, and negative begetting negative. However, congruity theories exist in more complex variants, where the entire pattern of the emotion maps onto the behavior (angry people are more aggressive). This mapping can operate quite metaphorically—people treat social acts as if they were contaminants when they have been physically disgusted (Schnall, Haidt, Clore, & Jordan, 2008) and act morally superior when they feel physically clean (Zhong, Strejcek, & Sivanathan, 2010).

Nesse (2004) uses the term ‘diagonal psychology’ to refer to the study of the positive effects of negative states and vice versa. We borrow from this locution here to define *diagonal* effects as those which show an opposite relationship between feelings and behavior. For our purposes, diagonal effects and emotion-judgment incongruity can be considered interchangeable.

### 1.3 How do feelings influence judgment?

#### 1.3.1 Major models

Numerous models for how feelings influence behavior have been proposed. Most, however, rely on some form of *congruity theory*: that is, they assume that the nature of the original emotion will cause some analogue in the subsequent behavior. Valence congruity plays a prominent role in most theories of mood (and some theories of emotion). Appraisal-based accounts of emotion don’t rely solely on valence, but do posit appraisal congruency. The existence of diagonal effects poses a potential problem for both sets of models.

One popular explanation for how feelings influence cognition are memory-based

models. Loosely speaking, these models work by semantic network activation: negative feelings make other negative ideas easier to access, and downstream cognitive processes incorporate these activated ideas (Bower, 1981; Isen, 1984). Such accounts have been used to predict mood and emotion congruency effects.

Then there are models that do not rely on semantic priming, but self-reflection. This is feelings-as-information theory (FAIT), which exists in several permutations sharing the common supposition that people treat their feelings as a source of guidance about the world (Schwarz & Clore, 1988). Someone who is unhappy and then goes shopping may mistakenly think her negative reaction to a dress is because she dislikes it, rather than her preexisting rotten mood. FAIT has an edge over semantic priming models because it can account for certain blips in affective influence, including that mood has negligible influence when objective facts are all that is needed to render a judgment (Schwarz, Strack, Kommer, & Wagner, 1987) and when people suspect the mood may be biasing them (Schwarz & Clore, 1983).

Nonetheless, early versions of Schwarz and Clore's theory implicated congruency so long as the feeling was actually being used (Schwarz & Bohner, 1996). Similarly, (Clore, 1992) argued that the process was additive: evaluating negative stimuli while in a negative mood will lead to an especially negative judgment. Such views leave very little room for diagonal effects.

Theories of emotion further demonstrate the pervasive assumption of congruity. These theories depart from the valence-based accounts in that they posit emotional impacts that are as varied as the emotions themselves. (Because they focus on explaining the variety of emotional influence rather than the cognitive mechanism of that influence, they need not be viewed as an alternative to semantic activation models or FAIT.)

Categorical theories describe emotion in terms of discrete, 'basic' emotions that are relatively inflexible and independent of one another (Ekman, 1992; Izard, 1977).

Categorical theories can be contrasted with appraisal theories, which instead characterize emotions in terms of how they rank along several dimensions, including certainty, agency, importance, and valence (Ellsworth & Scherer, 2003). The key insight of appraisal theories is that emotions result from a (potentially labile) assessment of one’s own circumstances. The emotion elicited depends in part on the resultant action tendencies: disgust is no longer ‘real’ disgust if it doesn’t lead to avoidance or negative evaluations.

Just as appraisals suggest emotions, emotions suggest appraisals. This symmetry has been used to demonstrate which appraisals go into emotions, based on the biases that linger afterwards—an example of the power of incidental emotions. Recent years have witnessed a crop of work on these so-called ‘appraisal tendencies’, showing that the influence of an emotion goes beyond mere valence and reflects the function of individual emotions (Keltner, Ellsworth, & Edwards, 1993; Lerner & Keltner, 2000). The appraisal tendency framework (ATF) suggests a one-to-one mapping between emotion and appraisal, with each emotion afforded a single, unique appraisal. For example, the appraisal of anger is that a negative event caused by someone else has taken place, so an angry decision-maker will tend to act in accordance with this appraisal (Lerner & Tiedens, 2006).

The strict relationship between appraisal and emotion proposed in these theories means that they are not yet able to accommodate the existence of diagonal effects. In this respect, emotion-based theories are even less flexible than valence-based theories—instead of a vague positive or negative, emotions entail a more elaborate, and constrained, assessment of a situation.

### **1.3.2 Explaining diagonal effects**

Diagonal, or at least incongruent, effects have been observed in the literature for many years. Typically this has been explained one of two ways: either the prime



was ignored (as in Schwarz & Clore, 1983), or it was used as a source of contrast in the subsequent judgment. Contrast effects may emerge when the prime becomes the measure against which the target judgment is made, particularly if the pre-existing mood and the prime are sufficiently disparate (Mark, Sinclair, & Wellens, 1991). Since incongruity effects are more common for negative moods, it has also been proposed they are a form of mood regulation—if you make someone feel bad enough, they will recall more pleasant memories in order to return to a positive mood (Blaney, 1986; Parrott & Sabini, 1990). Such accounts seek to explain incongruity with a mechanism added over top the original model, rather than adjusting the model itself.

Recently, however, a new crop of research has pushed on these explanations as not capable of explaining all the observed phenomena. L. Martin, Abend, Sedikides, and Green (1997) hypothesized that people attend to whether the emotion is relevant to achieving a particular goal (“role fulfillment”). To test this idea, they put subjects in either a happy or a sad mood, had them read happy or sad stories, then had them rate the stories for how much they liked them. Under traditional memory-based and FAIT accounts, subjects should have liked both happy and sad stories better when in a good mood. Under the ‘additivity’ hypothesis of Clore and others, reading a sad story in a sad mood should have made subjects like the story least of any of the four conditions. Under the mood repair hypothesis, subjects should have liked the happy and sad stories the same when they were in a sad mood. And, if there had been a contrast effect, subjects should have liked the happy (sad) stories the most when they were in a sad (happy) mood. Instead, Martin and colleagues found that subjects preferred sad stories when in a sad mood, and happy stories when in a happy mood. They explain these findings by saying that subjects recognize that, when reading sad stories, they *ought* to feel sad, and to the extent that they feel sad while reading the stories, they judge the sad story to be a good, effective example of a tearjerker. While there may be context-insensitive information in moods (such as

negative mood = unsafe), there are no context-insensitive evaluations (the sense of risk on a rollercoaster can easily translate to a positive, thrilling experience; see also Mesquita, 2010).<sup>2</sup>

Although both memory-based models and FAIT have been used to explain congruency effects, if you look carefully, congruity itself is not actually part of the proposed mechanism. Rather, it is an additional, inessential assumption that could easily be jettisoned. Recall that memory-based models work by semantic network activation. A person who has been disgusted could have a diverse set of information primed—not just contamination, disease, and mortality, but also weirdness, interestingness, and funniness. The model itself is silent about what those ‘related’ items in the semantic network actually are.

FAIT contains a similar agnosticism, a fact which Schwarz and colleagues have developed in recent iterations of the theory. Kim, Park, and Schwarz (2009) found that discrete positive emotions (serene or excited) have opposite effects on evaluation depending on product expectations (a vacation to Japan touted as either relaxing or adventurous), a finding consistent with L. Martin et al. (1997) role-fulfillment hypothesis. Feelings-as-information can also accommodate this finding—people judge the goodness of a product by consulting with how it makes them feel, and matching this feeling to how the product is *supposed* to make them feel. Thus, positive emotions do not necessarily make for more positive evaluations. (L. Martin et al. (1997)’s view is so compatible with FAIT that it has since been adopted as an example that illustrates, rather than contradicts, the theory (Schwarz, 2012).) However, Kim et al. (2009) insist: “We hasten to add that positive effects of matching feelings are likely to be limited to positive emotions. In the unlikely case that a product makes negative

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<sup>2</sup>Appraisal theories have made a related point by putting valence and goals on different dimensions, suggesting that things that feel bad can also motivate us. However, appraisal theories usually make the bolder claim that if the behavior or evaluation is different in the two different contexts, the emotion is also different. It seems bizarre in this case to say that people are not ‘really’ sad when reading a sad story, just because they appreciate the experience.

emotional claims, experiencing these emotions should result in a high perceived likelihood that the product delivers what it promises—yet this perception will rarely be associated with a desire to consume it” (p. 989). Although the authors are resistant to the idea that consumers (or anyone) could want to feel bad, they do grudgingly admit that, under such circumstances, feeling bad should make them appreciate the product more.

Part of what is missing from these accounts is any heed to the specific emotions and contexts involved. The models have tried to apply a theory that is naive of content and insensitive to specifics. So, while the suggested mechanisms do not rule out incongruity, they are unable to make specific predictions about what we will find across emotions, judgments, and contexts. The models are too underdetermined to predict the variety of effects we really see. To do this, we need to look lower, at the level of the particular emotions and situations in question. The rules for how feelings influence judgment—and, importantly, insight as to why!—are going to turn on the specifics.

## 1.4 What is the appraisal process of disgust?

Disgust is a surprisingly understudied emotion. Although recognized as one of the basic emotions, it is consistently left out of descriptions of different emotional appraisals (see, for instance, Lerner & Keltner, 2000, p.479; Ellsworth & Scherer, 2003, p. 583; Levine & Pizarro, 2004; cf. Frijda, 1986, p. 88 and Lazarus, 1991, p. 131 ). Lazarus (1991, p. 131) describes disgust’s appraisal as “taking in or being too close to an indigestible object or an idea (metaphorically speaking).” Similarly, Frijda (1986)’s ‘action tendency’<sup>3</sup> for disgust is portrayed as rejecting and removing

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<sup>3</sup>Lerner and Keltner’s ‘appraisal tendencies’ are intended to be a contrastive reference to Frijda’s ‘action tendencies’, where behavior: judgment :: action tendency : appraisal tendency. Frijda’s ‘action tendencies’ are themselves a reference to (Lorenz & Kickert, 1981)’s ‘fixed action patterns’, where *tendency* is meant to highlight the flexibility of human emotions relative to animal reflexes.

the offending stimulus.

The number of studies that attempt to experimentally demonstrate this as appraisal for disgust are few in number and, somewhat lopsidedly, limited to the relationship between disgust and moral judgment (Horberg, Oveis, Keltner, & Cohen, 2009; Schnall, Haidt, et al., 2008; Wheatley & Haidt, 2005). To this author's knowledge, no one has published data showing that incidental disgust makes food less appealing, perhaps because this was considered too obvious to bother with (manipulation checks in the work presented here may be the first such demonstration). An unpublished paper has shown that this appraisal also applies to consumer decisions, with disgusted subjects more likely to devalue products and throw them away (Han, Lerner, & Zeckhauser, 2008).

Before now, there has been a fair amount of agreement about the appraisal of disgust, and the influence we should expect it to have. The existence of diagonal effects in disgust would pose a major problem for these accounts, and would require one of two revisions. One is that different emotions are being experienced in congruent and incongruent cases, such that a person enjoying a ribald punchline is not experiencing disgust. Because people self-report feeling disgust (and amusement) when they encounter dirty humor (McGraw & Warren, 2010), this may not be the best explanation. The other solution is that the same emotional experience can lead to different evaluations depending on context, and that multiple appraisal tendencies need to be proposed for different emotions. The extant appraisal framework is flexible enough to accommodate such a revision, but the specific circumstances in which we can expect this pattern to emerge have not been adequately mapped out, either theoretically or empirically. In looking at the different appraisal tendencies inherent to disgust we also hope to illuminate how flexible appraisal tendencies are across contexts.

## 1.5 Benign masochism

We may wonder why or how an appraisal for disgust could change so radically depending on context. After all, the function of this emotion is to keep us away from vectors of disease and other forms of contamination (Rozin, Haidt, & McCauley, 1993). Given the extreme aversiveness of disgust, it is a bit puzzling that it should ever be sought out, or a source of pleasure.

This problem is not unique to disgust, but crops up in a multitude of other negative experiences: roller coasters, sad novels, horror movies, spicy foods, and certain sexual fetishes. The phenomenon has been collectively referred to as benign masochism (Rozin, 1990). The crucial observation about these instances is that they are not pursued despite their unpleasantness, but because of it (unlike, say, going on a run or writing a paper, which serves a superordinate goal). For instance, it has been demonstrated that the burning sensation caused by spicy foods (rather than other factors, like flavor) underlies their appeal, because when their piquancy is removed, they are not liked as much (Rozin & Schiller, 1980).

One account of benign masochism holds that watching or participating in such acts may draw us in because they allow a safe space in which we can gain mastery over our emotions and environment (Bloom, 2010). We may be too faint-hearted to eat crickets ourselves, but watching others conquer their feelings may help us do the same, should the situation one day warrant it. There are a few problems with this theory. It's hard to imagine that laughing when someone steps in dog poop is a strategy for conquering our feelings. Also, the implication that emotions are there to be conquered and regulated runs counter to the idea that emotions are a functional part of human psychology: watching movies of people being chased by bears so we learn to be indifferent during a bear attack seems like a rather bad idea. (Nor has a causal link for participating in benign masochistic activities and ability to regulate mood been shown.)

One thing these instances do all seem to have in common is they do not engender any real or serious danger (hence ‘benign’). It is possible that any negative feeling has the potential to be enjoyable when it is stripped of the belief that what is happening is actually bad, leaving behind physiological arousal that is, in itself, exhilarating or interesting. Whatever the reason, the cases explored here, including dirty humor and nontraditional art, are all cases where no harm can actually befall the participant, such that the emotion being experienced is detached from any real danger.

The notion that disgust could have positive hedonic impact is not new (Rozin, 1990; Korsmeyer, 2011), but the possibility that disgust fuels liking in such instances has not yet been experimentally demonstrated.

In this thesis, we attempt such a demonstration. In Chapter II, we investigate how low arousal emotions, including disgust, influence judgments of funniness. In Chapter III, we investigate the ways in which incidental feelings of disgust alter our assessments of different forms of art. In Chapter IV, we look at how olfactory and environmental cues of disgust impact enjoyment of comedy routines and adventurous eating shows. Finally, in Chapter V we provide a summary and analysis of the empirical work presented here.

## CHAPTER II

### The Effect of Disgust and Sadness on Humor

Although humor is frequently regarded as a benevolent force and is highly sought after as a source of entertainment, the actual content of humor can be quite negative (Cousins, 1979; McGhee, 2010; c.f. Billig, 2005). A central debate of the field is whether the dark, dirty, and offensive elements found in humor contribute to our enjoyment of it (R. Martin, 2007). Early psychoanalytic theories argued for a crucial connection between humor and the taboo (Freud, 1905/1963), while subsequent cognitive theories have downplayed or even dismissed this relationship (Koestler, 1964; Raskin, 1985; Attardo, 1994). However, the exact role that negative emotional experiences play in generating amusement remains unclear, and largely untested.

Given that so many theories of humor have centered around stress and arousal dynamics (Spencer, 1860; Freud, 1905/1963; Berlyne, 1972; Hurley, Dennett, & Adams, 2011), many researchers have posited that physiological arousal is behind the appeal of negative experiences in humorous utterances. Certainly it is the case that psychophysiological arousal increases as a result of exposure to humorous stimuli: cortisol and epinephrine increase immediately after watching comedy films (Levi, 1965; Hubert, Möller, & Jong-Meyer, 1993), and when heart rate and skin conductance are measured during the set-up and punchline of jokes, arousal increases for the entirety of the joke, with their peak immediately following the punchline (Godkewitsch, 1976).

What happens when arousal is independently manipulated before presenting subjects with humorous material? In one experiment, students were instructed to either handle a docile rat (low anxiety condition), extract a blood sample (moderate anxiety condition), or extract a large amount of blood from a rat described as prone to biting and escaping (high anxiety condition). When the cage opened and the rat was revealed to be a toy, subjects thought this was funniest in the anxiety-provoking conditions (Shurcliff, 1968). While there was no difference in amusement between the high and moderate anxiety conditions, amusement was correlated with subjective reports of anxiety and surprise.

Consistent with the idea that joking serves as an outlet for inappropriate sexual and aggressive impulses, manipulations of anger (by way of a rude experimenter) lead to higher judged funniness of jokes, and the presence of humor subsequently attenuates anger levels (Strickland, 1959; Dworkin & Efran, 1967). Sexual arousal also increases funniness ratings (Cantor et al., 1974; Strickland, 1959; Lamb, 1968; Davis & Farina, 1970). Although sexual arousal has a positive hedonic tone, it is still taboo (perhaps especially in a laboratory setting), so in this sense may contain some of the nervous or tendentious elements contained in more overtly unpleasant material.

A limitation of the existing literature is that arousal and affective valence are confounded: the manipulation always has a stronger affective valence *and* arousal level than the control condition. This makes it difficult to tease apart what is driving the effect. For example, in Cantor et al. (1974), subjects read either a low arousal negative passage (about the adverse effects of snowmobiles on ecology), a high arousal negative passage (a graphic description of a lynch mob torturing an innocent boy), a low arousal positive passage (about the benefits of the recent surge in the beaver population on the local ecology), or a high arousal positive passage (a bowdlerization-worthy sexual liaison containing phrases such as “bursting plum-colored nipples”). Subjects then rated a series of jokes and cartoons. The authors found that the



TABLE 1  
**MEAN RATINGS OF AROUSINGNESS AND PLEASANTNESS  
 OF THE FOUR WRITTEN EXCERPTS EFFECTING THE  
 EXCITATORY AND HEDONIC VARIATIONS**

Hedonic tone	Arousingness ratings		Pleasantness ratings	
	Excitatory potential		Excitatory potential	
	Low <sub>a</sub>	High	Low	High
Positive	39.625 <sub>n</sub>	68.867 <sub>b</sub>	38.219 <sub>c</sub>	64.200 <sub>d</sub>
Negative	48.170 <sub>n</sub>	65.800 <sub>b</sub>	-4.223 <sub>b</sub>	-81.005 <sub>n</sub>

*Note.* Means having different letter subscripts differ significantly at  $p < .05$  by Neman-Keuls's test.

Figure 2.1: Ratings of the passages in Cantor et al. (1974), showing that the high arousal passages were also more extreme in hedonic impact.

high arousal passages elicited higher funniness ratings than either of the low arousal passages. The problem here is that the higher arousal passages are also more intensely positive and negative (as confirmed by their own manipulation check; see Figure 2.1). Emotional intensity is considered an independent dimension from arousal by most modern emotion researchers (Bradley & Lang, 1994; Fontaine, Scherer, Roesch, & Ellsworth, 2007).

As it turns out, the only direct manipulation of physiological arousal on record contradicts the view that arousal plays any role in altering humor judgments. Schachter and Wheeler (1962) administered a syringe of epinephrine (sympathetic nervous system agonist), chlorpromazine (sympathetic nervous system antagonist), or a saline placebo (control condition). People who'd received epinephrine were more likely to actively join in with a stooge's clowning around while waiting in a room, and less likely to do so if they'd received chlorpromazine, compared to the control condition. However, the injections made no difference for self-report of mood, or how funny subjects found the stooge's shenanigans. The fact that subjective mirth did not change when physiological arousal was directly manipulated suggests that physiological arousal

alone is not sufficient to alter humor perception.

Another problem with this view is that low arousal negative emotions feature prominently in humor. Dirty jokes, for example, elicit a combination of amusement and disgust (Hemenover & Schimmack, 2007), and disgusting stimuli can elicit spontaneous laughter (Rozin, Haidt, & McCauley, 2010). Likewise, dark and gallows humor appear to trade on emotions such as sadness. Sadness and disgust are consistently self-reported as low arousal, both when compared to other emotions and when compared to neutral states (Russell & Bullock, 1985; Stark, Walter, Schienle, & Vaitl, 2005; Fontaine et al., 2007). Psychophysiological measures tell a comparable story: disgust lowers heart rate (Hare, 1972; Ekman, Levenson, & Friesen, 1983; Levenson, Ekman, & Friesen, 1990; Levenson, 1992), sadness and disgust lower skin temperature (Ekman et al., 1983; Stark et al., 2005), and sadness reduces muscle activity, as measured by forearm flexor muscle tension (Levenson et al., 1990). Sadness and disgust increase gastric activity, as measured by salivation and eletrogastogram, suggesting that these emotions are more closely tied to resting-state parasympathetic response (Levenson, 1992; Vianna & Tranel, 2006; Mendes, 2009). In spite of the presence of low-arousal negative emotional content in humor, there have been no empirical investigations of how these emotions might impact amusement.

The possibility that unpleasant feeling underlies some of the comedic impact of humor is especially intriguing in light of our current understanding of negative emotions. Disgust is thought to have originated as a mechanism to keep us away from pathogens and other contaminants (Darwin, 1872/2002; Rozin, Haidt, & McCauley, 1999; Curtis, De Barra, & Aunger, 2011). Thus, its primary effect on behavior ought to be recoil and rejection (Angyal, 1941; Miller, 1997), and negative valence in general is thought to function as a defensive, withdrawal mechanism (Lang, Bradley, & Cuthbert, 1992). Disgust fosters a mood-congruent response across several domains: it leads us to morally condemn actions (Schnall, Haidt, et al., 2008; Chapman, Kim,

Susskind, & Anderson, 2009), eschew incest (Schaich Borg, Lieberman, & Kiehl, 2008), and throw products away (Han et al., 2008). Sadness, an emotion related to loss and rejection, also creates mood-congruent responses, with unhappy memories in one domain (like romantic failure) triggering judgments of failure across multiple domains (Kavanagh & Bower, 1985).

While empirical work has been unanimous in finding that disgust elicits negative evaluations, some scholars have observed that disgust also has a paradoxical allure (Miller, 1997; Rozin et al., 1999; Korsmeyer, 2011). We are drawn to car crashes, sideshow exhibits, and game shows where contestants eat bugs. There is also limited evidence that sadness can enhance enjoyment under the proper circumstances: when in a sad mood, people enjoy sad stories more than when they have been put into a happy mood (and vice versa; L. Martin et al., 1997).

The question of whether negative emotions contribute to the enjoyment of humor speaks to the larger question of how emotional dimensions influence downstream processes. Most contemporary theories predict congruent effects between emotion and cognition. Mood-based theories hold that emotions increase the accessibility of emotion-congruent information (Bower, 1981; Isen, 1984); these theories would predict that disgust and sadness should bring negative information to mind, resulting in negative evaluations. Emotion-specific theories posit that emotions engender responses corresponding to the core theme or appraisal dimensions of that emotion (Lazarus, 1991; Lerner & Keltner, 2000); these theories would predict that disgust and sadness should elicit judgments consistent with rejection, aversion, and loss.

The alternative possibility, that negative emotions could engender a positive or hedonic response for certain judgments, has a precedent in feelings-as-information theory, which holds that emotions only have an influence on judgments to the extent that they are considered relevant or apt to the task at hand (Schwarz & Clore, 1983; Schwarz, 2012). So, if discomfort or emotional intensity are considered signals of a

successful joke, then they may feed into judgments that the joke was a funny one. While this theory does not make specific predictions about how negative emotions will impact enjoyment of humor, it does allow for the possibility that sadness and disgust could be flexible enough in their impact to create positive responses, given the proper setting.

The goals of the present set of studies are, therefore, threefold. The first is to establish whether the effects previously established for high arousal negative emotions on humor are limited to those with high arousal, or whether they extend to low arousal negative emotions as well. The second goal is to demonstrate that there are contexts where disgust and sadness could engender a positive response. This would be the first such instance of hedonic disgust reported in the literature, and among the first reported for sadness (the L. Martin et al. (1997) paper cited above is the only other example we are aware of). Finally, we would like to test the scope of disgust’s impact on judgments of funniness, to see if it only applies when judging humorous stimuli, or if it extends to assessments of moral violations. These results would contribute significant new knowledge both to models of humor and to models of emotion.

To test these possibilities, we induced incidental disgust and sadness before asking participants to evaluate the appetizingness of food, the funniness of cartoons (Study 1), and the funniness of moral violations (Study 2).

## **2.1 Study 1: Cartoons**

### **2.1.1 Cartoon Selection**

The cartoons used in this study come from a corpus of 600 selected from *The New Yorker*. 300 of the cartoons were published in the magazine between 1994–2004 (Mankoff, Remnick, & Gopnik, 2004). The other 300 were submitted to *The New Yorker* during this period but were rejected because they were deemed too risqué

(Diffie & Mankoff, 2006; Diffie, 2007). The rejected and published cartoons took the same single-panel form and were by the same set of artists. Figure 2.2 gives a sampling of these cartoons.

To determine the stimulus properties of this corpus, undergraduates at the University of Michigan rated cartoons for funniness and dirtiness (scale 1–6; or 0 for “I don’t get it”), spread across two one-hour sessions ( $N = 82$ ). Although the principal reason for conducting this norming study was to gather descriptive information about the humor corpus, it bears noting that the dirtier a cartoon was rated, the funnier it was considered,  $r(598) = .10$ ,  $p < .02$ , this in spite of the fact that the cleaner cartoons were the ones selected for publication.

The cartoons to be used in the priming experiment were determined by applying an automated selective-search algorithm written in the R statistical package. This algorithm was designed to select a subset of cartoons (120) that would maximize dirtiness for 60 of the cartoons, minimize dirtiness for the other 60, while keeping overall funniness as equal across the two groups as possible. The selected cartoons had a dirtiness mean of 3.1 ( $SD = .39$ ) for dirty cartoons and 1.0 ( $SD = .01$ ) for clean cartoons. Dirty cartoons had a mean funniness rating of 2.6 ( $SD = .40$ ), and clean cartoons 2.3 ( $SD = .48$ ). Although mean ratings of funniness hover around the scale’s midpoint, any rating above 1 should be interpreted as at least some quantity of amusement.<sup>1</sup>

### 2.1.2 Manipulation Check of Emotion Primes Using Self-Report

The emotion primes were four-word sentences designed to be either physically disgusting (“The sewage was green”), sad (“His faithful dog died”), or neutral/no

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<sup>1</sup>It is hard to get terribly high overall cartoon ratings for at least two reasons. One, there is a large amount of disagreement in what is funny—even the best of jokes will leave some people offended, rolling their eyes, or scratching their heads. Perhaps more importantly, humor occurs more frequently and with more intensity when in a social context (Provine & Fischer, 1989), so mid-scale ratings may be near the upper bound of amusement we can expect from people reading cartoons alone in a study setting.



*"Scientists confirmed today that everything we know about the structure of the universe is wronged-y-wrong-wrong."*

A cartoon by Jack Ziegler (Clean)



*"I got another callback. My agent says it's between me and the guy who's going to get it."*

A cartoon by Pat Byrnes (Clean)



*"Yes, Mr. Hargraves, thumb-sucking can be cured. But first let's talk about what your other hand is doing."*

A cartoon by J.C. Duffy (Dirty)



*"From everything you're describing, son, it sounds to me like you've just had your first boner."*

A cartoon by David Sipress (Dirty)

Figure 2.2: Sample cartoons used in the priming experiment.

emotion (“The pillows are cotton”; see Appendix A for the full list). 240 such sentences were prepared, 80 in each emotion category.

In an online study, 62 subjects ( $Mdn_{age} = 30.5$ , 56% female) were given the 240 sentences and asked to choose the emotion that the sentence “predominantly evokes” in them. They could choose from four options: “Disgust”, “Sadness”, “No emotion”, or “Other emotion” (for the last option, subjects were asked to specify what emotion the sentence made them feel). Participants could choose only one of the options. Order of sentences was randomized between subjects. The survey took approximately 20 minutes, after which subjects were paid.

An overview of the results of the study are presented in Table 2.1. Sentences in the nominal disgust condition were categorized as disgusting 64% of the time.<sup>2</sup> By contrast, the neutral and sad sentences were put into the disgust category less than 2% of the time. Sentences in the sadness condition were categorized as sad 73% of the time (compared to 4% and 3% for the disgusting and neutral sentences), and sentences in the neutral condition were categorized as evoking no emotion 89% of the time.

As evidenced by Table 2.1, sentences that failed to evoke the intended emotion (sadness or disgust) were more likely to be categorized as emotionally neutral than some other emotion. Given that neutral is our control condition, this suggests that differences that emerge between the experimental and control conditions will be in spite of the affective similarity between some of the negative emotion stimuli and the neutral stimuli.

The text entry responses give us no reason to think that any of the individual sentences reliably elicited a dramatically different emotion than the intended one.

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<sup>2</sup>This figure collapses across individual sentences within category, which ranged in how reliably they were put into the intended category. Since this study was run as confirmation of the validity of these stimuli only *after* the priming studies were performed, there was no opportunity to kick out the lowest-scoring items. When one subsets out the least disgusting disgust and least sad sadness sentences, the results reported in §2.1.5 are not reliably different.

Table 2.1: The frequency that items in the three emotion conditions of the scrambled sentence corpus were reported as eliciting one of four different emotional states. Figures in **bold face** indicate the most frequently selected choice for each emotion condition.

% SELF-REPORTING	NOMINAL CONDITION		
	DISGUST	SADNESS	NEUTRAL
“Disgust”	<b>64.1%</b>	1.5%	1.8%
“Sadness”	4.3%	<b>72.9%</b>	2.9%
“No emotion”	31.0%	24.2%	<b>89.1%</b>
“Other emotion”	0.6%	1.4%	6.2%

In fact, the typed-in responses often referenced conceptually similar states to the intended category. For example, disgust sentences were sometimes labeled “aversion”, neutral sentences could convey “boredom” or “calm”, and sadness sentences were sometimes classified as “depression”, “desperation”, “sorrow”, or “despair”. Our participants’ sensitivity to these nuances likely reflects the fact that emotional states do not conform to sharp natural categories (Demiralp et al., in press). Thus, the figures in Table 2.1 may underestimate the aptness of the sentences to elicit the intended emotion.

At the same time, the fact that we did not provide a more representative listing of emotions for subjects to choose from may be artificially inflating how well the sentences fit into the sadness and disgust categories. Even though we gave an option for “Other”, the emotions mentioned by name will be the most salient, which could bias subjects towards selecting them. Nonetheless, the sentences within a putative emotion category elicit the intended emotion more often than do the sentences from the other categories: the disgusting sentences elicit disgust more reliably than the non-disgust sentences, the sad primes elicit sadness more reliably than the non-sad sentences, and the neutral primes elicit little to no emotion more reliably than the non-neutral sentences. Thus, these sentences as a whole have content validity for their target emotion.



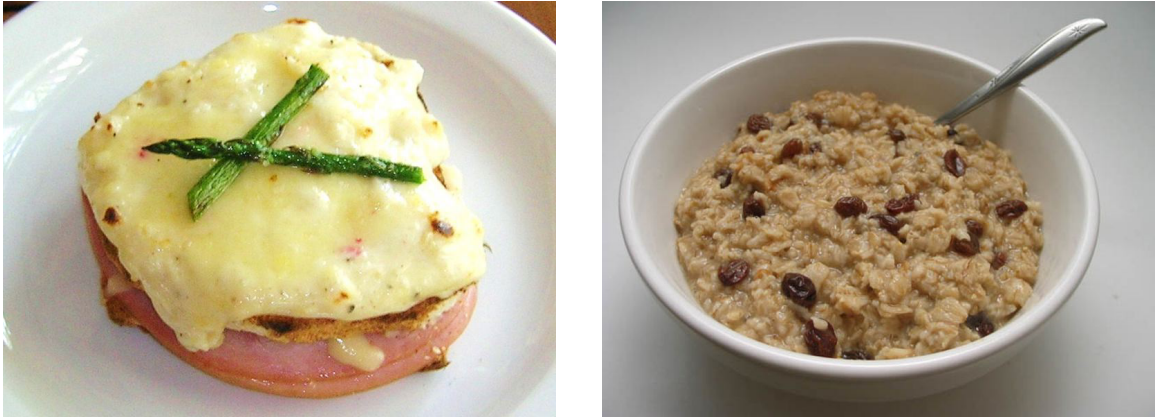


Figure 2.3: Sample food images from the implicit manipulation check study in § 2.1.3

### 2.1.3 Manipulation Check of Emotion Primes Using An Implicit Measure

A second manipulation check on these stimuli complements the self-report data. 130 participants were given scrambled versions of the disgust or neutral sentences to put into grammatical order (the sentence unscrambling task; Srull & Wyer, 1979). After unscrambling each sentence, they were given a food photograph to rate for how appetizing it looked on a 6-point scale (1 = “Not at all appetizing”; 6 = “Very appetizing”). Sample food images are reproduced in Figure 2.3. Sad sentences were not tested. For further details on the design of this study, see Section 3.1.

Confirming that our manipulation was successful, the food items were rated as less appetizing after exposure to disgusting ( $M = 3.21$ ) compared to neutral ( $M = 3.94$ ) sentences; paired  $t(128) = 14.3$ ,  $p < .0001$ ,  $d = .45$  (Figure 2.4). This is the first experimental demonstration that incidental disgust makes food seem less appetizing, a finding that is consistent with the postulate that a primary function of disgust is to aid in the oral rejection of spoiled or contaminated food (Rozin & Fallon, 1987; Curtis et al., 2011).



Figure 2.4: Results from the manipulation check priming experiment in § 2.1.3. Incidental disgust led to lower ratings of appetizingness of food. Whiskers represent the standard error.

#### 2.1.4 Experiment Methods

279 American, native English speakers (61% male; age 18–81,  $Mdn_{age} = 29$ ) were told they were participating in a study on multitasking. They completed the 50-minute paid study online.

In a 3 (disgust vs. sadness vs. neutral control primes) x 2 (clean vs. dirty jokes) factorial between-subjects design, participants were exposed to emotion prime sentences before rating the funniness of either clean or dirty cartoons. Humor stimuli were 60 dirty or clean cartoons, as selected on the basis of the norming study in Section 2.1.1. Emotion stimuli were 60 disgusting, sad, or emotionally neutral sentences randomly selected between subjects from a pool of 80 possible within-emotion condition sentences, as described in § 2.1.2 (and listed in Appendix A).

Each cartoon was preceded by a single scrambled sentence. After typing the sentence in grammatically correct form, participants read a cartoon on a new screen, rated its funniness (1 = “Not at all funny”; 5 = “Very funny”), and advanced to a

screen containing the next scrambled sentence. There were 60 trials. Cartoon and sentence order were independently randomized between subjects.

### 2.1.5 Results

Cartoons were rated as funnier in the disgust ( $M = 3.3$ ) than in the control ( $M = 2.8$ ) condition;  $F(1,276) = 26.2$ ,  $p < .0001$ , Cohen's  $d = .33$ , for the main effect of emotion induction in a two-way repeated measures ANOVA. This main effect was not qualified by an interaction with cartoon type;  $F(1,275) = 1.15$ ,  $p = .28$  (Figure 2.5).

Cartoons in the sadness condition were rated as funnier than those in the neutral control condition ( $M_{sad} = 3.41$ ,  $M_{neutral} = 2.80$ ,  $t = 27.9$ ,  $p < .0001$ ;  $d = .41$ ). For the dirty cartoons only, the sadness primes were more effective at enhancing funniness than the disgust primes ( $M_{sad} = 3.58$ ,  $M_{disgust} = 3.32$ ,  $t = 8.0$ ,  $p < .0001$ ). The clean cartoon condition showed no such advantage ( $M_{sad} = 3.25$ ,  $M_{disgust} = 3.27$ ,  $t = 0.65$ ,  $p = 0.51$ ).

These results were independent of participants' gender ( $p > .65$  for all interactions involving gender). Thus, contrary to gender stereotypes, men are not alone in finding humor funnier when they have been disgusted. There was, however, a main effect of sex on enjoyment of the dirty cartoons ( $M_{male} = 3.15$ ,  $M_{female} = 2.87$ ,  $t = 8.16$ ,  $p < .0001$ ). There was no difference between the sexes in enjoyment of the clean cartoons ( $M_{male} = 3.11$ ,  $M_{female} = 3.14$ ,  $t = 1.09$ ,  $p = .28$ ).

The results were independent of the baseline funniness of the cartoons,  $F(1,275) = 1.15$ ,  $p = .28$  for the interaction. Disgust and sadness enhanced the funniness of cartoons that were considered not particularly funny (below 2) in the control condition,  $F(1,275) = 24.4$ ,  $p < .0001$ .

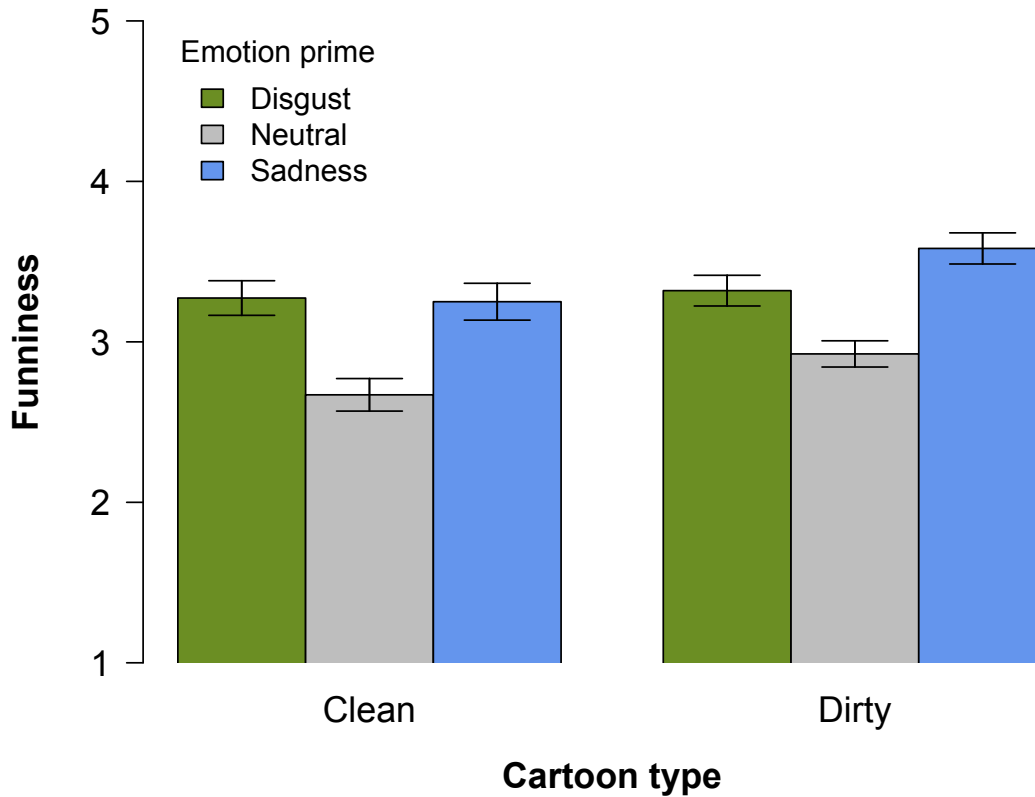


Figure 2.5: The influence of two distinct negative emotions on humor, compared to neutral. Incidental disgust and sadness both led to higher ratings of funniness of clean and dirty cartoons. Whiskers represent the standard error.

## 2.2 Study 2: Moral violations

The previous experiment demonstrated that two negatively valenced low arousal emotions, disgust and sadness, increase the perceived funniness of cartoons. Given that these emotions typically foster negative evaluations of targets, this seems to indicate that negative emotions have effects which are flexible and contingent on circumstance. We don't yet have a good idea of what the bounds of this effect are, however: can low arousal negative emotions enhance funniness ratings even when the target of judgment is itself not a comedy item?

Previous research has shown that disgust increases moral disapproval, although many of the stimuli that have been used in this research are potentially humorous. In the classic “footbridge” problem, one must decide whether it is acceptable to

knock a fat man off a bridge to save the lives of five workmen who are about to be hit by a trolley (Greene, Morelli, Lowenberg, Nystrom, & Cohen, 2008; Thomson, 1976). Other stories that have been used by moral psychologists depict men pleasuring themselves with kittens (Schnall, Haidt, et al., 2008) and masturbating into chicken carcasses (Haidt, Koller, & Dias, 1993). We will refer to such stories as ridiculous moral violations, or RMVs. While RMVs can be thought of as serious moral problems when in the right frame of mind, they also contain comedic elements, such as slapstick, absurdity, and bawdiness.

Disgust has previously been shown to increase moral disapprobation for RMVs (Wheatley & Haidt, 2005; Schnall, Haidt, et al., 2008). Effects such as these have led researchers to characterize disgust as a “moralizing” emotion—one that deepens moral engagement (Horberg et al., 2009). If this is true, then disgust should make moral violations appear more serious, thereby decreasing our ability to see them as funny. On the other hand, if the informational value of disgust changes depending on the task, then we might expect disgust to increase the funniness of moral violations when one is asked to evaluate them on that dimension. The existence of judgment stimuli that have the potential for both hilarity and offense provide a particularly strong test for hedonic disgust, since all variables, aside from the frame the subject brings to bear on the task, can be kept constant.

### **2.2.1 Ridiculous Moral Violation (RMV) Selection**

42 RMVs were developed (Appendix B). These were either copied wholesale from studies in the moral psychology literature, modified to be more humorous (e.g., the inclusion of a non-sequitur or ribald detail), or written from scratch, imitating this general style.

In order to determine the RMVs that had the most potential for humor, 41 participants (age 18-33, 39% male) from the University of Michigan participated in a

norming study. Half the participants rated the RMVs for funniness, and half rated them for wrongness. The order of stories was randomized between subjects. Responses were measured on a scale from 1 (“Not funny at all” or “Not wrong at all”) to 6 (“Very funny” or “Very wrong”). The study took approximately 20 minutes.

For the priming experiment, we removed stories that had a mean funniness rating of less than two, leaving 20 of the original RMVs. The RMVs exhibited a fair degree of variation in wrongness (see Appendix B for details).

### **2.2.2 Methods**

The experimental design was similar to that used in Study 1, except there were 20 trials: 20 sentence primes (either disgust or neutral, as before) and 20 RMVs. The order of trials was randomized between subjects, with sentence and RMV placed together in fixed random pairs (appearing on separate pages). Each RMV was rated for funniness on a 1–6 scale.

94 participants (American, age 17-67, 40% male) were run in the 15-minute paid online study. At the end of the experiment, participants were asked what they thought the study was about. Six participants (about 6%) opined that the sentences might have been meant to influence the judgment in some way, but none of them specifically identified disgust, mood, or emotion as a critical factor in the manipulation. Since removing these participants did not affect the overall results, these data were retained in the analysis.

### **2.2.3 Results and discussion**

An independent samples t-test revealed a significant effect of disgust increasing the judged funniness of ridiculous moral violations,  $t(91) = 2.49$ ,  $p = .01$ ,  $d = .51$  (Figure 2.6). As in the previous experiment, there was no interaction effect with the gender of the subject.

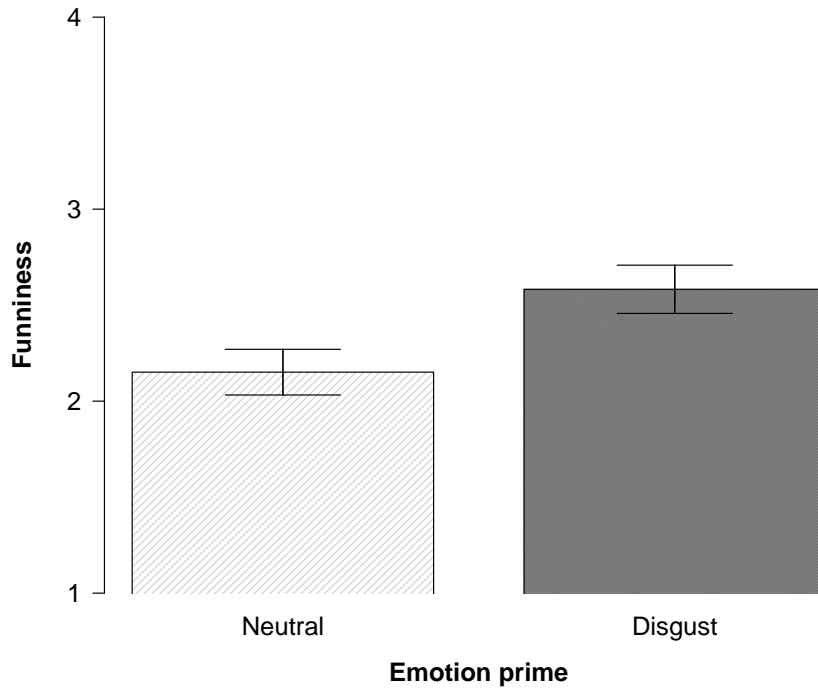


Figure 2.6: Results from the Ridiculous Moral Violation experiment (§ 2.2.3). Disgust primes lead to higher ratings of funniness for moral violations. Whiskers represent the standard error by subject.

This finding serves as a conceptual replication of the previous experiment, that a low arousal negative emotion can enhance judgments of funniness. It also demonstrates that disgust increases humor perception even when when evaluating scenarios containing serious moral violations.

### 2.3 Discussion

A longstanding puzzle in humor research has been whether the tendentious subject matter frequently featured in humor contributes to enjoyment, and if so, what aspects of these emotional elements are responsible for enhancing amusement. Previous researchers have either suggested that these emotional elements play a minimal role (Koestler, 1964), or are only due to transfer of excitation (Shurcliff, 1968; Can-

tor et al., 1974). However, our results show that two low-arousal negative emotions, disgust and sadness, can enhance the funniness of cartoons and moral violations. This suggests that arousal alone is not enough to account for the appeal of strong emotional content in humor.

These studies also represent the first experimental evidence that incidental disgust can improve the evaluation of a target, and are among the first showing that sadness can have such an effect. The rendering of a more positive judgment by a negative emotions provides evidence against the idea that emotion exerts an influence on downstream processes that must be congruent with the emotion's valence or core themes (Bower, 1981; Lazarus, 1991; Lerner, Small, & Loewenstein, 2004; Horberg, Oveis, & Keltner, 2011). These results can be better understood within the feelings-as-information framework, where emotions exert their influence in a way that reflects the meaning they have in a particular context (Schwarz, 2012).

In spite of the gains that these new studies make for our understanding of humor and emotion, our data leave open several questions.

First, while previous work suggests that sadness and disgust are low arousal, we did not test our stimuli for how psychologically or physiologically arousing they were. Many emotions have the capacity to vary in their arousal level; for example, depression and despair have different arousal levels, despite both being classifiable as a subtype of sadness (Russell & Bullock, 1985; Fontaine et al., 2007). Typically, sadness and disgust correspond to a similar level of arousal as an emotionally neutral state, or slightly below it (Levenson et al., 1990; Fontaine et al., 2007), but we did not take measures of whether this also holds true for the emotion primes used in these studies. Nonetheless, we have no reason to believe that our verbal stimuli would represent a departure from the emotion induction methods used by other researchers to measure arousal, which include remembering or reliving past experiences (Smith & Ellsworth, 1985; Ekman et al., 1983), guiding facial expressions (Levenson et al.,



1990), or viewing images or film (Bradley, Greenwald, Petry, & Lang, 1992; Vianna & Tranel, 2006).

A related concern is that, while we know that our disgust and sadness primes elicited the target emotion based on self-report (and priming in the food domain for disgust), we cannot say with certainty what aspect or aspects of our primes caused the jump in funniness ratings, and whether other negative stimuli would show the same effect. Sadness and disgust differ from neutral states on more than one dimension. One of these dimensions is negative affect, but the effect could equally well be driven by emotional intensity, the interestingness of the sentences (interest, arguably, being an emotion in its own right), or some other factor. Pinpointing what it is about sadness and disgust that leads to increased levels of amusement will be key to informing the question of why negative contents shows up so frequently in humorous contexts.

One might be tempted to attribute our results to a contrast effect: perhaps the disgust and sadness primes provide a negative baseline against which subsequent stimuli are perceived more favorably. Arguing against this possibility is the observation that negative emotion primes led to higher evaluations for some pleasant stimuli (cartoons) and lower evaluations for others (food). Furthermore, the disgust primes did not have a diminished effect on stimuli that were in some ways unpleasant themselves—the moral violations and the disgusting cartoons—and would thus be expected to lead to lower contrast.

Perhaps there is something specifically about contrasts in a humorous context. Broadly speaking, “contrasts” of some sort are found in many forms of humor (as with irony, puns, bathos, and absurdity), and many theories consider violations of expectation to be a key feature of humor (Koestler, 1964; Berlyne, 1972; Apter, 1982; Hurley et al., 2011). Perhaps there is a mild sense of absurdity that accompanies the act of descrambling unpleasant sentences and then being asked to rate cartoons and moral violations, and this is reflected in the subjects’ ratings. Contrast may be

a *feature* of humor perception.

It's possible (even likely) that the disgusting sentences are themselves slightly funny (viz. Rozin et al.'s (2010) observation that disgusting stimuli can elicit nervous laughter). This might shed light on the mechanism (i.e. that feelings of mirth emerge even before the joke is presented), but it merely pushes back the question: why are these aversive stimuli seen as funny? It would also not explain why the sad sentences have a comparable effect.

One surprise in our data was a failure to find a specific effect of emotion by cartoon category. Disgust would seem to be especially apt for judging dirty jokes, yet its influence in this context was no stronger than it was for clean jokes. The only interaction effect we uncovered has no obvious explanation: sadness enhanced the dirty cartoons to a greater degree than did disgust. Earlier attempts at finding interactions between emotion and humor type have been mixed. Sometimes they succeed (Strickland (1959) found that anger increases appreciation of hostile but not neutral humor) but sometimes they fail (Cantor et al., 1974). The mild unpleasantness or emotional intensity brought on by sad and disgusting primes may signal a successful joke largely independent of the joke's content. Future testing will be needed to figure out under which circumstances emotional states give rise to differential impact on humor.

A feature of the mood induction used here is its relatively mild emotional impact. An open question for future research is what our results would look like as the degree of negativity in emotion primes is modulated. We might expect a U-shaped curve, where discomfort or intensity increases the enjoyability of a joke, after which it can become too unpleasant and have an adverse effect. Although previous research has failed to uncover a such a U-shaped curve for arousal in humor appreciation (Strohming, in press), there may be one for negative affect. This would be consistent with recent findings showing that some amount of distance is required to find tragedy funny

(McGraw & Warren, 2010), and the observation that benign masochistic activities are self-reported to be pleasurable only up to a certain threshold, after which they become aversive (Rozin, Guillot, Fincher, & Rozin, 2010).

Although disgust and sadness are both negative emotions, whether they lead to positive or negative judgments depends on the context in which they are placed. In a humorous context, both emotions appear to increase appreciation of humor. Such diagonal effects may not be limited to our assessment of comedy, however. In the next chapter, we explore another instance where negative emotions may be seen as attractive: the arts.

## CHAPTER III

### Disgust as a Vehicle of Aesthetic Pleasure

Most of the negative emotions—such as the sadness evinced by tragedies, or fear in the face of natural wonders—have been defended or lauded by aestheticians over the years (Kant, 1790/1987; Burke, 1759/1998; Mendelssohn, 1997; Lessing, 1874/2005). But disgust, in spite of its ubiquity in cultural forms like the dirty joke, has typically been left out of this pantheon (Korsmeyer, 2011).<sup>1</sup>

While other unpleasant sentiments aroused by art can be fictionalized, abstracted, or transformed (for example, fear into the sublime) disgust resists any such refinement. Kant (1790/1987) writes:

There is only one kind of ugliness that cannot be presented in conformity with nature without obliterating all aesthetic liking and hence artistic beauty; that ugliness which arouses *disgust*. For in that strange sensation, which rests on nothing but imagination, the object is presented as if it insisted, as it were, on our enjoying it even though that is just what we are forcefully resisting; and hence the artistic presentation of the object is no longer distinguished in our sensation from the nature of this object itself, so that it cannot possibly be considered beautiful.

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<sup>1</sup>The dismissal of disgust by aestheticians mirrors the tendency of psychologists in the 20th century to ignore disgust. In both cases, this decision appears to stem from the belief that disgust is base and non-cognitive: not really an emotion so much as a drive, akin to hunger or lust. Disgust is, in some ways, the most bodily of the emotions, and earlier scholars noted that its chief conduit is through the baser senses of smell and taste. But disgust does have a cognitive component, like any other full-fledged emotion. And by some accounts its cognitive dimensions are quite complex, even unusually contemplative (Miller, 1997; Kolnai, Korsmeyer, & Smith, 2003; Korsmeyer, 2011).

This basic view is echoed in other works: since aesthetic disgust arouses the “real” emotion, and not a mimesis of it, it is crass, objectionable, and ill-suited to true art (Burke, 1759/1998; Mendelssohn, 1997). When the grotesque in art is approved of, it’s only to the extent that the work can be appreciated intellectually, as a display of virtuosity:

“Who will wish to paint you, when no one wishes to see you?” says an old epigrammatist concerning an extremely misshapen man. Many a more modern artist would say, “Be you as misshapen as is possible, I will paint you nevertheless. Though, indeed, no one may wish to see you, people will still wish to see my picture; not in so far as it represents you, but in so far as it is a demonstration of my art, which knows how to make so good a likeness of such a monster.” Lessing (1874/2005, p. 8)

Disgust *qua* disgust has no place in art, or the *beaux arts*, anyway.

What’s perplexing about this resistance is that art history is littered with work that is seemingly designed to disgust and disturb—what we will refer to here as grotesque art. The grotesque pops up in everything from religious iconography (such as the Passion and Crucifixion) to the gamepiece and *vanitas* still lifes, to more modern provocateurs like Damien Hirst’s cows and sharks suspended in formaldehyde. To all appearances, pleasurable disgust experiences are not limited to dirty jokes, zombie flicks, and other preoccupations of the hoi polloi. It is only very recently, though, that any serious attention has been paid to the possibility that disgust can deepen our appreciation of fine art (Korsmeyer, 2011).

I mention this debate not because I aim to resolve the question of whether disgust can be a “real” aesthetic emotion, suited to the higher planes of being, but to show that scholars have long noted that the existence of disgust in art poses a peculiar problem for aesthetic enjoyment, and have struggled with how to explain it (or explain it away). Philosophers’ bemusement at the existence of these phenomena is reflected in their terminology for it: the paradox of horror, the paradox of tragedy, the paradox of aversion. (Even the related term in psychology, benign masochism, tries to tuck the

solution into its name: it's benign, so it doesn't really count as masochism.) Solutions to this paradox can be roughly divided into two camps: those arguing that disgust exists in art in spite of itself, and those that say we genuinely enjoy the sensation of disgust.

Carroll (1990) addresses this paradox by stating that the disgust and fear we experience in the horror, while unpleasant, is not as bad as the pleasure we take in curiosity and interest from the situation, such that the pros outweigh the cons: "The disgust that [monsters] evince might be seen as part of the price to be paid for the pleasure of their disclosure" (p. 184). Korsmeyer (2011) also places the locus of enjoyment in disgust's ability to draw our attention and morbid fascination—on this view, rubbernecking may be seen as one of the core components of disgust's behavioral repertoire. She goes so far as to argue that aesthetic disgust does not even constitute a negative sensation, such that there is therefore no 'paradox' to solve.

To a certain extent, psychological theories have sought to solve this paradox the same way, citing a higher intellectual engagement with the stimuli as the explanation for our ability to enjoy them. Rozin, Guillot, et al. (2010) states this quite explicitly, saying that benign masochism stems from "pleasure at 'mind over body'" (p.1). Likewise, Bloom (2010) suggests that the unpleasantness is only withstood insofar as the relief it provides afterwards: "the initial pain might be worthwhile because it's outweighed by the later pleasure" (p. 195). These discussions are not as fully articulated as the parallel theories in philosophy, and it could be argued that they are at least partly agnostic on the question of where the pleasure derives from. (Bloom, for instance, breezily entertains several theories in his book on pleasure, without advocating for any of them particularly strongly.)

Gaut, by contrast, has argued that disgust and other negative emotions can be, in themselves, enjoyable (Gaut, 1993). We can, after all, leave a horror movie being disappointed it was not gory enough (while still being plenty interesting). Even Burke

(1759/1998), who rejects the notion that disgust can awaken any proper aesthetic sensibility, places the locus of these thrills in negative sensations. He points out that most people would prefer attending a public execution over a Sophocles play (the moral prohibition against gawking at gory public executions is a relatively recent phenomenon). At an execution, the violence is not imaginary, and this element of realness and immediacy is the very reason for its heightened entertainment value. And in spite of Rozin's cognitivist stance on benign masochism, his studies indicate that people's favorite aversive pursuits are those that are only just beneath the most intense sensation they can stand, suggesting that people are seeking out, at least at some level, the negative sensation itself.

The question of whether negative sensation itself affords any thrill unto itself in aesthetic experiences, and whether disgust in particular can enhance aesthetic experiences, is, of course, subject to empirical scrutiny. Very little experimental work exists on this matter however. L. Martin et al. (1997) found that inducing sadness increased liking for sad stories (but not happy stories). More recently, a study has shown that fear, but not arousal, enhanced enjoyment of abstract paintings (Eskine, Kacinik, & Prinz, 2012).<sup>2</sup> This supports Burke's basic observation that aesthetic awe and the sublime originate in the negative emotion of fear.

Up to this point, no one has looked at whether disgust can enhance aesthetic enjoyment, particularly for fine art. To do this, we ran a set of emotion induction experiments to see whether, and under what conditions, disgust leads to enhanced aesthetic experiences. These studies aim to collectively illuminate how disgust interfaces with different types of art, why it is we sometimes like ugly or unpleasant art, and what level of flexibility this emotion has in an aesthetic context. As with the humor studies in the previous chapter, a demonstration that incidental disgust can lead to a more positive evaluation would pose a fairly major problem for theories of

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<sup>2</sup>“Arousal” was induced by having subjects do jumping jacks, so a healthy amount of skepticism may be warranted.

emotions.

### 3.1 Initial study: Abstract art

The above discussion notwithstanding, there are good reasons to predict that disgust could only lead to unfavorable aesthetic judgments. Indeed, my prediction when I first turned to these matters was that disgust would work on aesthetic judgments as it does on morality. There is a long history in philosophy of drawing comparisons between—if not actually equating—the ethical and the aesthetical. Hume (1875), for instance, argues that moral and aesthetic judgment both essentially boil down to the subjective feeling states that we have in response to them. So, not only do we rely heavily (perhaps exclusively) on emotional responses for both types of judgment, but the judgment itself is constituted by the same basic process. In a similar vein, Shaftesbury (1711/1999) held that virtue is a subtype of beauty, and that moral appreciation is, in essence, a form of aesthetic appreciation. More recent philosophers have detailed the various commonalities between aesthetic and moral judgments, in order to show that aesthetic realism is tenable on many of the same grounds as moral realism (Railton, 2001). A new wave of psychologists, taking a cue from Hume, have argued that moral preferences are akin to aesthetic preferences insofar as they are feeling-based and not penetrable to reason; the only difference between these two forms of preference is that we are more motivated to come up with *post hoc* rationalizations for our moral preferences (Zajonc, 1980; Haidt, 2001; Ditto, Pizarro, & Tannenbaum, 2009).

Consistent with views articulated by Hume, Shaftesbury, and Railton, a recent study found that children consider statements like ‘grapes are yummy’ and ‘swingsets are fun’ to be a matter of subjective taste, but when it comes to moral and aesthetic claims—such as whether it’s wrong to hurt someone or whether roses are beautiful—children believe there is a single, objective truth (Nichols & Folds-Bennett, 2003).



This suggests that, developmentally, aesthetic evaluations are treated as objective, universal, and preference-independent in the same way that moral evaluations are. Testing an adult population, Goodwin and Darley (2008) found that people were more likely to say there was an objective truth to moral than aesthetic claims, although this pattern may have been due to the fact that the aesthetic statements were framed as a comparison between two, potentially incomparable, evaluations (“Classical music is better than rock music”) rather than a judgment about the objectivity of a single statement (“Assisting in the death of a terminally ill friend is morally permissible”).

The link between moral and aesthetic evaluation appears in other forms as well. The language of moral and aesthetic evaluation is co-mingled (both moral deeds and art works can be ‘offensive’ or ‘in good taste’). Bad art is often seen as not just an affront to good taste but to moral propriety, and boundary-pushing art is regularly accompanied by moral outrage: a cast of Senators famously petitioned the NEA in 1989 for funding the homoerotic photography of Robert Mapplethorpe and Andres Serrano’s *Piss Christ* (a crucifix floating in a jar of ‘urine’), referring to the creations as “morally reprehensible trash” (Summers, 2004). *Sensation*, a show of the Saatchi collection that toured the world in the late 1990s, brought controversy in practically every city it landed; Mayor Giuliani referred to the exhibit (which included Chris Olifi’s dung-spattered painting of the Virgin Mary) as “sick stuff”, and tried to cut public funding of the museum that hosted it (Young, 2005). Nor is this a uniquely modern phenomenon; Edouard Manet’s now tame-seeming depiction of an imperious courtesan, *Olympia*, was derided as “vulgar” and “immoral” when it debuted in 1863 (Richardson, Manet, & Adler, 1998). Mirroring the social history of art, there is a rich literature in philosophy debating the question of whether morally wicked art can even *be* aesthetically good, providing further evidence for the cognitive blur between our moral and aesthetic responses to artwork (Hume (1875); Carroll (1996); Gaut (2007); Hanson (2001); although see Kant (1790/1987); Jacobson (1997); Kieran (2006)).

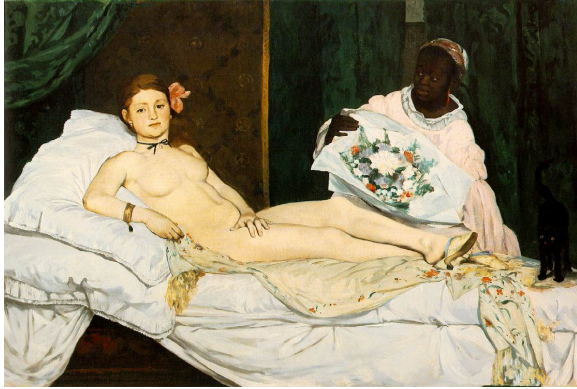


Figure 3.1: Manet’s outrageous *Olympia*. The scandal stemmed not from the prostitute’s nudity, but from the lack of idealization, and her unapologetically superior gaze.

If moral and aesthetic judgments are so closely overlapping, especially in how they make use of feeling state information, then the inferences we make about art when we feel disgusted should be comparable to the inferences we make about moral acts in this state. It does not seem unreasonable to imagine that the disgust that viewers felt when first gazing upon *Piss Christ* or *Olympia* for the first time was driving both their judgment of the work as aesthetically valueless and as a moral abomination.<sup>3</sup> If, on the other hand, we fail to find such a reliable relationship, this would be evidence that aesthetic judgments are not as comparable to moral judgments as is sometimes argued.

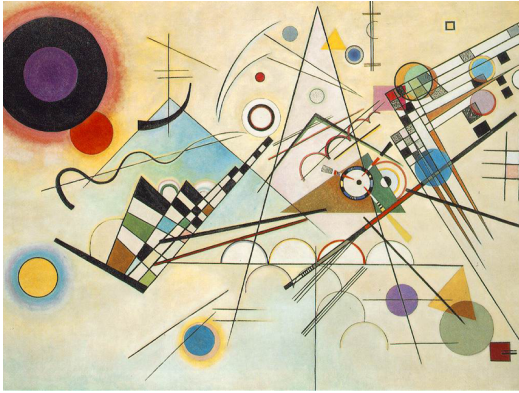
As a starting point, I selected paintings in the abstract expressionist style. The generic, non-representational nature of these paintings suits an exploratory analysis, as it is fairly content-agnostic, and invites the viewer to interpret the work in an open-ended fashion. See Figure 3.2 for a couple of representative examples of the paintings used.

### 3.1.1 Methods

This study was chiefly designed as a pilot study to see if disgust could make cartoons funnier. We wanted to be able to show that the disgust stimuli would not always have a salutary effect, so we included a block where people rated food pictures.

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<sup>3</sup>The possibility that disgust could potentiate both moral offense *and* aesthetic appreciation over a work of art is taken up in Section 3.4, below.)



Wassily Kandinsky, *Composition VIII* (1923)



Franz Kline, *Painting* (1952)

Figure 3.2: Two of the abstract paintings used in the studies appearing in Sections 3.1 and 3.2.

We also included a block that contained moral scenarios, so we could compare our results to what was, at the time, a new effect in the literature, that disgust makes moral judgments more severe (Wheatley & Haidt, 2005; Schnall, Haidt, et al., 2008). A fourth condition included paintings to be used in aesthetic judgments.

132 undergraduates from the University of Michigan spent an hour in the lab for course credit. Participants were told the study was on whether linguistic abilities can account for individual differences in everyday preferences. Three subjects were excluded from the analysis due to missing data—the computer crashed before they could finish.

The experiment was arranged into two overarching blocks, with the one half of trials containing neutral primes, and the other half containing disgust primes. Emotion was thus manipulated within subject. Whether the disgust primes appeared in the first or second half of the experiment was counterbalanced between subjects. Within an emotion block, there were four sets of judgment trials as outlined above (cartoons, food, art, moral scenarios), with fifteen trials each. Order of judgment block (whether in first, second, third, or fourth ordinal position within the emotional block) was counterbalanced between subjects, but repeated across the two emotion

blocks within subjects. Although the order of items within judgment block was randomized between subjects, the items that appeared within an emotion block did not change. That is, the same set of paintings always appeared in the disgust condition, and this was distinct and nonoverlapping with the set of paintings that appeared in the neutral condition.

For each of the four types of judgment, there were 15 trials in the disgust prime condition, 15 trials in the neutral prime condition. For aesthetic judgments, each trial consisted of a scrambled sentence the subject had to descramble, followed, on the next screen, by a painting with a rating scale: “How much do you like this painting?” on a scale from 1 (“I hate it”) to 6 (“I love it”). For moral judgments, the judgment screen contained a short moral dilemma (based on those used in Greene, Sommerville, Nystrom, Darley, & Cohen, 2001) on a scale from 1 (“Forbidden”) to 6 (“Completely permissible”). For gustatory judgments, the judgment screen displayed a full-color photograph of food, on a scale from 1 (“Not at all appetizing”) to 6 (“Very appetizing”). For humor judgments, the judgment screen displayed a dirty cartoon.<sup>4</sup>

To minimize the chance that subjects would discern the true purpose of the study, only half of the sentences in the disgust condition had disgust-related content (the other half were neutral). In the neutral condition, all of the sentences were neutral.

### 3.1.2 Results

Contrary to predictions, a paired t-test revealed that paintings were reliably enjoyed more in the disgust condition ( $M_{disgust} = 3.16$ ) than the paintings in the neutral condition ( $M_{neutral} = 3.01$ ; paired  $t(128) = 3.14$ ,  $p = .002$ ; Cohen’s  $d = .19$ ). See Figure 3.3.

Cartoons were also liked more in the disgust than the neutral conditions ( $M_{disgust}$

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<sup>4</sup>30 cartoons from the *New Yorker* corpus were used. To increase the chances of finding an effect, only dirty cartoons were used, as we thought disgust would be most likely to have a salutary effect for jokes that were already disgusting.

= 3.30,  $M_{neutral} = 2.96$ ; paired  $t(127) = 7.74$ ,  $p < .00001$ ; Cohen's  $d = .38$ ). However, the validity of this comparison was later called into question; see below.

Food images, as one might imagine, were liked less when subjects had been disgusted (emph $M_{disgust} = 3.21$ ,  $M_{neutral} = 3.94$ ; paired  $t(128) = 14.28$ ,  $p < .00001$ ; Cohen's  $d = 1.02$ ). Of all the emotion priming manipulations performed for my dissertation, this was easily the strongest and most reliable effect. This is likely because feeling disgusted when surrounded by food sends the clearest and most unambiguous message about what the emotional state signifies. For all of disgust's flexibility—the ability to be applied metaphorically or ironically to a variety of judgments and preferences—disgust nevertheless retains a primary and specialized function, which is to avoid pathogens, especially through oral contamination (Rozin & Fallon, 1987; Rozin, Haidt, & Fincher, 2009).

The morality condition yielded a null effect ( $M_{disgust} = 2.88$ ,  $M_{neutral} = 2.81$ ; paired  $t(127) = 1.34$ ,  $p = .18$ ). There are a variety of reasons we might have failed to find that disgust makes moral judgments more severe, an effect which has been demonstrated by other researchers (Wheatley & Haidt, 2005; Schnall, Haidt, et al., 2008; Inbar, Pizarro, & Bloom, 2012; Horberg et al., 2009). The pattern even in the published record shows an inconsistent efficacy of disgust priming on moral judgment. For example, Horberg et al. (2009) found that disgust amplified moral repugnance only when the moral scenario contained a purity violation. Wheatley and Haidt (2005) and Schnall, Haidt, et al. (2008) found that induced disgust only affected a subset of the moral judgments tested, though there was no demonstrable pattern of whether the violations were related to purity or not. Finally, Inbar et al. (2012) found that disgusting smells had a deleterious effect on judgments of male homosexual behavior, but no effect on evaluations of gay women. As research in this area progresses, it may turn out that the complexity and variability of higher-level evaluations such as those involved in moral judgment, combined with the multiplicative determinacy of

emotion states, lead to emotion-cognition relationships that cannot be summed up by neat rules such as “disgust = moral disapprobation”. Determining the boundary conditions on these effects will likely be a key challenge of the field in the coming years.

While intriguing, this study has several limitations. One of these is that the wording of the anchors for the aesthetic judgment (from “I hate it” to “I love it”) are non-standard for a scaled question, and may encourage responses artificially clustered around the midpoint, due to their extremity (Schwarz, 1995). Additionally, the interleaving of different judgment types could have had some unanticipated contamination effects on judgment. If anything, this should have weakened the effects rather than potentiated them; still, ideally we would be able to observe this effect in a population that had only been making a single type of judgment.

Another design issue is the stimuli were in fixed random order within emotion condition: the same 15 paintings always appeared in the neutral condition, and a different set always appeared in the disgust condition. This raises the possibility that the observed effects were completely due to the serendipitous placement of preferred judgment stimuli in one emotion induction condition block over the other. Indeed, subsequent analyses revealed that the cartoons in the disgust condition had a higher mean funniness rating, according to norming data taken earlier that semester from the same student population.<sup>5</sup> However, this fear can be allayed for the aesthetics condition, as a subsequent norming study (Section 3.3.2) revealed that the paintings in the neutral condition were actually liked more than the other fifteen (but not significantly so;  $M_{disgust} = 3.52$ ,  $M_{neutral} = 3.60$ ). Although the population providing the norming data come from online subjects, who are demographically more diverse than the present study’s sample of midwestern undergraduates, this at least provides

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<sup>5</sup>The author, in her zeal for data collection, had only made sure that the cartoons all had high ranking on funniness, not that the cartoons, when partitioned into two groups, were equally funny. The results discussed in Chapter II are the product of an improved version of the study, with cartoons appearing in both conditions with equal frequency.

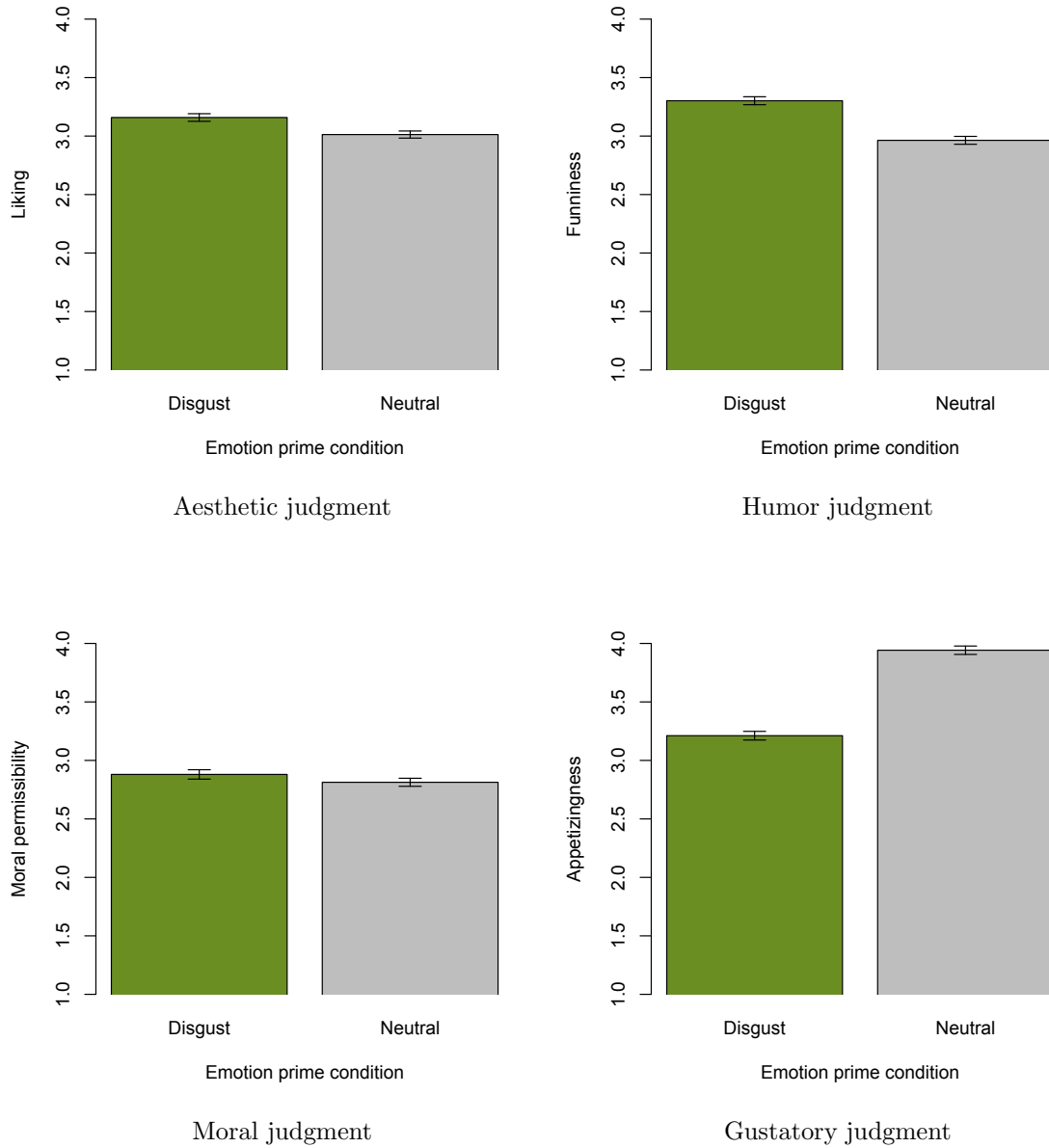


Figure 3.3: An overview of the results of the pilot study. All within-judgment emotion priming comparisons were significant except for morality; see text for details.

a sanity check that the paintings randomly placed in the experimental condition did not radically differ from those in the control condition.

Finally, the range of paintings used to elicit aesthetic judgments was quite narrow, and it is not clear whether this effect would generalize to other types of art. Abstract art is often intended to challenge the viewer; in this context, feeling disgust may be interpreted as being disquieted or upset in a way that is congruent with the intended impact of the artwork. On the other hand, disgust might disrupt enjoyment of paintings that are intended to be happy, uncomplicated, or serene. This matter is taken up in the next study.

### **3.2 Abstract versus landscape art**

Earlier, we highlighted the point that, if aesthetic judgment really is like moral judgment, then the inferences we make from feeling states should be comparable in both. There appear to be at least two major differences in the use of emotion between moral and aesthetic judgment. The first relates to the informational value of a *lack* of emotional response. If I fail to have a strong emotional reaction to a proposal of moral import, I may conclude that I am agnostic on the issue—that is, I fail to form a negative moral evaluation. By contrast, a lack of emotional engagement with an artwork signifies dullness and a failure to entertain, which would work against a favorable aesthetic response.

Another difference is that art, in contrast to moral acts, has a broader range of emotional states that signify success or greatness. When we watch *The Shining*, our feeling of dread as Danny pedals through the hotel corridor is what leads us to like this scene; yet our enjoyment when John Cleese holds forth on the finer points of ex-parrots is governed by a completely different emotional response, mirth.

While it may be the case that a wider range of emotional states are acceptable for aesthetic judgments, it may still be true that these emotional states can suit cer-



tain aesthetic contexts better than others. So, if Danny’s pedaling seemed suddenly and unaccountably ridiculous, this would break the spell of tension that Kubrick had worked so hard to construct, thereby leading us to conclude that the scene was clumsy rather than masterful. Thus it is quite possible that preferences for emotional states vary depending on the the stage that has already been set by the artwork, and whatever other assumptions and cultural knowledge the viewer imports to it (Liao, Strohming, & Sripada, 2012). The exact way these responses work is undoubtedly complex; nonetheless, we can take some opening stabs at figuring them out by examining the simplest, clearest-cut cases first.

Thus, the next study was designed to look at two sets of art from which we would expect distinct feeling state responses: abstract expressionist paintings, and 19<sup>th</sup> century landscapes, mostly from the French Neoclassical and Hudson River schools.<sup>6</sup> It is possible that disgust would selectively interrupt aesthetic experiences that are designed to be pleasant, welcoming, and serene.

### 3.2.1 Methods

89 undergraduates ( $M_{age} = 19.9$ , 72% female) at the University of Michigan were run in a 45 minute-long study.

The abstract painting corpus was expanded to 60 paintings (from the original 30), along with 60 landscape paintings. Emotion was induced with a sentence descrambling task placed between each judgment trial. The same sentences used in the pilot study were used; as before, only half of the sentences in the disgust condition were disgust-related. Painting type (abstract or landscape) and emotion prime (disgust or neutral) were manipulated within subject. This 2 x 2 design was broken into four,

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<sup>6</sup>While these paintings were selected for their more traditional and straightforwardly pleasant properties, in retrospect, some of them make actually arouse fear-related emotions, akin to awe and the sublime, owing to their depiction of vast, expansive vistas and their sometimes haunting or portentous use of light (Burke, 1759/1998). Nonetheless, these are the most straightforwardly pleasant and ‘positive’ artworks investigated here, and provide a reasonably good counterpoint to more expressly disturbing and unusual artworks.



Albert Bierstadt, *Storm in the Mountains* (ca. 1870)



Gustave Courbet, *River Landscape* (1869)

Figure 3.4: Two examples of the landscapes used in the study appearing in Sections 3.2. On the left, a Hudson River school painting; on the right, a quintessential neoclassical landscape.

hierarchically-arranged blocks that were counterbalanced between subjects. Participants would unscramble a sentence in one emotion condition followed by a rating of one type of painting, repeat this process for 30 trials, then move to the other painting block within the same emotion condition for 30 trials, before switching to the other emotion condition for the final 60 trials (the switching of conditions was not announced or otherwise explicitly signaled to subjects).

Participants rated paintings according to the question, “How much do you like this painting?” with anchors at 1 (“Not at all”) and 6 (“Very much”). Whether a painting appeared in the disgust or neutral condition was randomized between subjects (although the painting could appear only once throughout the course of the experiment. There were 120 trials in all. Afterwards, participants completed some personality and demographics questionnaires.

### 3.2.2 Results

To analyze the effect of of emotion prime on aesthetic judgment, we used a mixed-effects model that treated painting and subject as a random effect (see Strohminger,

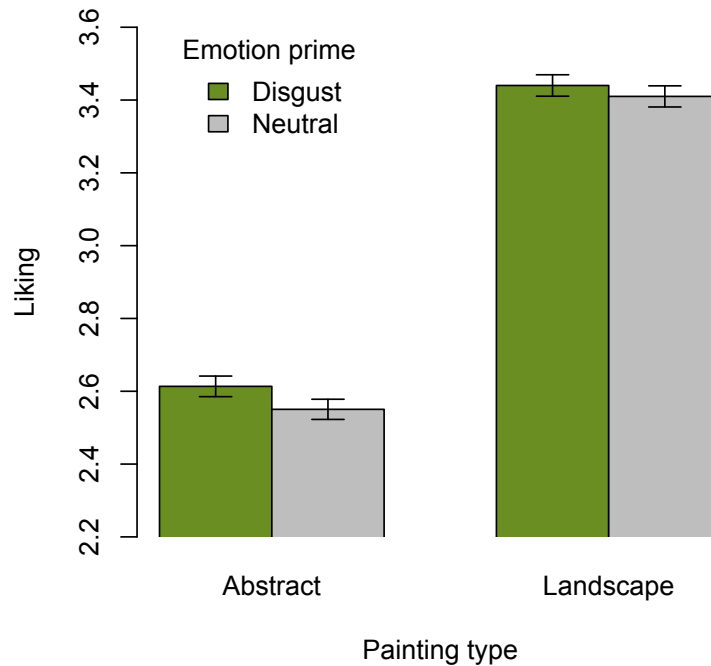


Figure 3.5: The influence of disgust on two different painting types; disgust enhanced enjoyment of abstract but not landscape paintings.

Lewis, & Meyer, 2011 for a comparable analysis). The model treats paintings (and subjects) as part of a larger population, rather than the entire population of relevant stimuli. Using such a model allows us to partial out noise that a standard ANOVA would be unable to detect. Effects for the abstract painting were marginally significant in the predicted direction ( $M_{disgust} = 2.61$ ,  $M_{neutral} = 2.55$ ;  $t = 1.84$ ,  $p = .06$ ; see Figure 3.5).

Disgust had no coherent effect on evaluations of landscape paintings ( $M_{disgust} = 3.44$ ,  $M_{neutral} = 3.41$ ; using a mixed effects model,  $t = 1.16$ ,  $p = .25$ ). Nor was there a significant interaction in the emotion’s influence among painting types when both painting conditions were compared in the same model ( $p = .61$ ). There was however a dramatic main effect of painting type on liking; perhaps unsurprisingly, abstract squiggles and washes of color are not as popular as depictions of bucolic splendor

( $t = 8.90$ ,  $p < .00001$ ). These two findings may be linked, at least in some indirect way. Perhaps when art has already engendered a strong positive response, it cannot be perturbed by a (relatively weak) incidental disgust prime. Or, perhaps the most enjoyable landscapes in the corpus are harmed by the presence of disgust, whereas the less enjoyable ones behave more like the abstract paintings. The available data do not allow anything beyond speculation, unfortunately, this condition collapses across landscapes which vary on attractiveness.

These results allow a few provisional conclusions. First, with the randomization problem dispensed with, as well as a fresh influx of abstract paintings, we can rest assured that the effect originally discovered in the last study is replicable. Second, we can toss out the idea that disgust necessarily disrupts enjoyment of art that is only meant to elicit positive emotions. The weakness of these effects is, of course, unsatisfying. We wondered whether disgust would have a more reliable effect on aesthetic judgments of art that was intended specifically to elicit disgust in the viewer. In the next study, we set out to test how feelings of disgust influence our appreciation of the grotesque.

### **3.3 Grotesque art**

Some art is expressly designed to disgust the viewer. For such art, disgust primes may be especially potent, as this emotion would send a more unambiguous signal of the efficacy of artwork. Furthermore, if we can show that disgust enhances grotesque art, we would have some empirical basis for characterizing why this art moves us, and the role of negative feelings in our appreciation of it (and whether there is indeed such a role, a point that some have denied; Carroll, 1990).

How disgust influences aesthetic judgment may turn on a variety of details about the artwork, so this study also set out to be systematic in its approach (or as systematic as possible, given the subject matter). The artwork used in the first two

studies was not systematically vetted or normed, leaving open many questions about which aspects of the art are influencing how disgust is incorporated into the judgment. Therefore, this study collected norming data on both the older set of abstract and landscape paintings, and on a new corpus of grotesque art. This would give us an empirical basis for selecting stimuli in later studies; these scores can also be used as predictors for the magnitude and direction of the priming effects.

### 3.3.1 Gathering the stimuli

The corpus of grotesque art was compiled by combing through approximately 100 art books containing full-color (where relevant) plates. For the most part, these books were gathered by drawing on the author's knowledge of art history. This was supplemented by the judicious use of keywords in searching the library database. Once the paintings had been selected, they were digitally scanned into high resolution electronic files. The art is mostly paintings and other two-dimensional media, although there is also a smattering of sculpture. The art is largely European and American in origin, although a handful of Asian and African art made its way into the corpus. All told, the corpus contains 473 artworks spanning seven centuries (from the 15th to the 21st), and represents 143 artists, a fair portion of whom are firmly entrenched in the Western canon (Bosch, Bruegel, Rubens, Goya, Dali, Magritte, Dix, and so forth). Some of the art in the corpus would be familiar even to someone with no art training (Munch's *The Scream*, Dali's *The Persistence of Time*), and very little of it would be unfamiliar to a person with a college-level education in art history (I say this as a person with a college-level education in art history).

This norming study also aimed to collect norming data about the extant abstract and landscape paintings. Comparatively speaking, our methods for collecting these pieces was less exhaustive. However, the goal of norming the the abstract and landscape paintings was only to aid in accounting for the effects in the studies that had

already been run, so there was no need to expand upon the original 60 abstract and 60 landscape paintings.

### **3.3.2 Norming the stimuli**

The norming project was divided into three different studies, and posted online. Subjects were recruited from mTurk. The same subject could sign up for all three studies if they wished. Since the time and IP address is stamped on each row of data, one could look at who participated in multiple studies, and what kinds of relationships exist among reactions to these various forms of art. We did not, however, analyze this aspect of the data.

#### **3.3.2.1 Grotesque norming**

156 American subjects participated; they are 64% female, *Mdn* age = 29, and hail from 36 states.

Of the original 473 items in the grotesque art corpus, 445 were included in the norming study. Sculptures and overly repetitious artwork by the same artist were excluded.

In light of the formidable number of items to be rated, the study was designed to select a random subset of 120 paintings. Each subject rated the painting on six questions: how much they liked the art, and how interesting, novel, funny, disturbing, disgusting, and offensive they found it. The scale was from 1 (“Not at all”) to 6 (“Very”, or, for the liking question, “Very much”). Subjects would answer all six questions about the artwork before moving to the next one.

There were a few reasons we cared about the ‘Liking’ dimension. As we have some hint of in the previous experiment, the intrinsic artistic merit of the painting may have an interactive effect with how we interpret any emotions we are having at the same time as viewing it. For example, an artwork that we would normally

deem good might make us more receptive to a wider range of emotional responses while looking at it. Contrarily, if paintings that are liked are those that generally entail positive affective responses, we may find that disgust hampers the most liked paintings in the group. ‘Liking’ is the most subjective question in the set, and as such it is the most cognitively ‘hidden’: it does not allow us to ascertain what kind of aesthetic experience the viewer is having: is the high rating because the painting is exquisitely beautiful, or haunting, or skillful, or intellectually engaging? Is the appreciation more cognitive, or is it more heady and hedonic? Nonetheless, there may be some interesting patterns at this most general level of evaluation.

We asked subjects to rate interest, because there has been some suggestion that these effects are about, in some ways, learning: new information is inherently stimulating and cognitively rewarding. ‘Novelty’ was also included as a dimension meant to get at this idea. Perhaps the mere presence of anything incongruous or convention-shattering would be enough to enhance responsiveness to disgust.

We asked subjects how funny the artwork was in part because we were trying to see whether there would be any connections between this finding and the earlier finding with humor: could the positive priming effect be explained purely through the perceived humor on the canvas, or was enjoyment deriving from other qualities?

We measured how disgusting the paintings were, to get a sense of whether the level of disgust people felt already while viewing the image would have an influence on the way an incidental burst of that same emotion would be used. It’s also possible that paintings which are disturbing or unsettling more generally could better explain when these priming effects are most effective. So we measured disturbingness, to disambiguate from disgust specifically. Finally, we asked subjects to rate offensiveness, as moral disgust could influence the use of a disgust prime, even in the absence of any physically disgusting cues.

To view the overall results of this study, see Table 3.1.

Table 3.1: Questions asked in the art norming studies, and mean value for all paintings in the study (standard deviation in parentheses). No value indicates the question was not asked for that type of art.

Question	Abstract	Landscape	Grotesque
How much do you LIKE this artwork?	3.32 (1.66)	3.90 (1.55)	2.71 (1.64)
How INTERESTING is this artwork?	3.61 (1.59)	3.88 (1.44)	3.39 (1.62)
How NOVEL is this artwork?	3.19 (1.44)		3.25 (1.54)
How CALMING is this artwork?	2.78 (1.51)	3.86 (1.44)	
How COMPLEX is this artwork?	3.59 (1.55)	3.98 (1.36)	
How PLEASANT is this artwork?	3.08 (1.50)	3.91 (1.43)	
How FAMILIAR is this artwork?	2.53 (1.57)	2.93 (1.63)	
How DISTURBING is this artwork?	2.33 (1.57)		3.14 (1.78)
How FUNNY is this artwork?			2.19 (1.57)
How DISGUSTING is this artwork?			2.73 (1.77)
How OFFENSIVE is this artwork?			2.38 (1.69)

### 3.3.2.2 Abstract norming

118 American subjects completed the study; *Mdn* age = 28, 57% female, from 35 states. The study took about one hour to complete.

Participants rated 60 abstract paintings, the same the originally appeared in earlier studies. Because of the relatively modest number of paintings to be ranked, each subject viewed all 60 paintings and rated them on all dimensions. The paintings were presented in between-subjects randomized order, with a fixed order of eight questions meant to draw out candidate important dimensions for predicting what was underlying the effect. The questions were on a 6-point scale, with anchors “Not at all” (1) and “Very” (2) (“Very much” for the Liking question). All questions would be asked of the artwork before advancing to the next painting. These questions were slightly different as those used in the grotesque art survey; see Table 3.1.

These norming data were then applied to the second abstract priming study (the one appearing in Section 3.2). Although the experimental data comes from a different population than the norming data, we were nonetheless hoping that some preliminary patterns might be observable here. The only finding of note in here was that including



familiarity of the painting as a predictor increased not only the main effect of emotion effect on liking, but yielded a significant interaction effect between these two. Using a linear mixed effects model treating subject and painting as random effects, the main effect of the emotion condition was more reliable than the original model ( $t = 2.50$ ,  $p = .01$ ), and the interaction effect was significant, such that the more familiar the painting was, the stronger the disgust priming effect ( $t = 2.26$ ,  $p = .02$ ). There is no obvious reason for the direction of the observed effect (if anything, one might have predicted the opposite, that less familiar work would have made greater use of the disgust prime).

### **3.3.2.3 Landscape norming**

119 American subjects completed the study; they had a median age of 29, were 65% female, and represented 32 states.

The design of the landscape norming study was the same as that of abstract norming study, except there was no question about novelty or disturbingness. For a full list of questions and the results, see Table 3.1.

The norming data were applied to the landscape painting condition in the previous priming study, but no discernible patterns between the prime condition by painting and ratings on any of the norming dimensions was found.

## **3.4 The use of disgust in grotesque art judgments**

The chief goal of this experiment was to use the norming data to select a reasonably well-controlled group of grotesque art and see how disgust influenced our experience of it, and to see whether any interesting patterns emerged depending on some of the qualities of that art.

A subsidiary goal of this study was to address a paradox in how disgust influences evaluative judgment: how is it that disgust can enhance liking of art, whilst disgust

at the same time appears to fuel moral furor over art in many cases (especially art containing some sort of purity violation: the violent, sexualized, or profane). To answer this question, this study asked subjects to evaluate paintings differently, depending on the question. Some were asked to respond how much they liked the painting, while others were asked to evaluate how offensive the painting was. A third group were asked to rate how pretty the painting was. We predicted that disgust would aid liking of the painting, but that disgust would also lead to higher judgments of offensiveness. The inclusion of the prettiness condition was intended to allow us to separate out what is going on with the liking effect: is disgust making the painting seem more appealing at a simple sensory level? Or is it deepening appreciation unrelated to mere prettiness?

### 3.4.1 Methods

724 subjects participated in this online study for a small cash payment. 68% were female, and they had a median age of 30.

The norming data collected on the grotesque art was used to select a subset of paintings to be included in a disgust priming study with grotesque art. 60 paintings of the normed 445 were selected: the 12 most liked, the 12 least liked, the 12 funniest, the 12 most disgusting, and the 12 least disgusting. In the case that a painting appeared on more than one list, it was put on the list it fit with best, and the next best candidate was selected for the other category.<sup>7</sup> Representative examples of high and low disgust grotesque art are presented in in Figure 3.6.

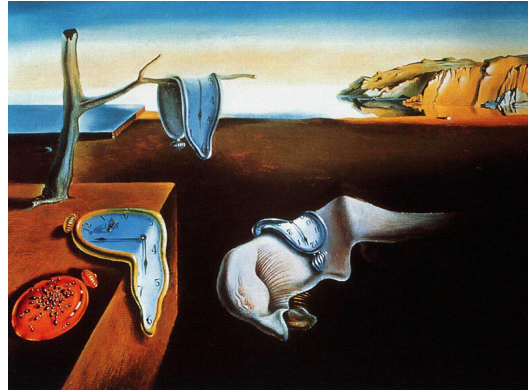
The previous art experiments used an interleaved design; that is, the emotion prime (a scrambled sentence) was placed between each aesthetic judgment. This is not a traditional design for emotion induction experiments, which tend to have a unified

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<sup>7</sup>Several of the dimensions bleed into one another. For example, the most disgusting art also tended to end up on the most disliked list. We did not control for all of these properties in the selected paintings.



Jenny Saville, *Matrix* (1999)



Salvador Dali, *The Persistence of Memory* (1931)



Francisco Goya, *Saturn Devouring His Son* (c. 1819-1823)



Pieter Bruegel the Elder, *Portrait of an Old Woman* (1563)

Figure 3.6: At left, two of the more disgusting artworks from the corpus, which were used in the grotesque priming experiment. At right, two of the least disgusting paintings.

mood induction stage followed by a unified judgment stage. The rationale behind such a design is that individual judgments are less likely to contaminate one another (perhaps falsely potentiating or carrying over judgments from one trial to another), and also to minimize the chance that subjects will discern the intent of the study. We wanted some assurance that our results would also obtain in a more traditional emotion induction paradigm, so the present study had a short mood induction portion (unscrambling ten sentences) followed by a single judgment task (of one painting).

An advantage of this design is it allows for a more plausible cover story: the experiment was presented as two studies by two different researchers. In the first ‘study’, participants unjumbled a random selection of ten scrambled sentences, either all disgusting or all neutral (the emotion condition was between-subjects) as selected from the larger pool of 80 sentences that has been used in the previous studies. In the ‘study’ immediately following, participants were instructed to rate a picture, which was one of the 60 paintings that had been selected from the corpus. Along the bottom of the image appeared one of three questions: ‘How much do you like this painting’, ‘How offensive do you find this painting’, or ‘How pretty is this painting?’ Subjects rated this question on a scale of 1 (‘Not at all’) to 6 (‘Very’ or ‘Very much’).

A major disadvantage of this design is we are only taking one measure per participant. So even though the design is ‘cleaner’ in some senses, it is also substantially lower powered. The larger number of subjects was intended to counteract this issue (particularly as we were interested in eventually comparing effects between the five different painting type conditions).

Afterwards, subjects were given some demographics and individual differences measures. The experiment took about ten minutes to complete.

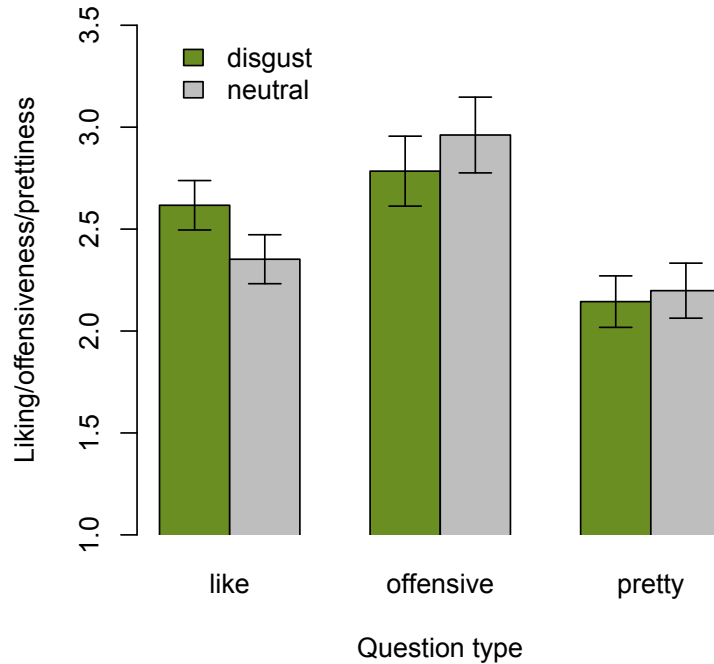


Figure 3.7: The influence of disgust on all types of grotesque art (including art rated as high and low in likability, and high and low in disgust). The emotion contrast is nearing significance in the ‘Liking’ question ( $p = .12$ ), but not for the other questions.

### 3.4.2 Results

A general trend appeared for all of the grotesque art to be liked more in the disgust condition ( $M_{disgust} = 2.62$ ,  $M_{neutral} = 2.35$ ,  $t = 1.55$ ,  $p = .12$ ). The two other questions were not nearing significance; see Figure 3.7).

When these data are subsetting by the intrinsic disgust of the painting, an interesting pattern emerges: subjects who saw high disgust images were more likely to find the image offensive in the disgust condition (see Figure 3.8). Conversely, they were less likely to say that the painting was offensive in the disgust condition for non-disgusting paintings ( $t = 1.95$ ,  $p = .05$ ). It is not surprising that the non-disgusting paintings did not seem more offensive in the disgust condition, since there was not much to be offended *by*; however, it is unexpected that disgust would lower

offensiveness.

The non-disgusting paintings were also considered less pretty when subjects had been exposed to disgust ( $t = 2.98$ ,  $p = .006$ ; see Figure 3.8). There is no coherent pattern for the disgusting paintings. Presumably this is due to a floor effect: the disgusting grotesque paintings weren't pretty to begin with (rated an average of 1.4 on a scale that only goes down to 1 in a neutral state). There is just not much wiggle room for finding superficial charm in spreadeagled transsexuals and filicidal cannibal-gods.

No coherent effects between painting types emerged when the strongly liked and strongly disliked paintings were compared. It therefore seems that the extant disgust content of a painting is a better predictor of whether the disgust prime will influence aesthetic judgment than overall liking.

### 3.5 Discussion

In this chapter, we demonstrated that disgust has no clear negative impact on aesthetic judgments, and in fact in some cases, appears to have a salutary effect. This finding goes against commonly held assumptions about how disgust (and negative affect more generally) weighs in on evaluative judgment, and represent the first demonstration that incidental disgust can increase liking for art.

How disgust influences aesthetic judgment depends on the type of art under consideration. Disgust enhances our enjoyment of abstract art, but not landscapes. Grotesque art also tended to be enjoyed more in our disgust condition, though this effect was not statistically significant. This is consistent with view that feeling states are incorporated into judgments only to the extent that they can be made sense of in relation to that judgment (Schwarz, 2012).

In a similar vein, disgust's influence varies depending on the question it is being asked to inform. Disgust can enhance an aesthetic experience when we are considering

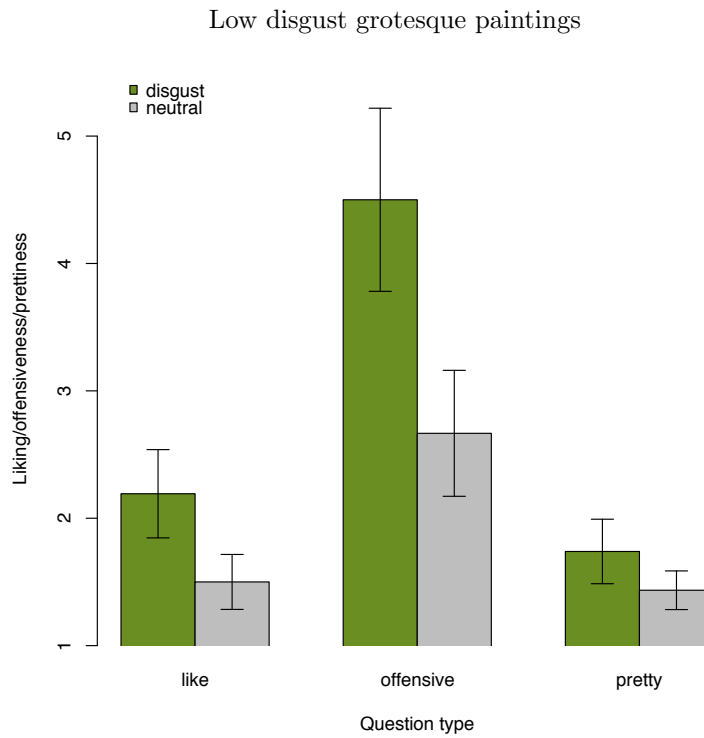
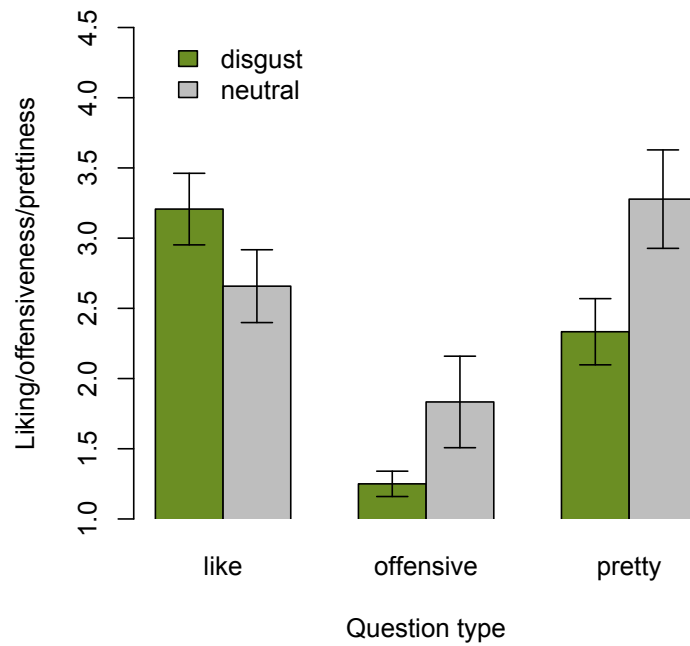


Figure 3.8: Disgust priming on two different types of grotesque paintings. Contrasts are significant in the offensiveness condition for both sets of paintings, and significant for the prettiness condition for the low disgust paintings. The contrast is trending for liking for both sets of paintings.

how much we like it, but when we see the art as potentially offensive, or are trying to determine how pretty it is, disgust can have the opposite effect. These effects are themselves qualified by the objects under consideration: for example, disgust increases the offensiveness of already disgusting paintings, but not paintings low in disgust.

These studies, while intriguing, are accompanied by several unexpected findings and limitations. First, we failed to uncover any clear differences in how disgust influences liking of different genres of art. While the effect of the disgust primes on judgments of landscape art were not significant, they were also not significantly different from the abstract art judgments. Likewise, liking of grotesque art, while trending in the predicted direction in the disgust condition, was not reliable enough to reach significance. These null and marginal results seem to reflect an overall weakness in the primes at eliciting an effect on behavior, although for the grotesque art experiment this may have also reflected the lower-powered design (consisting of a single trial for each subject, rather than a few dozen).

Given the low means and relatively higher standard deviations for ratings of the abstract and grotesque art, individual differences may be playing a large role in how disgust is interpreted during aesthetic experiences. Unfortunately, these studies did not measure pre-existing artistic preferences, so we are lent no perspective onto whether this would have made a difference in the efficacy of the disgust primes. Future work should place an emphasis on the between-subjects factors that go into the hedonic disgust response.

As with studies in Chapter II, the nature of the emotion induction stimuli limits the generality of the conclusions we can draw about how disgust influences judgment. While the disgust sentences are more disgusting than the neutral sentences, they also differ on a few other dimensions, such as emotional intensity and interestingness. Furthermore, their highly abstract nature makes it harder to know whether affec-



tive valence is driving their influence on judgment. In the next chapter, we explore additional kinds of disgust induction method, to see how these effect aesthetic and comedic judgments.

## CHAPTER IV

### Embodied Hedonic Disgust

In the preceding chapters, we looked at how disgust influences evaluations using a particular kind of prime: scrambled sentences. While this method has been used successfully by other investigators (Schnall, Benton, & Harvey, 2008; Costin, 1969; Srull & Wyer, 1979), it is not without its limitations.

One reservation we might have is that these sentences are not emotional enough. While our pretests indicate that subjects are more likely to report that sentences in the disgust condition elicit disgust than an emotionally neutral state (§ 2.1.2), the *amount* of disgust these sentences arouse was not measured. Even assuming that these sentences succeed at eliciting a reasonable amount of disgust by some standard, their overtly conceptual nature leaves open the possibility that our results are due to semantic, rather than emotional, priming. Admittedly, here is an ill-defined boundary here, since full-fledged emotions have semantic content, and priming of specific emotions (as opposed to moods or affective states) relies on activating cognitive appraisals (“I am in danger”, “this person wronged me”, *et cetera*; Ellsworth & Scherer, 2003; Lerner & Keltner, 2000). But it is not inconceivable that these sentences activate a variety of semantic networks, only some of which are associated with emotional appraisals—perhaps the non-emotional semantic activations are solely responsible for the observed changes to downstream judgments. Even if we eliminated

that possibility, we would still want to know whether it is only the semantic or conceptual aspects of disgust that are amenable to hedonic reversals, or whether its affective and somatic dimensions also play a role.

A related concern is the scrambled sentences represent a version of disgust that is both mild and relatively abstracted. Subjects are not being presented with a disgusting object, but rather a verbal description of one, which lacks any of the sensory properties of the object it describes. The state induced by disgusting sentences, therefore, may be circumscribed in a way that does not align with the emotion as it is usually encountered in the real world. In the Introduction, we suggested that there may be an upper threshold for negative sensation in benign masochistic behavior, after which the activity is no longer pleasurable. Others have made a similar suggestion, that the negative sensation needs to occur in a safe context in order to be pleasurable (Bloom, 2010; Apter, 1982; Rozin, Guillot, et al., 2010). Perhaps hedonic reversals can only be achieved when the emotion has been watered down, or we have obtained the proper psychological distance from it. Using stronger, more realistic emotion primes would allow us to observe how hedonic disgust withstands a higher level of emotional intensity, negativity, and immediacy.

Finally, an overarching goal of this line of research is to determine what it is about disgust that allows it to have a positive hedonic impact. Earlier we demonstrated that sadness primes can also make humor funnier (§ 2.1), but this finding leaves many questions unanswered: is this due to some shared property of sadness and disgust—such as negative valence, arousal level, or interestingness? Or is their convergent effect on humor the result of two different cognitive mechanisms? One way to approach such questions is to look at the range of disgust stimuli that elicit hedonic reversals, and for which judgments.

Thus, we turn our attention to two novel strategies for inducing disgust: olfactory cues (an aversive odor) and visual/tactile cues (a dirty environment). These disgust

primes have have no overt semantic content, they are relatively strong, they are not hypothetical or abstracted, and they are ecologically valid. They therefore have the potential to address all or most of the concerns raised above.<sup>1</sup>

Such emotion induction methods are new to the field, but not untested. Research has shown that disgust-related states driven by environmental and somatic information influence behavior much the same way as more conceptual or indirect manipulations (which would include reading words, viewing faces and other imagery, and memory and imagination-based exercises). For example, hand-washing makes moral judgment more severe (Zhong et al., 2010), and recalling past misdeeds increases the desire to clean one’s hands (Zhong & Liljenquist, 2006). The overall cleanliness of an environment can also impact moral judgment, with dirty rooms increasing the severity of moral judgments, and cleaning behavior reversing this effect (Schnall, Haidt, et al., 2008; Schnall, Benton, & Harvey, 2008). Odors can also alter behavior: fresh scents promote cleaning behavior (Holland, Hendriks, & Aarts, 2005) and virtuous acts (Liljenquist, Zhong, & Galinsky, 2010), and disgusting smells can make moral pronouncements harsher (Schnall, Haidt, et al., 2008; Inbar et al., 2012). Most of the work using these manipulations has focused on their relation to emotion-congruent moral commitments (although see Lee & Schwarz, 2010; Xu, Zwick, & Schwarz, 2012); whether such manipulations can lead to increased enjoyment has not been tested.

Another limitation of previous studies that we hope to redress here is the narrow band of judgment stimuli. Our humor stimuli in the past have been limited to single-panel New Yorker cartoons and moral vignettes; ideally we would expect to see the disgust enhancement effect across all potentially humorous stimuli. Previous studies failed to find a difference between the effect of disgust on clean and dirty humor.

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<sup>1</sup>This was not our only experimentation with other modes of disgust induction, though it was our only successful one. We also ran an online study manipulating disgust by having subjects recall a disgusting experience. Activating memories of past disgusting experiences failed to affect subsequent judgment of cartoons compared to recall of sad or emotionally neutral experiences. These results are reported in Appendix C.

This runs somewhat counter to feelings-as-information theory (Schwarz, 2012), which would predict that, since disgust is especially apt during the delivery of a dirty joke, disgust should have a larger effect on judgments of dirty jokes. This study gives us another opportunity to see whether any differences in humor type emerge in disgust's efficacy at enhancing funniness.

In Chapter III, we looked at how disgust influences judgments of paintings. For this study, we turned our attention to another cultural phenomenon that makes use of disgust: adventurous eating shows. In these programs, people are depicted consuming delicacies such as crickets and bull testicles. While these shows ostensibly have an educational component, part of their entertainment value appears to derive from trading on the alluring, shocking, and rubbernecking qualities of disgust. Whether this emotion actually contributes to our enjoyment of such programming has never been tested.

Thus, the present study focuses on two hedonic disgust experiences, humor and adventurous eating. Embodied disgust was induced in subjects by placing them in either an unkempt or smelly room while watching these shows. We predicted that stand-up comedy and adventurous eating shows would be more enjoyable in the disgusting rooms.

## **4.1 Methods**

Four types of video clip were prepared. Clean and dirty humor stimuli were excerpted from full-length stand-up comedy acts from several well-known comedians. The clean humor videos came from Jerry Seinfeld, Demetri Martin, Mitch Hedberg, and David Cross. The dirty humor videos came from Bob Sagat, Chris Rock, Sarah Silverman, Nick Swardson, and David Cross. The content of these videos was screened to ensure that they contained dirty topics, primarily sexual or scatological in nature (for the dirty videos) or that they had no dirty, taboo, or aggressive content (for the

clean videos). Because of disgust's strong ties to gustation, any bits related to food or eating were excluded from the stimulus set for both sets of humor videos.<sup>2</sup>

A number of adventurous eating shows have cropped up over the past few years; the video clips in the present study were excerpted from episodes of *Bizarre Foods with Andrew Zimmern*. In this show, the host travels the world, eating food that most Westerners would consider inedible (eyeballs, penises, and all manner of crunchy insects). As a control, we included a fourth video type, one that should be enjoyed less when feeling disgusted: traditional cooking shows. This would serve as our manipulation check, much the same as the manipulation check that was used for the scrambled sentences (§ 2.1.3) The traditional cooking videos were excerpted from the show *Good Eats*, which features a host cooking a variety of sweet and savory meals.

Fourteen video clips in each category were created. All clips were trimmed to be approximately three minutes long.

Three rooms were prepared for subject running, representing each of three between-subject emotion manipulations. One room was a normal testing space, a small room with two fairly new computers on a desk and no extraneous clutter or detritus on the desk or surrounding area. The room was the same as that used in the other laboratory experiments reported in previous chapters: it was not exceptionally or conspicuously clean, just not in any way noticeably dirty. The second room was virtually the same as the first, but a novelty fart spray (brand name: Liquid Ass) was spritzed into an open plastic baggie and put into the trash bin under the computer desk during subject running. The odor of the spray could be described as a mixture of sulphur, manure, and halitosis. One spritz of fart spray was put onto a paper towel in the ziplock baggie approximately every other subject. The recency of the odor replenishment was recorded, and the old baggie was sealed before a new baggie

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<sup>2</sup>This is also true of the New Yorker cartoons selected for the priming studies described in Chapter II.

would be prepared. The trashcan was emptied at the end of the day.<sup>3</sup> This method ensured the smell would be noticeable, but not so bad that it would be noteworthy or unbearable.<sup>4</sup> The room was otherwise equivalently clean to the first testing room.

For the physical dirtiness condition, a computer was set up in a room containing a large, old-fashioned soundproof booth. Although the computer and monitor were the same as that used in the other rooms, the white keyboard and mouse (which the subject had to touch) were older, yellowed and grungy. Sugar water was dribbled over the desk and metal floor, leaving it shiny and tacky.<sup>5</sup> Some older lab items, such as a pair of headphones whose orange foam had dried and begun to crumble off, were placed at the far end of the desk, not close but within view. A few drops of non-dairy creamer were splashed onto the seat of an old fabric chair where the subject was to be seated, giving the appearance of a bodily fluid of unknown provenance. A couple of crumbled tissues were strewn on the ground, near the trash can. These were only visual and tactile cues to dirtiness in the room, which was odorless.<sup>6</sup> See Figure 4.1 for images of the dirty room.

150 American, native English-speaking University of Michigan students (62% female,  $M_{age} = 18.7$ ) participated in the experiment for course credit. They were told the experiment was about personality and television preferences. In a 3 x 2 x 2 between-subjects experimental design, participants were placed in the clean, dirty, or smelly room and then shown a video program that was either food-related or humor-related, containing either hedonic disgust content or not. Room type and video type

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<sup>3</sup>This method was taken from D. Pizarro (personal communication). This method is identical to that used in, e.g. Inbar et al., 2012.

<sup>4</sup>Interestingly, no participants remarked upon the odor of the room to the experimenters. My own subjective experience sitting at the computer in this room was that a mild but unmistakable odor would waft up every now and again over the course of the hour. It was not a strong, persistent odor, or an odor to which one quickly acclimated.

<sup>5</sup>Note to D. Meyer, who generously allowed me to defile his lab space in this way: this room has since been cleaned.

<sup>6</sup>A small number of subjects remarked upon how the testing room seemed run-down or even creepy: it was evident that this room was not as nice as the main lab space, where they had met their experimenter and signed their consent forms. Not enough subjects remarked upon the dirtiness of the room for us to determine whether this awareness had any measurable effect on responses.



A view of the testing room as one entered



The trashcan next to the computer desk



Detail of the keyboard



The testing room floor. Note the shiny, discolored appearance.

Figure 4.1: The room used in the dirty room condition of the embodied disgust study.



were counterbalanced. The experimental software, E-Prime, turned out to be ill-suited to the task of showing videos, and would sometimes crash partway through the experiment. The video clip, video condition, or computer used at the time of the crash appeared to be random (that is, certain conditions were not more likely to experience the malfunction than others). 20 subjects did not complete the experiment for this reason, leaving a total of 130 subjects for whom complete data was obtained (and analyzed).

Each participant viewed fourteen video clips, each of which were approximately three minutes long. At the conclusion of each clip, participants would rate the video on a scale of 1–6, for how much they liked it. A rating of ‘1’ signified they did not like the clip “at all”, and a rating of ‘6’ indicated that they liked the clip “very much”. The order of the video clips was randomized between subjects.

After the video ratings were complete, participants completed an online survey, which included basic demographic questions and individual differences surveys, including Rozin’s Benign Masochism scale (Rozin, Guillot, et al., 2010), the Openness subscale of the Big Five Inventory (John & Srivastava, 1999) and the Obsessional Impulses to Harm Self/Others Subscale of the Padua Inventory (Burns, Keortge, Formea, & Sternberger, 1996). The benign masochism scale is a list of 30 benign masochistic activities, which are rated for how much they are enjoyed. The scale includes some disgust-related items, such as gory movies, medical exhibits, and dirty jokes. Openness to experience (whose subscales relate to imagination, artistic interests, emotionality, and adventurousness) on Big Five personality scales correlates with aesthetic chills while listening to music, particularly sad music, although openness has not been directly tested as a predictor of benign masochism enjoyment (McCrae, 2007).<sup>7</sup> The Padua Inventory was included to see whether desire to cause genuine harm to the self—non-benign masochism—predicts harmless hedonic reversals (those

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<sup>7</sup>Excitement-seeking—a dimension of the extroversion factor—may have also been relevant, though this was not tested.

which simulate, in some sense, actual harming of the self). After administering these scales, we asked subjects whether they noticed the odor in the room, and if so what it was. The experiment lasted approximately 60 minutes.

After the first 150 subjects were run, the data were analyzed, at which point it was discovered that the disgust manipulations were having a null effect on judgments in the humor condition (see below). We wanted to eliminate the possibility that this failure was due to using a different question as previous studies (we were asking subjects to report how much they *liked* the humor stimuli, whereas in the past we had asked them how *funny* they were). Thus, another 99 subjects (20 dropped because of computer crashing) were run in the humor conditions with the new question phrasing (“How funny did you find that clip?” instead of “How much did you like that clip?”).

## 4.2 Results

### 4.2.1 Effects of experimental condition

The overall results for the first 130 subjects who had complete data are given in Figure 4.2. Physical and olfactory disgust stimuli had the predicted effect on food-related programming. People liked the cooking shows less when they viewed them in a dirty or smelly room ( $M_{neutral} = 4.10$ ,  $M_{dirty} = 3.68$ ,  $M_{smelly} = 3.69$ ), but they enjoyed the adventurous eating shows more when in these rooms ( $M_{neutral} = 2.36$ ,  $M_{dirty} = 3.48$ ,  $M_{smelly} = 3.37$ ). Given that both disgust manipulations appeared to have comparable effects on judgments, we set contrasts in a linear mixed effects model so that the disgust manipulations were in one group, and the neutral condition (the clean room) was in the other. Emotion manipulation, video type, and trial number were set as fixed effects, and video clip and subject were set as random effects.<sup>8</sup>

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<sup>8</sup>For all models described here, trial was included as a predictor. Trial often had a significant main effect, in the direction of the ratings going down as the experiment wore on. No interaction effects for trial (e.g. with room type) were ever found.

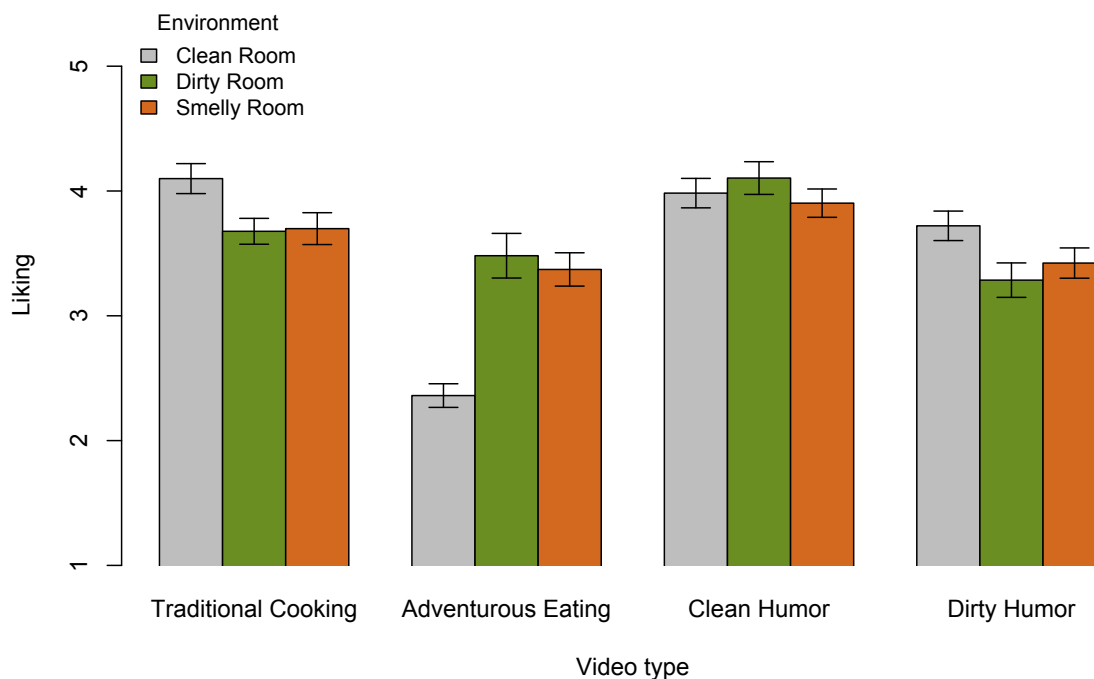


Figure 4.2: The influence of two forms of embodied disgust—odor and room dirtiness—on enjoyment of traditional cooking shows, adventurous eating shows, and dirty and clean stand-up comedy.

This model revealed a significant interaction between food show type (cooking or adventurous) and emotion manipulation (neutral or disgust),  $N = 64$ ,  $t = 2.27$ ,  $p = .008$ . There was no main effect of show type on liking ( $t = .51$ ,  $p = .34$ ).

An analogous model was constructed for the 66 subjects in the two humor conditions. There was an overall preference for the clean stand-up comedy ( $t = 1.76$ ,  $p = .05$ ), but no main effect of emotion manipulation (disgust conditions vs. neutral), or significant interaction between show type (dirty humor vs. clean humor) and emotion manipulation ( $t = .06$ ,  $p = .96$ ). Although there appears to be an overall trend for the two disgust conditions to harm ratings of the dirty stand-up comedy, this effect is not significant ( $t = .19$ ,  $p = .83$ ).

The ineffectiveness of the odor and dirtiness manipulations at evincing a change in humor judgment—either for better or worse—is inconsistent with both our predictions and the predictions of traditional congruency-based emotion theories. Since

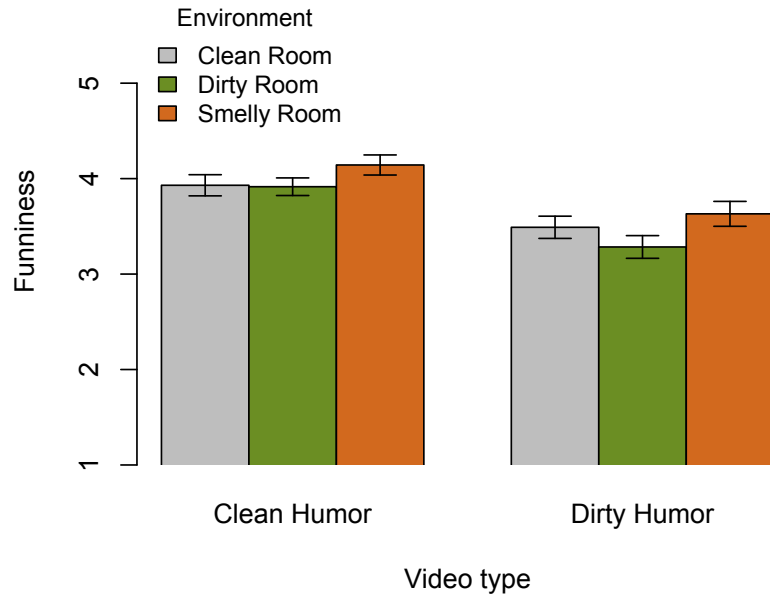


Figure 4.3: The (null) results for the second version of the experiment, where subjects rated the funniness, rather than likability, of stand-up comedy.

our previous studies had indicated that disgust enhances humor when subjects are asked to evaluate *funniness* (§§ 2.1, 2.2) and the way disgust is incorporated into a judgment is contingent on the question asked (§ 3.4), we ran subjects in a second version of the study, where subjects were asked to report the stand-up comedy’s funniness, rather how much they liked it. Although these questions should yield highly overlapping judgments for most comedic stimuli, it is possible to imagine the two sometimes diverging, as when finding something amusing while also recognizing its overall unfortunateness or offensiveness.

The results of this modified version of the experiment are presented in Figure 4.3. Changing the evaluation from one of ‘liking’ to one of ‘funniness’ made no appreciable difference in how disgust impacted, or failed to impact, judgments. In a linear mixed-effects model setting room condition, video type, and trial as fixed effects, with video clip and subject as random factors, no significant effects emerged ( $N = 79$ , all  $p = \text{n.s.}$ ).

### 4.2.2 Effects of odor liminality

Odor, while designed to be kept relatively constant from subject to subject, was not always reported as noticeable in the smelly room: only 26% of subjects reported smelling anything in the smelly room (0% of subjects reported smelling anything in the clean or dirty rooms). When asked to identify the smell, subjects reported a range of candidates: rotten eggs, cow dung, staleness, mustiness, old food, sweat, dog poop, “the odor of animals at the zoo”, sardines, flatulence, “old people smell”. Some declined to give a specific guess, but identified the smell as unpleasant (“I’m not sure but it smelled bad”). While there was a wide range of interpretations as to the exact nature of the odor, the smells were always identified as unpleasant, and almost all of the guesses were disgust-related.

It’s not clear whether we should expect awareness to impact performance in the smelly room condition. Schnall, Haidt, et al., 2008 found that the strength of a novelty fart spray dispersed into a room (which correlated with likelihood that subjects noticed the smell) did not predict the strength of the effect: the mere presence of the odor was all that mattered. Studies using aversive odors (including fart spray) to influence attitudes towards homosexuals and suspicion (Inbar et al., 2012; Lee & Schwarz, 2011) found that whether subjects noticed the smell did not mediate the observed effects (Inbar, personal communication; Lee, personal communication). Studies where the disgust-related odor was designed to be largely or wholly subliminal find such primes to be effective: for the ‘clean scent’ placed in the room in Holland et al., 2005, virtually all subjects were unaware of the aroma when queried afterwards (there were too few subjects who did notice the scent to draw any conclusions about whether supraliminality would have differentially affected the results).

Some research has uncovered cases where unconscious olfactory cues are more effective at changing behavior than conscious ones (Li, Moallem, Paller, & Gottfried, 2007). This is not unlike priming effects in other domains, where subliminal primes

can be more effective (e.g. Murphy & Zajonc, 1993; Jacoby & Whitehouse, 1989), especially if the supraliminal condition is one where the subject is motivated to ‘correct’ for it (Kelley, 1973; Schwarz & Clore, 1983, 2007). If unconscious olfactory cues are more effective simply because they cannot be intercepted, then we would expect consciously experienced stimuli to be equally discounted across all types of judgment. But additional factors may play a part in determining the efficacy of a subliminal or supraliminal prime, including the domain-specific relevance of liminality. Perhaps overt disgust signals are apt, even necessary, for gustation-related judgments, whereas hedonic disgust requires a lighter touch. To test this possibility, we divided subjects in the smelly room condition into those who could smell the odor, and those who did not.

The sub- and supraliminal odor subjects were compared to those in the neutral (clean, odor-free room) condition. This data is represented in Figure 4.4.

A disgusting odor decreased enjoyment of cooking shows, but only when that odor was noticeable (contrasting the supraliminal condition to the other two conditions,  $N = 48$ ,  $t = 2.24$ ,  $p = .003$ ). Overall, the subliminal and clean room conditions led to nearly identical cooking show ratings ( $M_{neutral} = 3.76$ ,  $M_{subliminal} = 3.76$ ,  $M_{supraliminal} = 3.04$ ).

We found the opposite effect for adventurous eating shows, with subliminal cues leading to higher ratings than consciously perceiving the odor, or there being no odor (contrasting the subliminal condition to the other two conditions,  $N = 51$ ,  $t = 2.26$ ,  $p = .002$ ). Interestingly, conscious awareness of the smell did not harm ratings of the adventurous eating shows compared to the neutral condition ( $M_{neutral} = 2.46$ ,  $M_{subliminal} = 3.21$ ,  $M_{supraliminal} = 2.39$ ).

Dividing the odor by liminality yielded no significant effects for either clean or dirty stand-up comedy. This null finding held whether considering the first version (‘liking’ question) or the second version (‘funniness’ question) of the experiment.

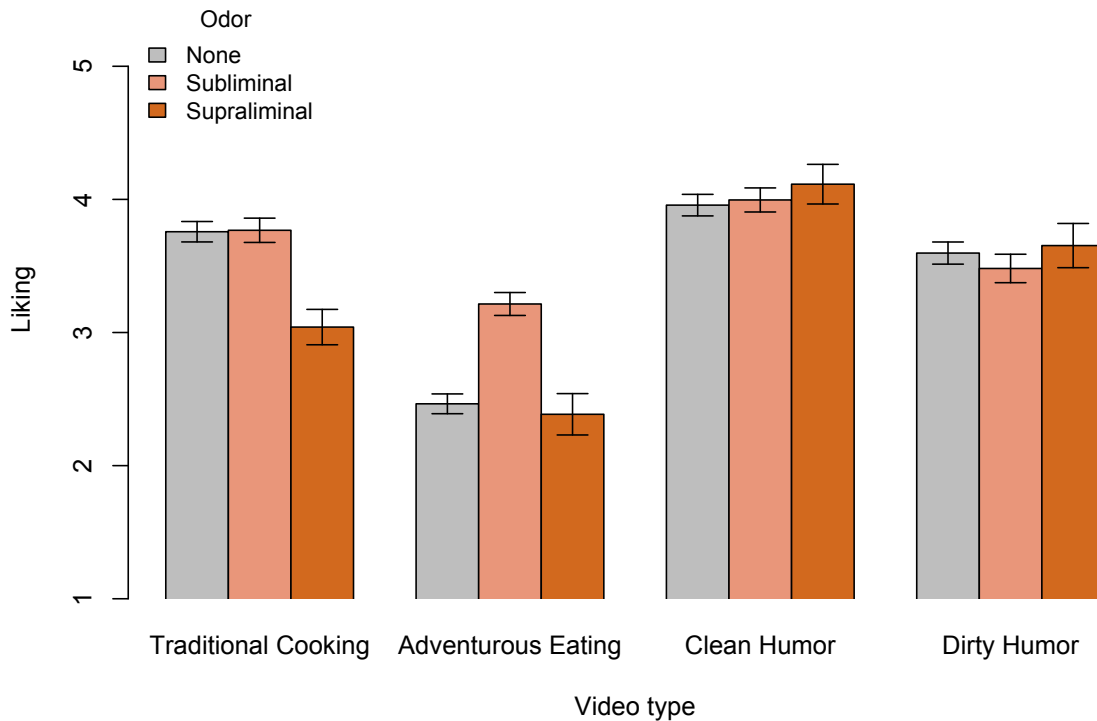


Figure 4.4: The influence of awareness of a disgusting odor on enjoyment of traditional cooking shows, adventurous eating shows, and dirty and clean stand-up comedy.

There were no significant interaction effects between the question asked and the odor conditions on ratings; the data depicted in Figure 4.4 collapses the data from both study versions.

### 4.2.3 Individual differences

For food shows, degree of priming effect was not mediated by the sex of the participant ( $t = 1.02, p = .31$ ). Partialling out sex did not bring out any priming effect for the humor shows ( $t = .18, p = .60$  for differences in the emotion prime means when sex is included in the model;  $t = 1.31, p = .16$  for the interaction between sex and emotion manipulation). However, there was a main effect of enjoyment of these shows by sex: men enjoyed the adventurous eating shows more ( $M_{male} = 3.77, M_{female} = 3.39, t = 2.63, p = .009$ ) and dirty comedy routines more ( $M_{male} = 3.70, M_{female} = 2.67, t = 6.10, p < .0001$ ). Women enjoyed the clean comedy routines more than

men did ( $M_{male} = 3.67$ ,  $M_{female} = 4.09$ ,  $t = 2.54$ ,  $p = .01$ ). No clear preference for the cooking shows emerged ( $M_{male} = 3.76$ ,  $M_{female} = 4.01$ ,  $t = 1.51$ ,  $p = .13$ ). These findings mirror those found in §2.1.5, in that males and females are equally susceptible to hedonic disgust primes, even as they display differing baseline levels of enjoyment for these activities. One interpretation of these results is that hedonic disgust is not what determines the disjunction in gender preferences for these sources of entertainment in the first place.

Subjects completed three individual differences surveys at the end of the experiment, included to test for whether any of these factors would predict the efficacy of the emotion prime.

The first among these was the Benign Masochism scale (Rozin, Guillot, et al., 2010), a survey that measures enjoyment of a variety of hedonic reversals. Subjects rate items on a sliding scale from 0 to 100 (“Not at all” – “As much as I like anything”), with a “Not Applicable” option if they have not experienced it. The scale consists of 29 items representing several subtypes of benign masochistic experience, including those related to sadness, pain, fear, and disgust (see Table 4.1 for a list of all items). The items on the benign masochism scale appeared in randomized order between participants.

The original paper describing the scale found that score on any one item positively predicts the score on the other items, and that the items correspond to coherent emotion-based factors, with the exception of the disgust-related items (Rozin, Guillot, et al., 2010). This may be due to the fact that two items on the disgust subscale (pinching pimples and nose picking) are recreations that only arouse disgust in others; if anything, these are behaviors rooted in grooming and hygiene. The hedonic disgust subscale might be best represented by disgusting jokes, disgusting museum exhibits, and gory movies, since these are the items most related to wallowing in the sensation of disgust.



There are a few other items on this scale that relate to disgust. Two are related to oral bitterness (black coffee, bitter vegetables). Taste bud receptors for bitterness are believed to have evolved to sense toxins, whereas disgust is more closely related to avoidance of pathogens (Glendinning, 1994; Rozin & Fallon, 1987; Rozin et al., 1999). For this reason “distaste” is considered a separate entity from disgust, although the two may have become entangled over time (Berridge, 2000; Kelly, 2011). Thus, we may not want to consider hedonic disgust and hedonic bitterness (distaste) equivalent sorts of experience.

The other disgust-related item is “stinky cheese”. The odor of cheese, when not put in context, is undeniably vile: in an unmarked container, the smell of parmesan is indistinguishable from vomit (Herz & von Clef, 2001). In spite of its sensory properties, there is no evidence that those who enjoy strong cheese actually experience it as disgusting. By contrast, when faced with a dirty joke, people report that they both disgusted and amused (Hemenover & Schimmack, 2007). The question of how much these contextual shifts change the activation of disgust is a question taken up in more detail in §5.3.

The exclusion of any sexual items on the original scale is somewhat surprising, especially considering that the term “masochism” in everyday language is principally used to describe sexual activity. We added an item to correct for this omission: “Mild pain in a sexual context (such as spanking or hair pulling).” Note that the wording specifies that the masochism in question was benign, consistent with the other items on the scale. This rounded the total number of items out to 30. This is the first research to make use of the scale outside of the paper in which it was developed.

A linear mixed-effects model for each of the TV show conditions fit to the specifications above (emotion manipulation and trial as fixed factors, with movie item and subject as random factors) was augmented to include Benign Masochism scale as a fixed factor. Under this set of models, a high benign masochism score positively

Table 4.1: Items and scores from the Benign Masochism Scale. Higher score indicates greater enjoyment. % NA is percentage of respondents who report never having had the experience. Hedonic disgust items highlighted in gray.

Item	Mean ( <i>SD</i> )	% NA
THRILL RIDES IN AMUSEMENT PARKS	76.4 ( <i>28.4</i> )	1.2
THE FEELING OF EXERTING YOURSELF PHYSICALLY (FOR EXAMPLE STARTING TO SWEAT, YOUR HEART POUNDING, ETC.)	65.0 ( <i>28.9</i> )	0.0
MASSAGES WHICH PRODUCE SOME PAIN	52.9 ( <i>31.5</i> )	4.3
THE FEELING OF BEING PHYSICALLY EXHAUSTED, AFTER EXTENDED EFFORT	52.1 ( <i>32.4</i> )	0.0
SPICY FOODS	50.9 ( <i>32.6</i> )	0.0
SAD MUSIC	48.9 ( <i>29.4</i> )	0.3
SAD MOVIES	46.7 ( <i>28.1</i> )	0.3
TACOS WITH HOT SAUCE	45.5 ( <i>35.6</i> )	2.2
FRIGHTENING MOVIES	42.8 ( <i>32.3</i> )	0.0
THE TASTE OF BEER	41.9 ( <i>31.3</i> )	7.1
SAD NOVELS	41.6 ( <i>30.1</i> )	0.9
THE POUNDING IN YOUR HEART IN RESPONSE TO FRIGHTENING EXPERIENCES OR MOVIES	40.8 ( <i>30.4</i> )	0.3
MILD PAIN IN A SEXUAL CONTEXT (SUCH AS SPANKING OR HAIR PULLING)	37.1 ( <i>32.6</i> )	12.3
DISGUSTING JOKES	36.8 ( <i>29.8</i> )	0.3
THE BURN YOU FEEL IN YOUR MOUTH WHEN EATING SPICY FOODS	32.5 ( <i>29.9</i> )	0.6
ANGER DIRECTED AT A FICTIONAL CHARACTER IN A NOVEL OR MOVIE	31.8 ( <i>25.9</i> )	1.2
PINCHING PIMPLES	29.9 ( <i>29.7</i> )	0.0
GORY MOVIES	28.8 ( <i>29.2</i> )	0.3
SAD PAINTINGS	28.8 ( <i>27.5</i> )	4.3
DISGUSTING EXPERIENCES (LIKE A MEDICAL EXHIBIT WITH REAL BODY FLUIDS AND PARTS)	28.3 ( <i>30.4</i> )	1.9
UNSWEETENED COFFEE	24.4 ( <i>32.0</i> )	5.9
FLASHES OF HOT PAIN (LIKE THE FIRST FEW SECONDS WHEN ENTERING A TOO HOT BATH)	24.1 ( <i>26.2</i> )	0.3
YOUR EYES TEARING UP WHEN EATING SPICY FOODS	21.4 ( <i>25.2</i> )	1.9
THE TASTE OF SCOTCH	20.4 ( <i>24.9</i> )	23.1
CRYING IN RESPONSE TO SAD ART	18.4 ( <i>24.5</i> )	12.0
FLASHES OF COLD PAIN (LIKE THE FIRST FEW SECONDS WHEN ENTERING A TOO COLD SHOWER OR THE OCEAN)	17.1 ( <i>21.7</i> )	0.6
PICKING YOUR NOSE	16.6 ( <i>21.9</i> )	2.2
SWEATING WHEN EATING SPICY FOODS	16.5 ( <i>22.1</i> )	3.1
STINKY CHEESE	15.3 ( <i>24.8</i> )	3.4
BITTER VEGETABLES (SUCH AS RADICCHIO, ESCAROLE, RADISHES)	15.0 ( <i>21.6</i> )	4.0

predicted liking for the adventurous eating shows ( $t = 3.59, p = .0001$ ), and was trending in the direction for predicting dislike of traditional cooking shows, but this effect was not significant ( $t = 1.03, p = .11$ ). It also marginally predicted liking both humor shows more ( $t = 1.90, p = .06$ ), with a significant interaction between type of humor, demonstrating that people with high benign masochism scores like dirty humor especially ( $t = 1.92, p = .02$ ). These main effects are consistent with the idea that dirty humor and adventurous eating are reflections of the broader phenomenon of benign masochism, and show that this scale reliably reflects preferences for actual experiences.

Furthermore, we found that the overall benign masochism score predicted the extent to which the emotion prime worked. Benign masochism score corresponded to increased enjoyment of food shows in the disgust conditions ( $t = 2.53, p = .0008$ ), especially for the adventurous eating shows ( $t = 2.00, p = .008$ , for the threeway interaction between emotion manipulation, food show type, and benign masochism score).

These results must be taken with a grain of salt, since the survey scores were taken in the same within-subject condition as the responses to the videos. We can rule out overall differences in BM scores between emotion conditions as the driver of these effects, however, since the room the subject was in had no effect on their BM score ( $M_{disgust} = 35.6, M_{neutral} = 35.8, t = 0.42, p = .67$ ). In spite of the limitations of this design, these results provide another form of evidence that negative emotion (in this case, disgust) is a contributing factor to the enjoyment of benign masochistic activities, and that those who enjoy benign masochistic activities may be especially prone to using these emotions flexibly to drive hedonic reversals.

We also looked at the Obsessional Impulses to Harm Self/Others Subscale of the Padua Inventory (Sanavio, 1988; Burns et al., 1996). As may be evident from its name, this scale was designed to assess impulsivity with regards to self- and other-

harm behaviors. Sample items from this inventory call to mind the Christopher Walken character in *Annie Hall*, and include: “At certain moments, I am tempted to tear off my clothes in public” and “While driving, I sometimes feel an impulse to drive the car into someone or something.” The items were rated from 0 (“Not at all”) to 5 (“Very much”).

Since the Padua Inventory is a scale typically administered to clinical populations, it should come as little surprise that few people scored very high on it (the modal score was, in fact, 0). This meant there was not enough variance for it to be informative on how individuals varied between conditions (there were no significant interactions with or main effects of the Padua score). However, overall benign masochism score was correlated with the Padua score ( $r = .37, p < .0001$ ), suggesting that an interest in benign masochism corresponds with an interest in actual masochism.

### 4.3 Discussion

Placing subjects in a dirty or smelly room while having them watch food-related shows altered their enjoyment of these shows. Traditional cooking shows were liked less when the subject was seated in a room that was either visually (and tactilely) disgusting, or olfactorily disgusting. By contrast, shows depicting consumption of bizarre or disgusting food items were rated as more enjoyable in the two disgusting rooms. Both of these findings are consistent with the view we have been advancing here, that negative emotions, including disgust, are enjoyable in some contexts, and that emotions, including disgust, impact judgment in a way that is commensurate with their contextual significance.

These findings provide additional evidence against the view that disgust and other negative emotions necessarily lead to more negative judgment of targets. Whether embodied disgust will be assimilated into a judgment at all depends on the target of judgment: while disgust impeded subjects’ ability to enjoy cooking shows, clean

and dirty humor were considered equally humorous no matter what room they were viewed in.

Desensitization to feeling disgusted in the adventurous eating condition cannot account for the higher ratings in the disgust conditions, as noticing the foul odor—which is a prerequisite for desensitization—had no impact on enjoyment.

Conscious awareness of the olfactory stimulus played a pivotal, if unpredicted, role in these results. Odor only affected enjoyment of cooking shows when subjects were aware of the room’s smell, and only affects enjoyment of adventurous eating shows when subjects were *not* aware of the room’s smell. Perhaps these results can be explained by the relative importance of signal strength across the two video types. In the traditional cooking shows, where one expects to see mouth-watering recipes, olfactory cues are most important when they are pressing rather than oblique.<sup>9</sup> Conversely, olfactory disgust may be enjoyable while engaged with adventurous eating shows, but only when it’s not overwhelming.

Caution is needed here, however: odor liminality was not experimentally controlled, so we cannot be sure that liminality is driving these group differences. For instance, maybe people who are hard of smelling take more pleasure in hedonic disgust (such an explanation would be intriguing in its own right). It’s worth noting that the other major paper on odor liminality’s effect on judgment also determined its sub- and supraliminal groups based on individual differences in odor sensitivity differences ( $d'$ ) rather than directly manipulating them (Li et al., 2007). Nonetheless, these results point to the importance of liminality in mediating these effects; future work will be needed to flesh out the role that conscious awareness plays for both traditional gustatory cognition and for hedonic disgust experiences.

Given that the means in the clean room are the ones that exhibit variance between the two food-related shows, this raises the question of whether the movement of the

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<sup>9</sup>One has to imagine that the brain is constantly receiving input about mild aversive odors; it may not be adaptive to tune a food rejection mechanism quite that conservatively.

manipulation was actually taking place in the neutral rooms. However, the more likely explanation is that cooking shows are simply more appealing to most people than the gross-out shows, just as landscape paintings are more appealing to most people than the grotesque. This interpretation is bolstered by the observation that baseline liking of the gross-out shows was higher for people who self-reported enjoying benign masochistic activities more.

Contrary to expectations, disgust had no impact on the evaluation of stand-up comedy, whether clean or dirty, and regardless of whether subjects were evaluating the routines for funniness or generic enjoyment. Our failure to uncover a relationship here may be due to a more a tenuous connection between humor and embodied disgust. Odors and messy workstations may not be effective at eliciting the discomfort necessary to prompt (or enhance) a mirth response, in the way that precise verbal articulations of disgust can. These results are, if nothing else, inconsistent with the simple mood congruence view, as disgusting stimuli failed to have a detrimental effect on humor ratings. Embodied disgust, like other emotional states, may be most effective when it has an evident practical or metaphorical relevance. The findings in Inbar et al. (2012) are consistent with this possibility: disgusting smells only increase negative attitudes towards homosexual men, and not lesbians, African-Americans, or the elderly; Inbar, Pizarro, Knobe, and Bloom (2009) suggest this is because the physically disgusting aspects of male gay sex are an especially salient aspect of prejudice against this group. The view that disgust is simply ‘for’ rejection and avoidance, and influences all judgments accordingly (Lazarus, 1991; Schnall, Haidt, et al., 2008; Han et al., 2008), appears to be wrong.

These data provide us with a tantalizing glimpse into the individual differences driving preferences for hedonic disgust activities. People who scored high on the Rozin Benign Masochism scale not only enjoyed the adventurous eating shows more (and the traditional cooking shows less), they enjoyed these shows in the disgust conditions

to a greater extent than did low scorers. This suggests that preference for benign masochistic activities reflects an increased enjoyment of the negative sensations that these activities entail.

In light of disgust's deep-rooted relationship to gustation, it is particularly interesting that disgust can be enjoyable in food-related contexts. Subjects in the adventurous eating condition, of course, were not being asked to engage in such activities themselves. The pleasure derived from these shows may be made possible the fact that the viewer has some comfortable distance from the events happening on screen. That said, a subset of the general population enjoy participating in these activities, and not just watching on the sidelines. Whether disgust plays a role in the excitement of these pursuits—the initial shudder of disgust they may feel when served a plate of fish sperm sashimi, or dog meat stew, or durian—remains to be seen.

These results support the view that gross-out television programming derives part of its appeal from generating disgust. Indeed, this industry might not exist at all were it not for disgust's qualities of attraction.

## CHAPTER V

# Closing Remarks

### 5.1 Summary of basic findings

Across several studies, we found evidence for the existence of hedonic disgust: disgust that increases enjoyment of an activity. Contrary to the predictions of traditional, congruency-based models of emotion, incidental disgust consistently led to enhanced enjoyment of, or had no effect on, judgments of humor and art.

#### 5.1.1 Humor

After gathering norming data on a corpus of *New Yorker* cartoons, an experiment (§2.1) found that disgust primes led to higher funniness ratings for both clean and dirty cartoons. Another low-arousal negative emotion, sadness, also enhanced the funniness of the cartoons. A follow-up experiment (§2.2) demonstrated that disgust primes also lead moral violations to be found funnier, in spite of disgust leading to disapprobatory judgments of these scenarios in prior research (Wheatley & Haidt, 2005; Schnall, Haidt, et al., 2008). These disgust primes led to lower evaluations in another judgment domain, making food seem less appetizing (§2.1.3). These results suggest that, rather than disgust does not have a uniform effect across situations; rather, it is deployed differently depending on the context in which it is placed.



While these findings defy congruency-based theories of emotion, they are consistent with an older set of humor studies, which found that negatively valenced stimuli are just as effective as positive valenced stimuli at eliciting heightened mirth (Shurcliff, 1968; Cantor et al., 1974). Our research complements the extant literature by showing that the negative emotional primes need not be high arousal in order to contribute to the enjoyment of humor.

### 5.1.2 Art

In Chapter III, we explored the impact that disgust has on judgments of art. A preliminary study (§3.1) demonstrated that disgust leads to increased liking of abstract art. The same subjects reported a decreased enjoyment of food in the disgust condition.

A follow-up study (§3.2) found that an extended set of abstract paintings were liked more after a disgust prime. No such significant effect was obtained for landscape paintings. A failure to uncover a significant interaction effect between painting types, however, suggests that disgust does not have the dramatically differential impact between abstract and landscape art that was supposed.

Neither abstract nor landscape art typically evokes disgust, so we next tested this paradigm using grotesque art, which contains disgust-related themes, such as the disturbing or macabre. We assembled a corpus of grotesque art pieces, and gathered ratings on a variety of dimensions for these paintings. We then ran a disgust induction experiment using sentence primes on a subset of these images, and found that subjects tended to rate the grotesque art higher in the disgust condition, though this trend was not significant.

In Chapter II, we demonstrated that moral violations are enjoyed more in a disgusted state when subjects are asked to evaluate them for their funniness. We applied the same reasoning to aesthetic judgments, predicting that disgust would have a dif-

ferential impact on responses depending on whether subjects were asked to evaluate how offensive, pretty, or likable the painting was.

When the grotesque paintings are considered as a whole, there was no main effect of emotion condition by question type (§3.4). However, when the paintings are divided by their stimulus properties, an intriguing pattern emerges. Very disgusting paintings are considered more offensive, and low disgust paintings are considered less offensive, when subjects have been primed with disgust. Paintings low in disgust are considered less pretty when subjects are disgusted, whereas very disgusting paintings, which are already at floor on prettiness, exhibit no difference in this dimension. Both types of painting have exhibit the trend of being liked more in the disgust condition, consistent with the effect uncovered for abstract art.

Overall, the salutary effect of disgust on judgment of works of art is not as strong as other examples of hedonic disgust we have observed in this thesis. Across the types of art we studied, disgust priming provided either a weak or marginal boost to painting ratings. If nothing else, this provides evidence against the view that disgust always has a detrimental effect on evaluative judgment, and that moral and aesthetic judgment make use of emotional information in the same way. The fact that disgust had a differential impact depending on the aspect of the artwork being evaluated further suggests that task plays an important role in how disgust is incorporated into downstream judgments.

### **5.1.3 Embodied Disgust**

In Chapter IV, we examined hedonic disgust using additional mood induction methods whose affective component would be especially dominant. We collected ratings for stand-up comedy routines (dirty and clean), cooking shows, and adventurous eating shows while people were sitting in either clean, dirty, or smelly rooms. As before, our disgust primes did not have a differential effect on comedy depending on

what type it was. However, unlike our previous findings, our disgust conditions had no impact on funniness judgments.

Our embodied emotion induction method was effective at impacting judgments of food-related TV shows. As predicted, sitting in a smelly or dirty room had a negative impact on enjoyment of traditional cooking shows. However, for adventurous eating shows, whose appeal lies in their ability to shock and disturb, a dirty or smelly setting enhanced enjoyment. There was an interaction effect between odor liminality and type of food-related programming: odor only had a detrimental effect on ratings of traditional cooking shows if subjects were aware of the room's smell, and odor only had a favorable effect on ratings of adventurous eating shows when subjects *weren't* aware of it.

The discovery that people can enjoy disgust in the domain of gustation is especially interesting given that food is thought to play a central role in disgust's evolved rejection mechanism (Rozin et al., 1999). Thus, disgust's flexibility to give rise to pleasure holds even in the emotion's most immediate domain of function. This study also shows that hedonic disgust is not limited to verbal cues, which have a milder emotional impact. Since people rarely watch shows in a vacuum devoid of environmental cues, these results open up possibilities for the practical impact of such cues on enjoyment of TV shows. Finally, the lack of impact these cues had on humor judgments suggests that there are boundary conditions on how disgust impacts humor perception (discussed in more detail below).

#### **5.1.4 Disgust and Morality**

One surprise of these studies was a failure to consistently replicate a finding that has been demonstrated several times by other researchers, that disgust makes moral judgments more severe (Wheatley & Haidt, 2005; Schnall, Haidt, et al., 2008; Eskine, Kacinik, & Prinz, 2011). In a study mixed with other types of judgments (§3.1),

moral violations were the sole object of judgment not affected by the disgust primes. Highly disgusting artistic images were deemed more offensive when preceded by disgust stimuli, but this pattern reversed for artwork that was not disgusting (§3.4).

These results are not as inconsistent with the literature as they at first seem. Multiple authors have reported that only a subset of their moral problems were susceptible to disgust primes (Schnall, Haidt, et al., 2008; Horberg et al., 2009; Inbar et al., 2012). Those who have failed to find a consistent impact of disgust across moral scenarios have attempted to explain this failure as a matter of disgust selectively impacting only certain types of moral transgression, for example purity violations (Horberg et al., 2009; Inbar et al., 2012). Such an explanation would count as a special case of the general phenomenon whereby emotional states are only attributed to their target to the extent that the emotion is deemed applicable to it (Schwarz, 2012). Disgust’s impact on moral judgment appears to be more nuanced than the simple congruence-based model allows; the exact contour of these nuances remains for future research to uncover.

### **5.1.5 Other Null Effects**

While we uncovered several instances of hedonic disgust in aesthetic and humorous contexts, our disgust induction methods sometimes failed to have the predicted impact. Two emotion induction methods generated null effects on humor judgments. When we induced disgust using environmental cues (either a dirty room or a smelly room), humor ratings were unaffected, whereas ratings of food-based TV shows were. Similarly, enjoyment of cartoons was unperturbed when subjects used a cued recall task of a past disgusting event (see Appendix C). Given that conceptual replications using the same sentence stimuli are effective at enhancing funniness (see §§2.1, 2.2, 3.1), the null results using different emotion induction stimuli provide us with a hint at the mechanism underlying our effects. Perhaps it is the part of disgust that makes

us nervous or uncomfortable, which is made especially salient by the verbal articulation of disgusting stimuli, that is driving the effect in humor judgments. Such an explanation would still revolve around deriving pleasure from unpleasant feelings, but it would locate the source of the effect in a more specific element of disgust.

A failure to uncover a difference in the control and experimental conditions could also be masking a more complex underlying process. For example, perhaps some priming methodologies (or judgment types) draw on dimensions of disgust which facilitate both enjoyment and repugnance. The two effects would then wash out in the final judgment. While we do not know whether such a mechanism could account for the null results reported here, this explanation would help explain why we would fail to get either the predicted effect or the canonical emotion-congruent effect.

In sum, incidental disgust can make judgments more positive, more negative, or have no net impact at all. The effect of disgust appears to be contingent on a complex set of factors, including the stimulus being evaluated, the aspect of the stimulus being evaluated, and on the manner in which disgust is elicited.

## **5.2 Caveats and limitations**

The findings presented here have very little precedent in the literature. As such, they leave a wide margin for speculation.

One important caveat is that we do not have a definitive picture of whether our subjects were feeling disgust, as most of our studies did not measure self-report disgust in subjects during the experiment. The one priming experiment that gathered self-report data from subjects, in Appendix C, did not demonstrate a main effect of emotion condition or an interaction between self-report and emotion condition. We nonetheless have a few reasons to believe that our primes were eliciting the target emotion. Images of food were deemed less appetizing when preceded by verbal disgust primes (§2.1.2) and cooking shows were enjoyed less when in the presence of disgusting

olfactory and environmental cues (§4.2). Additionally, the verbal disgust stimuli were judged by an independent group of subjects to be more disgusting than the verbal neutral stimuli (§2.1.3). This does not tell us whether subjects in our paradigms were experiencing disgust as such, but it does at least provide evidence that the disgust primes behave the way we would expect them to in normal settings.

A failure to uncover increased self-report disgust in future disgust manipulations, however, would still allow for the possibility that disgust was unconsciously guiding their choices. Previous research suggests that we need not experience feelings in order to be influenced by them (Winkielman, Berridge, & Wilbarger, 2005; Winkielman & Berridge, 2004), and that being unaware of primes can actually bolster their effect (Schwarz & Clore, 1983; Murphy & Zajonc, 1993). Schnall, Haidt, et al. (2008) and Lerner et al. (2004) found that, even though their subjects did not report higher disgust in the experimental condition, the disgust manipulation still exacted an influence on decisions in the predicted direction. Work presented here (with olfactory cues; §4.2) suggests that, at least in some cases of hedonic disgust, a lack of conscious awareness of an emotion can facilitate its effect.

While our studies repeatedly uncovered evidence for the existence of enjoyment enhanced by disgust, they did not show that disgust primes *always* lead to such an enhancement. For example, while verbal disgust primes consistently made subsequent humorous material funnier, olfactory and environmental cues had no discernible effect on humorous material (§§2.1.5, 2.2.3, 4.2). Similarly, disgust had no effect on enjoyment of landscape art (§3.2), and only marginal enhancement of enjoyment of grotesque art (§3.4). It seems there are important boundary conditions on how and whether disgust will influence our enjoyment of humor and art, which we are only just beginning to sort out.

To a certain extent, our interpretation of these results has just as much to do with how priming methodology works as it does with how disgust works. An assumption

we have made throughout this document is that incidental emotion can be treated as equivalent to emotions integral to the target of judgment. The question of how these two might function differently has not been systematically studied, though the available evidence suggests that the two are comparable in their effects. For example, trait disgust sensitivity (integral) and disgust induction with an odor (incidental) both increase anti-gay sentiment (Inbar et al., 2009, 2012). In our studies, the dirtiness of a cartoon (integral) and verbal disgust primes (incidental) both increased the funniness of a cartoon (§2.1.1, 2.1).

As discussed in Chapter I, one reason that incidental mood inductions are commonly used is they provide a means of teasing apart causality, a virtue absent in correlational studies. Future investigations need not choose between correlational data and experimental manipulation of incidental emotions. An alternative method would be to make the object of judgment systematically more disgusting: adding a line to make a dirty joke even raunchier, or a visual shot to make the adventurous eating show even grosser. Such manipulations are generally more difficult to implement than incidental emotion inductions—close attention is required to not systematically change other factors about the experimental stimuli, such as making them longer, or less natural—but they would complement the existing studies. A good example of this method from the literature comes from Shurcliff (1968), who made subjects anxious by telling them they would have to handle a tame rat or draw blood from a vicious rat. When subjects went to the cage to perform the task, they found a rubber rat waiting. Subjects were then asked how funny the situation was. In this case, the situation eliciting the anxiety was the same as the situation being judged, thus allowing for stronger conclusions about the functional relationship between the two.

Beyond its requirement that we assume incidental and integral emotions are equivalent, mood induction is a finicky methodology for a host of reasons. If subjects become aware of the prime, or aware that the prime may affect behavior, they will

often adjust their judgments to compensate for it (Schwarz & Clore, 1983; Bargh, 1994; Higgins, 1996). In addition, the prime must be strong enough to drown out the ambient noise of all the other incidental factors that are going into the behavioral output. Successful priming methodology boils down to a delicate balancing act between getting a prime that is strong enough to be heard above the din, but not so loud that we notice its presence and correct for it. Some disgust researchers have reported that their attempts with more powerful disgust primes have failed for just this reason (Inbar et al., 2012), and others, who have attempted to modulate the quantity of emotion in order to give rise to a commensurate modulation in the direction of the effect, have failed (Schnall, Haidt, et al., 2008; Shurcliff, 1968).

Technically, we did not show that people enjoy feeling disgusted, only that they enjoy certain activities shortly after being disgusted (or primed with disgusting stimuli). Since disgust comprises several dimensions beyond its negative hedonic tone, we are not able to pinpoint negative affective valence as a determinant in the observed effects. Negative affect is the most obvious shared trait between sadness and disgust primes, both of which led to increased funniness ratings (§2.1). But they share other traits, such as both being more interesting than the neutral primes, and having greater emotional intensity than the neutral primes. These studies have succeeded in showing that incidental disgust and sadness primes can lead to increased enjoyment of activities, which is a novel finding, but they cannot make any definitive claims about whether it is the negative affective experience *itself* that leads disgusting stimuli to be enjoyed in these contexts.

### **5.3 The How and the Why of Hedonic Disgust**

The studies in this dissertation were chiefly concerned with demonstrating the existence of hedonic disgust. Nonetheless, the studies allow us to sketch a rough outline of what the mechanism of hedonic disgust might look like.



First, these results are not the result of transference of arousal. The most obvious reason for this is disgust is a low arousal emotion, both when measured by self-report (Stark et al., 2005; Fontaine et al., 2007) and psychophysiology (Levenson, 1992). Disgust is not just low arousal *for an emotion*, it lowers measures of autonomic arousal such as heart rate and skin temperature when compared to *baseline* neutral states (Ekman et al., 1983; Levenson et al., 1990; Stark et al., 2005). Likewise, sadness, the classic “low arousal” emotion, has a facilitative effect on humor enjoyment, making arousal a poor explanation for this effect (§2.1).

Second, these results are unlikely to be an artifact of a generalized contrast effect. This is because the objects of judgment are sometimes unpleasant themselves (e.g. the moral violations in §2.2, the grotesque paintings in §3.4), and emotion-congruent effects obtain for select pleasant activities (e.g. food judgments in §§2.1.2, 4.2). An appeal to a contrast effect would not explain this pattern of responses. Nonetheless, it may be the case that ‘contrast’, broadly construed, is valued for certain types of judgment. Theories of humor variously stipulate surprise, relief, and incongruency as a source of mirth (Freud, 1905/1963; Koestler, 1964; Berlyne, 1972; Apter, 1982; Hurley et al., 2011); these are all properties that negative emotions could have if placed in a humorous context. It has also been suggested that the appeal of benign masochistic phenomena derives from the pleasure of removing the offending stimulus (Burke, 1759/1998; Bloom, 2010; Rozin, Guillot, et al., 2010). To the extent that contrast plays a role in these effects, it may speak to the importance of contrast dynamics to the phenomenon, rather than an artifact of the research design.

Emotions comprise several dimensions: the way they feel (affect), cognitive appraisals, physiological responses, and behavioral output. Many of these dimensions are shared among more than one different emotion. For example, both fear and anger increase heart rate (Ekman et al., 1983), both hope and jealousy are characterized by feelings of uncertainty (Fontaine et al., 2007), and both disgust and guilt typically

lead to avoidance (Smith & Ellsworth, 1985). The generally combinatorial nature of emotions has led many contemporary theorists of emotion to argue for an infinite spectrum of emotion comprised of constituent parts, with no basic emotion underneath (Ellsworth & Scherer, 2003; Barrett, 2006). While the behavioral and neural evidence increasingly favors this view (Barrett & Wager, 2006; Wilson-Mendenhall, Barrett, & Barsalou, in press), it is nonetheless the case that some traits can be unique to, even characteristic of, an emotion (or a single cluster of very similar emotions). For example, only disgust leads to the activation of the gag reflex, to implicit beliefs about biological contamination (Mulken, Jong, & Merckelbach, 1996; Brown & Harris, 2012), and, perhaps most obviously, to the canonical disgust face (disgust is the only emotion that raises the levator labii muscle; Vrana, 1993). The fact that emotions can contain idiosyncratic properties may contribute to the popular notion that emotions have an essential, indivisible core.

Since disgust contains emotion-specific properties, there could be aspects of it that uniquely contribute to the hedonic reversal, especially in specific cases. It's quite possible, for instance, that disgust is the only negative emotion that potentiates enjoyment of adventurous eating shows. At the same time, since disgust is partially comprised of units that are shared among other emotions, disgust need not be exceptional in its ability to give rise to positive evaluations. If the cause of the effects reported here are the result of traits that disgust shares with other emotions, then any other emotion could have the same effect on judgments, and for the same reason. One explanation for why disgust, sadness (§2.1), fear (Shurcliff, 1968), and horror (Cantor et al., 1974) all increase judged funniness is that they all operate by way of the same underlying mechanism, such as that humor is enhanced by incongruity, emotional intensity, or mild doses of misery (or all three). Even if a shared cognitive mechanism cannot explain all these effects, disgust is almost certainly not unique in its ability to generate hedonic reversals, since benign masochistic activities run the

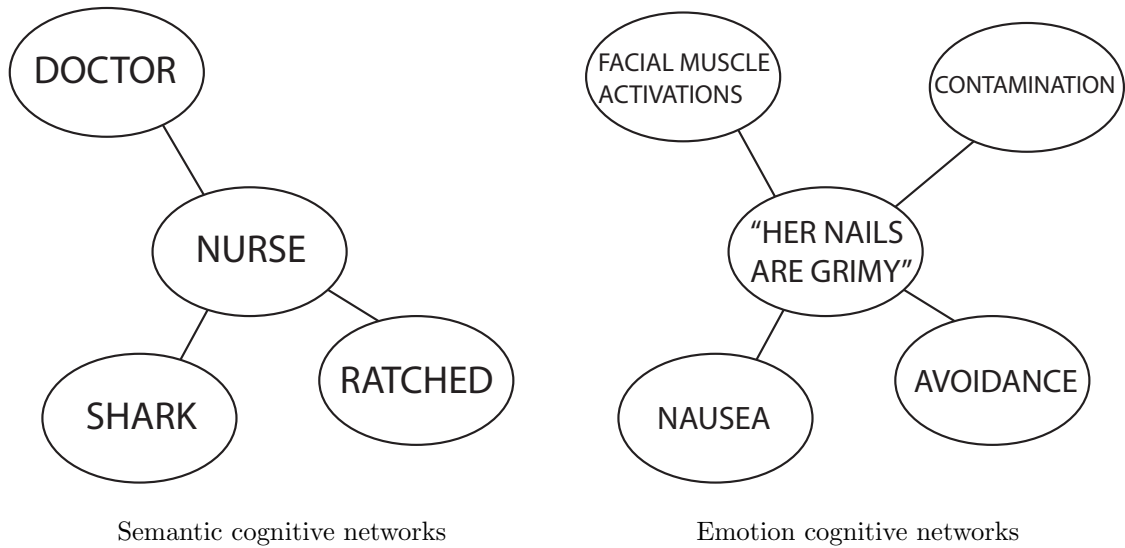


Figure 5.1: Schematic representations of how information is stored in the brain, with semantic and emotional information both susceptible to spreading activation.

full gamut of possible negative affective states, including sadness, fear, disgust, anger, and pain (Rozin, Guillot, et al., 2010).

So far in this document we have not delved into what the cognitive mechanism could be that leads to hedonic reversals. While it is too early to make any strong commitments to what this mechanism might be, in the interest of constructing a theoretical foundation for understanding our results, we will present one possibility.

A major account for semantic priming is spreading activation, wherein the activation of one concept triggers semantically related concepts (Collins & Loftus, 1975). If a person has just read the word nurse, concepts such as doctor, shark, and Ratched will become more accessible (see Figure 5.1). This organization of knowledge explains the reduced reaction time between semantically primed words and increased likelihood of filling in word-stem completion tasks with semantically related concepts (Meyer & Schvaneveldt, 1971; Warrington & Weiskrantz, 1970).

Emotion priming appears to proceed in much the same way, with activation of one node in the network potentiating the concomitants of that emotion. If a person has just read one of our verbal disgust stimuli, “Her nails are grimy”, this sentence

activates a constellation of related nodes (Figure 5.1). These nodes could include conceptual beliefs (such as contamination), affective sensations (feelings of nausea), somatic effects (activation of facial muscles), and behavioral tendencies (avoidance, cleansing). An executive mechanism is required to mediate whether any of those activated nodes will be incorporated into downstream processes, including any judgments we happen to be making during this time frame. Feelings-as-information theory, which stipulates that we decide whether a feeling is relevant before applying it to a judgment, effectively posits such an executive mechanism (Schwarz, 2012). Other social cognition theorists arrive at similar conclusions, such as Higgins (1996), who argues that accessible knowledge must have applicability and judged usability in order to be effective. The characterization of emotion priming as comprising early activation which is immediately followed by pruning for the applicable content is consistent with evidence from the semantic priming literature, which shows that lexical activations are suppressed shortly after they are deemed irrelevant to the context (Swinney, 1979).

Thus, only a subset of the activated nodes from the emotion prime may be selected for inclusion in the subsequent judgment. In the example given, the aptness executor may consider the discomfort from the aversiveness of the prime, or the taboo violation of not having clean hands, or the emotional intensity, as pertinent to the assessment of funniness in a temporally close punchline. Activations in other nodes not deemed relevant in the context are suppressed or ignored. Likewise, when judging the moral probity of homosexuality, activations to the contamination and avoidance nodes may be considered relevant (at least by some), which would then feed into a negative evaluation.

This theory has several strengths. It explains the data in a way that is consistent with several disparate but related models in the literature. It also provides a framework for understanding why emotion priming is often (but not always) congruent: the

spreading activation is, in essence, a network of congruent nodes (although there are bound to be exceptions: just as “black” primes “white”, feelings of dirtiness prime cleanliness behavior; Zhong & Liljenquist, 2006). When we speak of emotion priming we can retain the fundamental idea of that, least in the early stages, emotions prime conceptually related networks. It also specifies a cognitive stage that departs from simple congruency theories (e.g. Bower, 1981, 1991), by positing an intermediary between the activated nodes and the subsequent judgments. This would allow the same emotion prime to give rise to completely different kinds of judgment across different contexts. This theory further affords that conceptual replications with the same emotion (e.g. two different disgust manipulations) could have differential effects, since these manipulations will inevitably prime slightly different portions of the network. Finally, this theory has the power to explain why incidental emotion primes and integral emotion activations are so often confounded, since they would both trigger spreading activations in emotion networks in close temporal proximity to the judgment.

The model described above provides a proximate explanation for *how* hedonic disgust could be cognitively instantiated. We might also ask *why* minds might be designed this way, allowing for situations where discomfort (or some other aspect of disgust) gives rise to a favorable evaluation. There are a few possibilities, but we will discuss the most likely.

Several scholars have identified the removal of an unpleasant stimulus as a potential source of aesthetic pleasure (Burke, 1759/1998; Bloom, 2010; Rozin, Guillot, et al., 2010) and mirth (Freud, 1905/1963). Under this view, we do not enjoy negative sensations so much as how we feel once the negative sensation is removed. This view is consistent with research showing that the subjective experience of pleasure and pain is contingent on the preceding stimuli; for example, cold water which is normally aversive will seem pleasant if one’s hand has just been immersed in even colder water

(Anderson & Pennebaker, 1980). A problem with this view is that people enjoy these activities while they are still happening; we do not enjoy spicy food only after we've swallowed it, or the medical exhibit only after we've left the room. Nonetheless, a more subtle form of relief could be at play, for example in the knowledge that, though one is feeling fear on a roller coaster, there is no real danger, and though one feels nauseated at the thought of eating bugs, they are perfectly harmless to eat.

A theme universal to almost all hedonic reversals is that they deliver negative sensations in a safe context.<sup>1</sup> The low risk aspect of these activities has led some to suggest that their function is to allow us to master our emotions, or practice these scenarios in a safe context (Bloom, 2010). This view is echoed in theories of humor that center around its role in play behavior (Darwin, 1872/2002; Berlyne, 1969; Ramachandran, 1998; Gervais & Wilson, 2005). While there may be some truth to this, it doesn't seem likely that it would be adaptive to learn to temper our emotions with such simulations (especially if the result of such simulations is desensitization to their impact). There is little evidence that these activities do have beneficial or pedagogical effects, though this is a line of research in its early stages of exploration (Mar & Oatley, 2008).

A related idea is that, in a more general sense, information is valuable. Exploratory behavior is essential to most organisms so that they can procure resources from their environment. Thus, stimulation, especially novel stimulation, can be rewarding even when it is slightly unpleasant. Rats, for instance, will forgo a food reward for the chance to explore new environments. Many theories of motivation posit that there is reward simply to arousal and stimulation, and is not limited to experiences that are purely positive (Hull, 1943; Hebb, 1955; Berlyne, 1969). In this sense, all emotional states, regardless of affective valence, serve as a heuristic that new information is at

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<sup>1</sup>Not all examples of benign masochism are risk-free. For example, skydiving carries with it a .001% chance of death, which is surely higher than staying at home on the couch. Then again, skydiving is substantially safer than jumping out of an airplane without a parachute, and it delivers nearly all of the same thrill, so comparatively speaking it is benign.

hand. The value of emotional information is implicit in our interest in emotionally-charged images: when people are allowed to view pictures freely, they spend the least time looking at emotionally neutral pictures, looking longer even at the negative valenced and low arousal ones (Bradley et al., 1992; Lang, 1995).

It's possible, then, that benign masochism is a function of our desire for novelty and sensation, which itself reflects a drive to learn about the world around us. Hedonic disgust may have less to do with the need to practice simulations in a safe context than it does with the simple joys of new sensations (which are all the more palatable when they pose no immediate danger to us). This would not be inconsistent with accounts about hedonic reversal that identify the locus of reward in the curiosity and interest they give rise to (Carroll, 1990).

These are not mutually exclusive explanations; any or all of them could account for the existence of benign masochism. What these explanations do give us a sense of is that hedonic disgust, far from being paradoxical, can be the result of an adaptive feature of the human mind.

We are only just beginning to get an idea of how negative emotions like disgust can be enjoyable. Although our current understanding of this phenomenon is admittedly incomplete, this line of work opens up new, previously unexplored territory in emotions research, which will eventually allow us to give a complete account of the many guises that emotion takes across diverse contexts.

## APPENDICES



## APPENDIX A

### Scrambled sentences

These sentences were modified and augmented from those used in Schnall, Benton, and Harvey (2008, personal communication).

#### *Disgust*

soil contaminated the became  
fruit disintegrated the mushy  
patient the hemorrhaging was  
messy is desk your  
sullied are linens their  
was pond the murky  
smelled cabbage the nasty  
was bread the moldy  
armpits sweaty her were  
grimy are nails her  
tainted they water drank  
is dusty their house  
felt his hands grubby  
was laundry the stinky  
noxious was sweat his  
sky hazy the was

#### *Neutral*

are twins they identical  
twirled umbrella her beach  
outlets are electric useful  
are pillows the cotton  
is complex plotline the  
rented lamp the was  
athletes the were swift  
ink he invisible used  
some she bought batteries  
was standard the service  
the woman spoke silent  
surface the glossy gleamed  
expensive her was ring  
natural movements her were  
money the was spent  
cards they late played

#### *Sadness*

was all she alone  
bleak looks the future  
somewhat looks she blue  
spirit broken her was  
brokenhearted left she him  
the crestfallen children were  
at night cries she  
feeling been he's dejected  
teenager depressed was the  
was the town desolate  
despair her she hides  
men they were desperate  
face woeful was her  
was the drab decor  
was aftermath devastating the  
were despondent orphans the

*Disgust*

was stench the repugnant  
 everywhere urine the splattered  
 consumed meat he spoiled  
 unsanitary the hospital was  
 was apartment his squalid  
 smudged was face his  
 knuckles her were scaly  
 he the sheets soiled  
 vile the slug writhed  
 dingy the is basement  
 was foul the odor  
 was blanket cruddy the  
 is procedure the unhygienic  
 very are birds disgusting  
 was keyboard the grungy  
 bloody ached the tendons  
 was festering pus the  
 pipe was scummy the  
 the musty was suitcase  
 pigs creatures dirty are  
 looked eyes cloudy her  
 has pink he eye  
 the oozed infected wound  
 became the muddy field  
 was attic the infested  
 wall defiled he the  
 milk putrid the was  
 lips were scabby his  
 rotting fish was the  
 feathers oily were its  
 clammy her skin was  
 the was sewage green

*Neutral*

over the is contest  
 was change there gradual  
 bunnies are the furry  
 tree short grew the  
 always are they active  
 the ball bounced red  
 had he hair bleached  
 she keys found gold  
 uncle his famous is  
 sturdy plastic was it  
 secure is password the  
 quotation the was literary  
 was frosty windshield the  
 read books they long  
 detailed is the design  
 running often she goes  
 package was the transported  
 dynamic group the was  
 style his modern was  
 him calculus basic confused  
 he hardly fast was  
 lives her near he  
 was wagon the covered  
 his he findings recorded  
 was wise prophet the  
 are loud their instruments  
 the porcelain are dishes  
 local thrived the market  
 the long was lecture  
 sparkly wore she accessories  
 the dog barked cute  
 they up early closed

*Sadness*

dog faithful died his  
 is his dim outlook  
 was disappointed terribly she  
 was accident disastrous the  
 the was discouraging news  
 was disenchanted the poet  
 his dismal prospects were  
 her was pointless distress  
 were eyes her downcast  
 downhearted was he quite  
 broken dreams her were  
 day dreary the was  
 were wasted efforts their  
 felt empty life his  
 she low energy had  
 test the he failed  
 failure was a he  
 she forget to wants  
 looked the figures forlorn  
 can friends drift apart  
 at he frowned her  
 gloomy the clouds were  
 seem they both glum  
 end good times all  
 voice was his grave  
 grieved the old women  
 luck has unfortunate he  
 animals zoo unhappy are  
 was uninviting the atmosphere  
 wept widow softly the  
 was play tragic the  
 was the priest troubled

*Disgust*

was the rancid beef  
 was trashcan leaking the  
 were membranes the mucous  
 fingers got his inky  
 stained was underwear the  
 was skin his flaking  
 was the decomposing log  
 was moist her tongue  
 dank felt office her  
 was mealy the orange  
 the lockerroom reeks filthy  
 was buffet revolting the  
 slovenly his is sister  
 greasy was engine the  
 were maggots the slimy  
 mucky leaves the were  
 the is bay polluted  
 got our sticky hair  
 got his infected wound  
 cawed the crow black  
 the was decaying flesh  
 cigarettes he smoked unfiltered  
 worsened blotchy complexion her  
 limbs pasty his rippled  
 snot gooey dripped the  
 is chimney the sooty  
 became the soggy toast  
 motel opened seedy the  
 was slobbery the dog  
 was odor the sickening  
 hair is unkempt her  
 intestines his were swollen

*Neutral*

priceless artifact the was  
 questions were his incessant  
 birds large ostriches are  
 chivalrous intrigued his manners  
 worsened windy the weather  
 was miser the thrifty  
 mobile robot the is  
 the close shot was  
 studied languages foreign he  
 immense the were winnings  
 lively was conversation the  
 was smooth line the  
 thorough ceased the exploration  
 seemed future clear seemed  
 the triangles tiny were  
 arbitrary is symbol the  
 the invented he microphone  
 is resume impressive his  
 the is beeping alarm  
 slacks wore white she  
 children the eager were  
 wore suits he tailored  
 differences matter small don't  
 work comprehensive is her  
 the was new building  
 glowing the light flickered  
 he cash budgeted enough  
 boyfriend is her tall  
 clever was magician the  
 muscular man the is  
 wide the is river  
 far drove they away

*Sadness*

the is grim diagnosis  
 his heavy was heart  
 story is heartbreaking her  
 was the saxophonist home  
 the hopeless was situation  
 words deeply hurt their  
 felt terribly isolated he  
 was joyless her life  
 their misfortune lamented they  
 is shepherd lonely the  
 hope all lost she  
 melancholy she feels often  
 miserable was boy the  
 missed friends her she  
 always moping is he  
 morose was he quite  
 played he mournful music  
 her no one understands  
 was an she outcast  
 was sky the overcast  
 wage pitiful the wage  
 overwhelmed them the recession  
 rejected the boy her  
 felt sad quite they  
 sank boy's heart the  
 serious was his sentence  
 girl's sobbed the mother  
 solemn procession the was  
 wailed sorrow they with  
 the was sullen dean  
 confession her tearful was  
 blurred her tears vision

## APPENDIX B

### Ridiculous Moral Violations

Below are the 42 ridiculous moral violations developed for use in Study 2.2. Some of these vignettes come from, or are based on, stimuli used in previous moral psychology research (see numerical footnotes for indication of source). Figure B.1 presents the wrongness and funniness ratings for each of the items below. Figure B.1 also demonstrates that greater funniness ratings do not necessarily mean a lesser perception of moral violation. In fact, some of the funniest vignettes were also judged the most wrong (notably “Lifeboat”), calling into question claims that only harmless moral violations can be seen as funny (McGraw & Warren, 2010).

#### 1 Lifeboat \*\*

A man, along with several children, is on a lifeboat which had escaped from a burning cruise ship. The man soon discovers a hole on the side of the lifeboat. Seawater has been trickling into the boat through this hole. If the hole is not sealed soon, the lifeboat will be sitting dangerously low in the water with the risk of sinking. The man realizes the silicone dildo he had brought with him on the cruise would fit perfectly into the hole. However, if he does this he will risk all the children on the raft seeing his sex toy. The man decides to plug the hole with his dildo.<sup>1</sup>

---

\*\*Indicates stories selected, after norming, for Study 2.2

## 2 Vaccine Test \*\*

A deadly virus has spread throughout a church hospital, infecting both patients and healthcare personnel. A doctor working on a cure has developed two substances in his laboratory. He knows that one of them is the vaccine, but in his haste he has forgotten which one. Consuming the non-vaccine will lead to permanent swelling of the genitalia which will require amputation. The doctor has two former priests under his care. In the interest of saving as many lives as possible, he injects each of the priests with one of the two substances while they are sleeping.<sup>1</sup>

## 3 Footbridge \*\*

A runaway trolley is heading down the tracks toward five workmen who will be killed if the trolley proceeds on its present course. Donny is on a footbridge over the tracks, in between the approaching trolley and the five workmen. Next to him on this footbridge is a very fat man. The only way to save the lives of the five workmen is for Donny to push him off the bridge and onto the tracks below where his large body will stop the trolley. Donny pushes the fat man off the bridge in order to save the five workmen.<sup>1</sup>

## 4 Taxes

A middle school teacher is finding it hard to make ends meet. This problem is made worse by his sex addiction. It occurs to him that he can file claims for reimbursement if he declares some of his private expenses as work-related expenses. For example, he claims that the pornography he bought are educational videos for his students. He also alleges that the condoms and inflatable doll he purchased for himself are used for sex education in his classroom.<sup>1</sup>

## 5 Sculpture

Elaine is visiting the holy site of her ancestors. The site overlooks a valley where her car is parked. Elaine notices that a boulder has begun rolling down the hill towards her car. The only way to save the car is to push the site's most holy artifact, a 3,000-year-old sculpture of the god of fertility, so that it rolls into the valley and blocks the boulder. Elaine pushes the sculpture into the valley to spare the car, even though she knows her ancestor's sacred relic will be destroyed.<sup>1</sup>

## 6 Safari

Mike, his wife and his 3-year old son have been taken hostage by a group of terrorists. One of the terrorists develops a crush on Mike. The terrorist informs him that his leader intends to kill his whole family the following morning. He is prepared to help them escape, but only if Mike is willing to masturbate with his son's teddy bear in front of his family and the terrorist. Mike eagerly complies, and his family escapes, leaving the teddy bear behind.<sup>1</sup>

## 7 Architect \*\*

Mitch is a young architect visiting a construction site with his boss. Mitch's boss is a pompous man who irritates all his employees, including Mitch. It occurs to Mitch that if he were to grease the floor on the building's porch, his boss would slip and fall. Mitch puts his plan into action and the boss tumbles to the ground in front of the other workers, ripping his pants on the way down.<sup>1</sup>

## 8 Dead Rats (formerly Hired Rapist) \*\*

Bob feels that his wife no longer appreciates him. Bob's wife is afraid of rats, and years ago when she found a dead rat in the kitchen, he comforted her. They were much closer then. Bob devises a plan to regain his wife's affection: he will put dead rats in the bread box, in the pie, in the cereal, in the freezer. Upon hearing the screams from the kitchen, Bob will return swiftly to her side to comfort her, and she will once again appreciate her husband.<sup>1</sup>

## 9 Sewage (formerly Standard Fumes)

Walter is the night watchman in a hospital. Due to an accident in the building next door, raw sewage is pouring in through the hospital's ventilation system. In a certain room of the hospital are three patients. In another room there is a single patient. If Walter does nothing the raw sewage will pour into the room with the three patients and cause their deaths. The only way to avoid the deaths of these patients is to hit an emergency switch, which will cause the sewage to bypass the room containing the three patients. As a result of doing this, the sewage will pour into the room containing the single patient, causing his death. Walter decides to hit the switch.<sup>1</sup>

## **10 Sexual Favor (formerly Illegal Lunch) \*\***

Pamela is a lawyer working on a big case, and she has evidence that would exonerate her client. For an obscure legal reason, she is not allowed to present her evidence to the jury. The judge presiding over the trial happens to be her old professor from law school. Pamela remembers that when he was her professor, he often flirted with her. So Pamela goes to the judge's chambers one evening and offers to perform oral sex on him. The next day, the judge announces that Pamela can present the evidence at court after all.<sup>1</sup>

## **11 Plane Crash**

Ben's plane has crashed in the Himalayas. The only survivors are Ben and a young girl. Their only chance at survival is to make it to a small a village on the other side of the mountain, several days away. The girl has a broken leg and cannot move very quickly. Her chances of surviving the journey are essentially zero. Without food, Ben will probably die as well. The girl is exhausted and implores her companion to sacrifice her, pointing out that her young flesh will give Ben the energy he needs to get to the village. So Ben kills the girl and eat her remains over the next few days.<sup>1</sup>

## **12 Preventing the Spread \*\***

Annie is a waitress. She overhears one of her customers say that he is about to go to jail and that in his last forty-eight hours of freedom he plans to infect as many people as possible with HIV. She knows him well enough to know that he is telling the truth and that he has access to many potential victims. Annie happens to know that this customer has a very strong allergy to poppy seeds. If he eats even one he will go into convulsions and have to be hospitalized for at least forty-eight hours. So Annie sprinkles a few poppy seeds into the man's soup before serving it to him.<sup>1</sup>

## **13 Bomb**

David is negotiating with a powerful and determined terrorist who is about to set off a bomb in a crowded area. David's one advantage is that he has the terrorist's teenage son in his custody. The terrorist comes from a culture where homosexuality is a sin. David knows he can break down the terrorist's resistance by making the teenage son

drink a cup of semen. David contacts the terrorist over the satellite hook-up that he has established and, in front of the camera, forces the boy to drink his own semen. David threatens to subject the boy to more depraved acts until the terrorist relents.<sup>1</sup>

## **14 Lawrence of Arabia**

Ghengis is the leader of a small army that consists of warriors from two tribes, the hill tribe and the river tribe. Ghengis belongs to neither tribe. During the night a hill tribesman got into an argument with a river tribesman because the river tribesman slept with his wife. The hill tribe is furious and will go to war with the river tribe unless the adulterer is castrated and the tribe gets to take his dismembered penis back to their hut as a trophy. In order to avoid conflict, Ghengis publicly castrates the adulterer.<sup>1</sup>

## **15 Sophie's Choice**

It is wartime and Sophie and her two sons are living in a territory that has been occupied by the enemy. At the enemy's headquarters is a doctor who performs humiliating experiments on children. He intends to perform a genetics experiment on one of her sons that will cause him to grow a long, rodent-like tail. The doctor will allow Sophie to choose which of her children will be experimented upon. She has twenty-four hours to bring one of her children to his laboratory. If she refuses to bring one of them in he will find them both and experiment on both of them. Sophie decides to bring her younger son to the laboratory, because he is not as handsome as the older son.<sup>1</sup>

## **16 Sacrifice \*\***

Sara is a devout Christian. She, her husband, and her four children are crossing a mountain range during a camping trip. They have inadvertently set up camp on land owned by a mentally deranged man. This man says he will rape Sara unless she dresses up like a dominatrix and whips her husband and children while shouting Bible verses at them. Sara agrees to this arrangement so that the man will let her go.<sup>1</sup>

## **17 Poison \*\***

Steve and Ken are roommates. There is a rat in their apartment, and Ken made some cookies with rat poison to kill the rat before leaving



for the weekend. Steve sees the cookies on the counter. Not realizing that the cookies contain poison, Steve eats the cookie and suffers from dysentery all weekend.<sup>2</sup>

## **18 Stand \*\***

John is walking through a carnival. He comes to a stand where you can punch a mechanical target to win a prize. Unbeknownst to John, the owner of the stand happens to be squatting beneath the target. When John hits the target to win the prize, he also hits the owner and breaks his nose.<sup>2</sup>

## **19 Family Dog**

A family's dog was killed by a car in front of their house. The family had heard that in Korea people consider dog meat a delicacy, and they were curious about what it tasted like. So they cut up the body and cooked it and ate it for dinner.<sup>3</sup>

## **20 Kitten**

Matthew is playing with his new kitten late one night. He is wearing only his boxer shorts, and the kitten sometimes walks over his genitals. Eventually, this arouses him, and he begins to rub his bare genitals along the kitten's body. The kitten purrs, and seems to enjoy the contact. Matthew figures no one is getting hurt, so he continues rubbing himself against the kitten.<sup>3</sup>

## **21 Pups**

Amanda sees some puppies playing next to her driveway again and wants to kill them. She decides to go to the hardware store to buy some poison that she thinks will work on the puppies. As she pulls out of her garage, the wheel slips and she drives off to the side of the driveway. All the puppies are crushed and killed under the car. With the puppies eliminated, Amanda doesn't need to go to the hardware store.<sup>4</sup>

## **22 Chicken**

Jon goes to the supermarket once a week and buys a chicken carcass. But before cooking the chicken, he has sexual intercourse with it. He then cooks it and eats it.<sup>5</sup>

## 23 Flag

Liane is cleaning out her closet, and she finds an old American flag. She doesn't want the flag anymore, so she cuts it up into pieces and uses the rags to clean her toilet.<sup>5</sup>

## 24 Promise \*\*

An old woman was dying, and on her deathbed she asked her son to promise that he would visit her grave every week. The son loved his mother very much, so he promised to visit her grave every week. But after the mother died, her son didn't keep his promise, because he was too busy playing World of Warcraft.<sup>5</sup>

## 25 Incest

Julie and Mark, who are brother and sister are traveling together in France. They are both on summer vacation from college. One night they are staying alone in a cabin near the beach. They decide that it would be interesting and fun if they tried making love. At very least it would be a new experience for each of them. Julie was already taking birth control pills, but Mark uses a condom too, just to be safe. They both enjoy it, but they decide not to do it again. They keep that night as a special secret between them, which makes them feel even closer to each other.<sup>6</sup>

## 26 Cannibalism

Jennifer works in a medical school pathology lab as a research assistant. The lab prepares human cadavers that are used to teach medical students about anatomy. The cadavers come from people who had donated their body to science for research. One night Jennifer is leaving the lab when she sees a body that is going to be discarded the next day. Jennifer was a vegetarian, for moral reasons. She thought it was wrong to kill animals for food. But then, when she saw a body about to be cremated, she thought it was irrational to waste perfectly edible meat. So she cut off a piece of flesh, and took it home and cooked it. The person had died recently of a heart attack, and she cooked the meat thoroughly, so there was no risk of disease.<sup>6</sup>

## 27 Weight Loss Drug

Susan is an inventor. She has not been happy with her looks, mostly because she is somewhat overweight. One day, she mixes together some chemicals that she believes might cause significant and permanent weight loss. Susan takes some, and within a day, notices a substantial drop in her weight. Though Susan doesn't recall the exact ingredients or their proportions, she has some of the mixed formula left. If Susan takes the rest of the mixture, she will shave off exactly what she wants and will look great. However, Susan knows that her neighbor is dying of obesity. If Susan gives her neighbor the remaining mixture, her neighbor will lose a significant amount of weight and survive. Susan decides to take the rest of the mixture herself.<sup>7</sup>

## 28 Organ Donor

Cindy wakes up one morning and finds a strange woman next to her in bed. A man from the Society of Music Lovers introduces himself and explains to Cindy that if she agrees to have this woman, a famous violinist, plugged into her kidney, she can save her from kidney failure. Without Cindy's help, the violinist will die. The man from the Society explains that Cindy must stay plugged into the violinist for 11 months in order for her to recover. Cindy agrees. Nine months after Cindy has been plugged into the violinist, she pulls the plug and the violinist dies.<sup>7</sup>

## 29 Shoe Fetish \*\*

Brian has a shoe fetish. Sometimes he will buy women's shoes, but his favorite thing to do is take shoes from women as they are trying on clothing at the department store. He brings the shoe with him to the bathroom, where he smells and caresses it. He then brings the shoe back before anyone notices.<sup>8</sup>

## 30 Webcam

Angela is a single mother during an economic recession. She was recently fired from her job in retail and now has no way to feed her family. As she is walking home one day, a man offers to hire her for his website. The job consists of being filmed going to the bathroom and broadcasting it on the internet. Her face would not be shown. Angela has had difficulty finding a job so she decides to take this one.<sup>8</sup>

### **31 Manure Prank \*\***

A student is angry with her teacher for giving her a bad grade. So she drives by the teacher's house late one night and throws dog poo at the teacher's windows. However, the student falls short of her target. The dog poo lands in the garden instead, and ends up fertilizing the teacher's flowers.<sup>8</sup>

### **32 Modern Play**

Fredriks is a well-known playwright. In his latest post-modern play, there is a scene where actors crawl around naked onstage acting like animals, urinating and pretending to mate with each other. The mayor has called the play indecent and demands an immediate halt to the performances. But Fredriks disregards the mayor's orders and continues putting on the play in the name of art.<sup>8</sup>

### **33 Biology Class \*\***

Mr. Lombardi's biology class is learning about the reproductive system. He thinks it would be instructive if the students could look at live sperm cells under the microscope, so he asks a couple of his male students to masturbate into a beaker in the bathroom and come back with samples for the class to look at.<sup>8</sup>

### **34 Bad Blood**

Jimmy is a pedophile, but he fears getting caught. Instead of touching children, he donates his blood to the local children's hospital. He likes the idea of his blood being inside of them.<sup>8</sup>

### **35 French Chef \*\***

Pierre is the head chef at a trendy French restaurant. He has never told anyone, but he derives erotic pleasure from touching raw meat. Whenever he has to tenderize the beef, he imagines he is touching a beautiful naked woman. Of course, the passion he brings to manipulating the beef makes it especially tender and delicious.<sup>8</sup>

### **36 Sperm Bank \*\***

Gary donates to the sperm bank once a week to make extra money. He is tall, intelligent, and good-looking, so he is a popular donor. However, the only way he can make a sample is if he dresses as a giant panda. So Gary secretly brings the costume with him to the sperm bank and changes into it whenever providing a medical sample.<sup>8</sup>

### **37 Accidental Porn \*\***

Mr. Schooner is giving a talk on abstinence to an auditorium full of eighth-graders when his powerpoint presentation crashes. The screen that's open on his computer is the hardcore pornography site he had been looking at before the talk. All the students and teachers in the room see the website before he can close the window.<sup>8</sup>

### **38 Sexting \*\***

Jane is sending text messages to her boyfriend when her father comes to her room to tell her to get off the phone and do her homework. Instead of doing her homework, she keeps texting her boyfriend. Jane's boyfriend asks her to send a picture of herself in her lingerie. Jane takes the picture, but is distracted by her father's nagging, and she accidentally sends the picture to her father's cell phone instead.<sup>8</sup>

### **39 Modeling Pictures \*\***

Paul is a closeted homosexual with a wife and family. He is cleaning up in the living room when he comes across some photographs of a young man's muscular body, taken from behind. Paul peruses the pictures and becomes sexually aroused. He does not realize that these are pictures his son took of himself to send to a modeling agency.<sup>8</sup>

### **40 Taboo Food \*\***

The government of a totalitarian regime is trying to extract information from a woman they believe to be a spy. The spy is part of a cult that worships snails, and holds that consuming snail meat is an abomination against God. In order to get the information they want, the government force feeds the spy escargot until she admits where her cult's secret headquarters are.<sup>8</sup>

### **41 Voluntary Cannibalism**

Anders and Marcus meet each other on the internet. Anders has always fantasized about eating another person. Marcus has always fantasized about being eaten. So Anders and Marcus arrange to meet. Marcus commits suicide, and Anders chops up Marcus's body and eats it in stew over the next few months.<sup>8</sup>

## 42 Scroll Napkin

Harold is a tourist visiting a famous cathedral in Europe. He has brought an ice cream cone inside with him. When the ice cream cone begins to drip, he takes a scroll that was hanging on the wall and dips it in holy water, and uses this to wipe up his mess.<sup>8</sup>

<sup>1</sup> Modified from GREENE ET AL. (2008), which itself is heavily modeled on vignettes appearing in THOMSON (1976), having drawn its inspiration from FOOT (1967), and so forth into the depths of history.

<sup>2</sup> Modified from CUSHMAN (2008).

<sup>3</sup> From SCHNALL, HAIDT, ET AL. (2008).

<sup>4</sup> From MELE AND CUSHMAN (2007).

<sup>5</sup> Modified from HAIDT ET AL. (1993).

<sup>6</sup> From HAIDT, BJÖRKLUND, AND MURPHY (2000).

<sup>7</sup> From THE MORAL SENSE TEST website, accessed July 2007 (unpublished stimuli).

<sup>8</sup> Written by N. Strohminger.

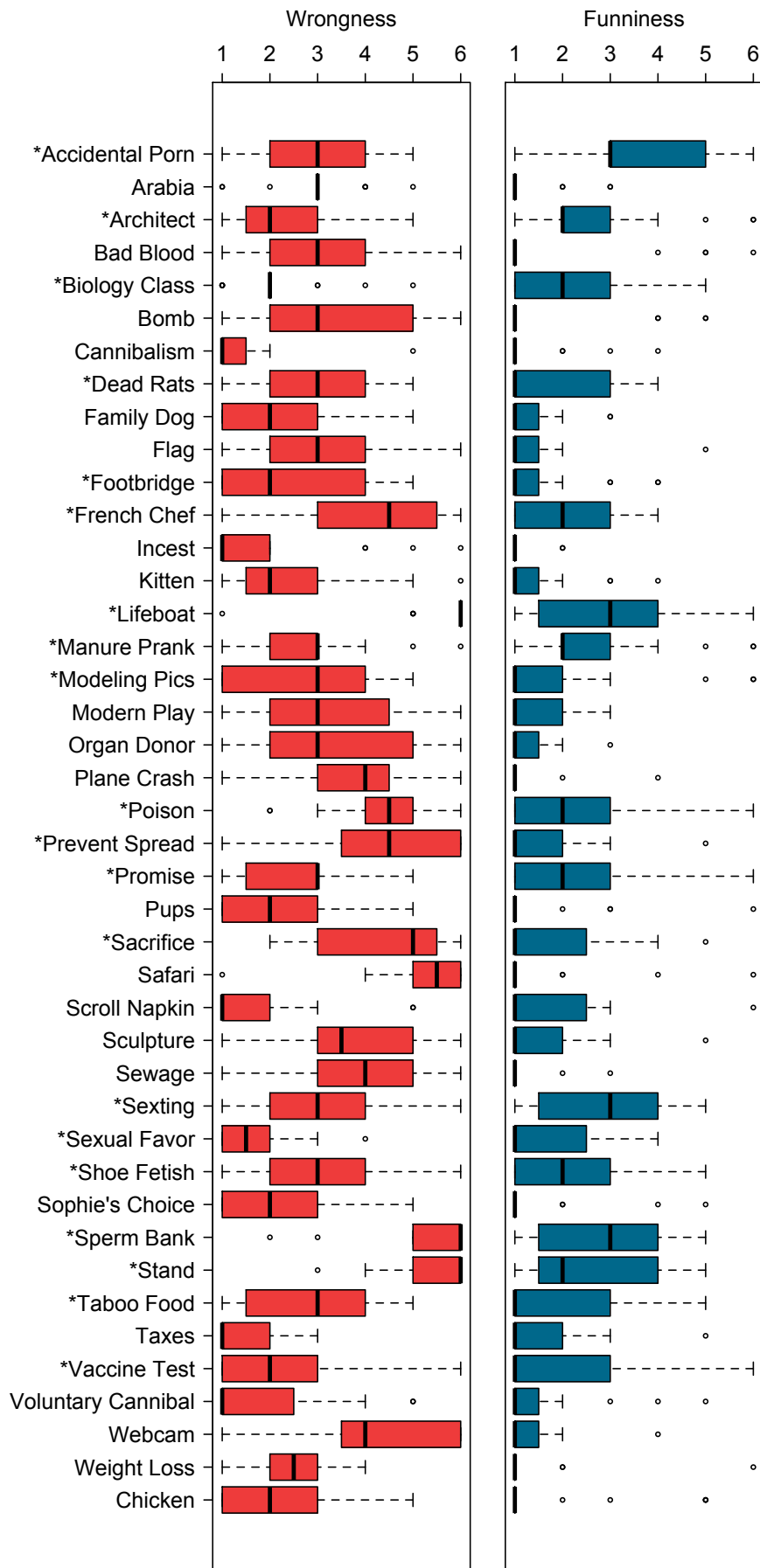


Figure B.1: Boxplot of RMV ratings for wrongness and funniness from the norming study. Asterisks indicate stories selected for Study 2.2.

## APPENDIX C

### Memory prime study

#### Methods

402 subjects ( $Mdn_{age} = 30$ , 61% female) completed an online study that lasted approximately 10 minutes. The study was presented to subjects as two separate polls.

In the first poll, participants wrote a short essay about a recent experience. They received one of four essay prompts, designed to elicit one of four different emotions: disgust, sadness, fear, or no emotion (neutral). The disgust condition specified a kitchen-related disgusting experience to ensure that core disgust would be written about. For question wording, see Table C.1.

Participants wrote for one minute, after which a button allowing (but not forcing) them to advance to the next screen would appear. Most people wrote 2–3 sentences. No one needed to be thrown out for not writing about the topic requested. Initially, there were only two essay conditions ( $N_{neutral} = 154$ ,  $N_{disgust} = 134$ ); after a preliminary analysis failed to uncover any difference between these two conditions, subjects were added to two additional negative emotion conditions, sadness and fear ( $N_{sadness} = 59$ ,  $N_{fear} = 47$ ).



Table C.1: Prompts used in the four different essay-writing conditions.

Emotion	Essay prompt
NEUTRAL	WHEN WAS THE LAST TIME YOU BOUGHT AN APPLIANCE FOR YOUR KITCHEN? What was it? What did you use it for? What other appliances have you bought for your kitchen?
DISGUST	WHEN WAS THE LAST TIME YOU FOUND SOMETHING DISGUSTING IN YOUR KITCHEN? What was it? How did you react when you found it? What other gross things have you found in your kitchen?
SADNESS	WHEN WAS THE LAST TIME YOU CRIED? What were you upset about? Does this thing still make you sad? What else makes you cry?
FEAR	WHEN WAS THE LAST TIME YOU WERE VERY SCARED? WHAT WERE YOU AFRAID OF, AND WHY? Was there an immediate physical danger, or otherwise a threat to your livelihood? In general, what things in the world have the ability to frighten you?

After the essay-writing task, subjects were asked to report the emotions they had felt while writing. We used a modification of the scale described in Coan and Allen (2007, p. 17), which is comparable to the PANAS (Watson, Clark, & Tellegen, 1988; *in* Gray & Watson, 2007). Thirteen separate emotions were measured in this manipulation check: amusement, anger, anxiety, confusion, disgust, fear, guilt, interest, joy, pride, sadness, shame, and surprise. Subjects reported the extent they felt each emotion on a 1–5 scale (1 = “not at all/none”, 5 = “extremely/a great deal”), followed by an overall pleasantness scale (scale 1–7, 1 = “Unpleasant”, 4 = “Neutral”, 7 = “Pleasant”).

Subjects then advanced to the second ‘poll’, where they were presented with one of a random selection of cartoons from a pool of 120. The cartoons were either clean or dirty, and were the same as those used in an earlier study using verbal emotion primes (§ 2.1).

## Results

Self-report indicates that each emotion condition reliably induced its target emotion better than any other measured emotion, and better than any other emotion

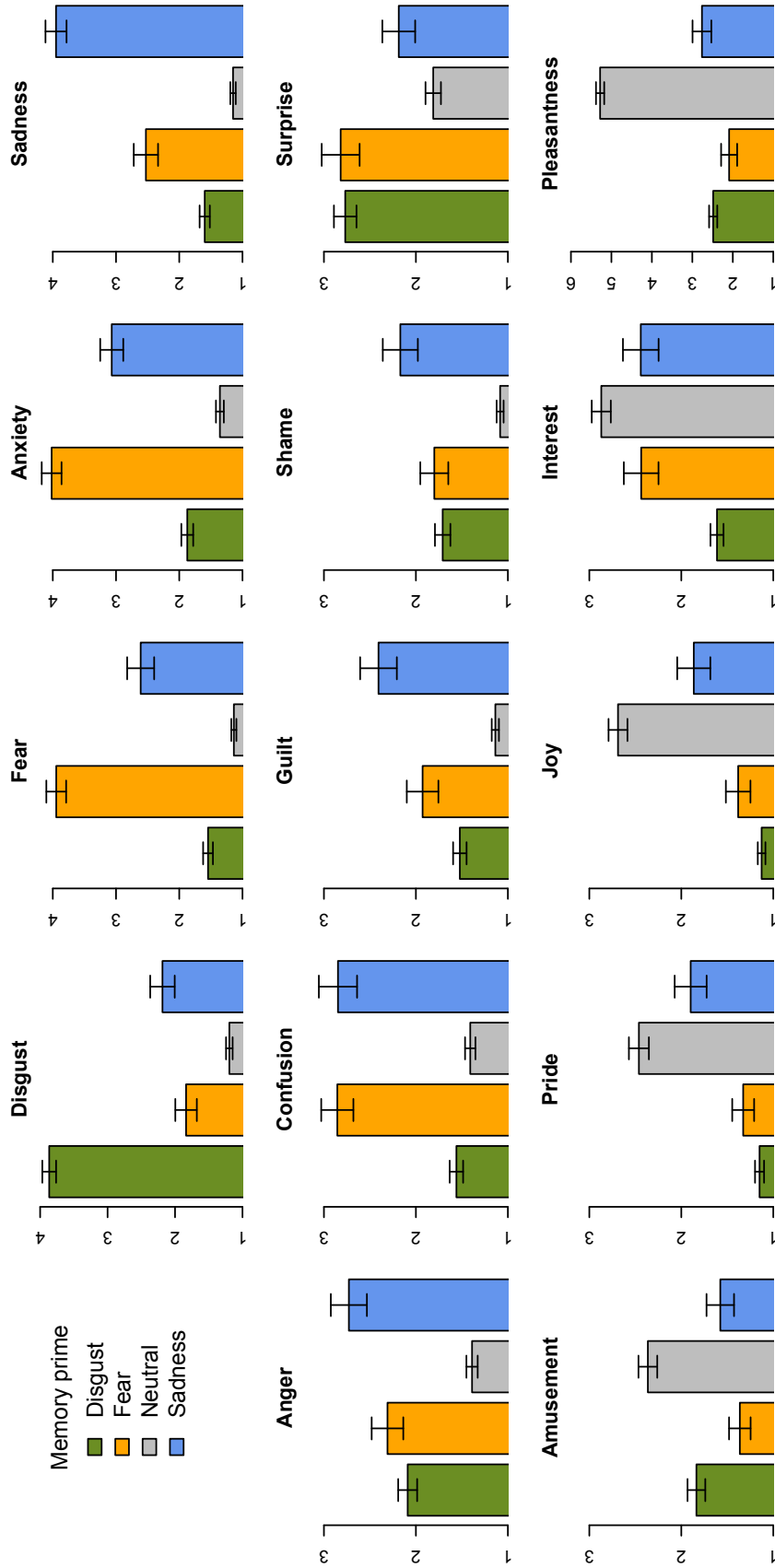


Figure C.1: Results from self-report emotions felt during the essay-writing portion of the memory study. Each emotion induction condition reliably resulted in the highest ratings for the target emotion. Note that the scale on the first row is different than the scale for the other rows, and the Pleasantness plot is also on a different scale. Whiskers represent 95% confidence intervals.

condition did (Figure C.1). For example, people in the disgust essay condition reported they felt disgust while writing their essay more than any of the other twelve emotions we asked them about. The disgust essay also elicited disgust more reliably than the other essay-writing conditions. The one exception was the fear condition, which elicited fear and anxiety to an equal degree. Since fear and anxiety are closely related states, these terms may not be meaningfully different for respondents.

In the disgust condition, people unerringly wrote about core disgust elicitors: mold, rotting food, dead animals, vermin, maggots. A typical response reads: “Today I found dog vomit on the kitchen floor. I almost threw up myself when I saw it. I’ve found dead cockroaches several times and slimy hairballs from the cat. Also, I’ve found rotten food in the refridgerator [sic] many times and rat feces in the pantry. It is really disgusting to find that rats or mice have been chewing into you [sic] cereal and other boxes of food and leaving their little droppings on everything.” In the sadness condition, the most common responses for the last time people cried were to personal loss or other failures within social relationships. Financial and medical hardships were also mentioned with a fair degree of frequency. A typical response reads: “I last cried yesterday. I miss my son. It makes me very sad because I live far away and can’t afford a plane ticket to go visit him. It’s actually making me cry now thinking about it. Sad movies or books make me cry too.” Interestingly, a large proportion (almost 20%) of respondents mentioned works of fiction (movies, books, or plays) as being the last time they cried. The fact that leisure pursuits give rise to such a large proportion of the total instances of crying in people’s daily lives speaks to the ubiquity (and popularity) of benign masochism for sad experiences. In the fear condition, people most often mentioned brushes with death (a bumpy airplane ride, walking through a dangerous neighborhood, a hospital trip). In the neutral condition, people tended to describe nice products that they were happy with. This is confirmed in the self-report scores, where the average pleasantness rating ( $M = 5.28$ ) was higher

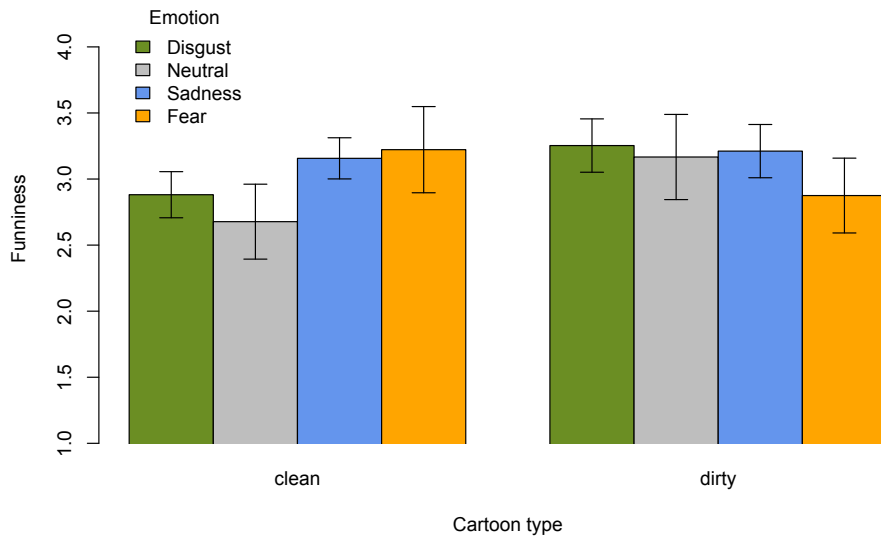


Figure C.2: Effect of four different emotional states on funniness judgments of clean and dirty cartoons. Whiskers represent 95% confidence intervals. All comparisons are non-significant.

than the midpoint of 4. So, while the control condition effectively avoided eliciting predominantly negative emotions, it was also not completely emotionally neutral. The challenge of coming up with a truly neutral control condition in priming studies is an ongoing one for researchers; see Chapter V for further discussion.

When all negative emotion conditions are compared to the neutral condition, no difference in humor judgments emerges, even when incorporating cartoon type into the model. Both the main effect of emotion ( $t = 1.1$ ,  $p = .28$  for main effect of emotion) and the interaction effect ( $t = .57$ ,  $p = .57$ ) were nonsignificant. The four emotion priming conditions, when considered separately, were also not significantly different from one another (all pairwise comparisons *NS*).

One limitation of this emotion induction paradigm is that the stimuli are self-generated, so everyone receives different priming stimuli.<sup>1</sup> We can try to account

<sup>1</sup>To a certain extent, this problem plagues all priming designs, since there will not be uniform response even when the stimuli are kept constant. And self-generated stimuli have the potential to be more effective than experimenter-generated stimuli, since the emotional resonance is tailored to the individual. Nonetheless, variance in past experiences, and ability to remember and vividly imagine past experiences, can all introduce impediments to uniformly inducing the target emotion.

for this variability by including the degree to which the emotion was experienced, according to self-report.

A simple Pearson product-moment correlation revealed no relationship between the degree to which emotions were felt (across priming conditions) and response to the subsequent humor judgment. This was true whether looking at the combined (additive) score for all emotions ( $r = .03$ ,  $p = .54$ ), looking at only the additive score for negative emotions (composite of anger, anxiety, confusion, disgust, fear, sadness, shame;  $r = -.009$ ,  $p = .86$ ), looking at the overall valence (pleasantness) score ( $r = .06$ ,  $p = .26$ ), or looking at individual emotion self-reports, such as disgust or fear (all correlations for individual emotions *NS*). Therefore, neither overall emotionality, negative affect, or individual emotions in the essay-writing portion predicted the degree to which subjects subsequently enjoyed the cartoons.

When these scores are incorporated into a linear mixed effects model, the results are equally uninformative of cartoon enjoyment. For example, self-report disgust failed to reveal any interesting between-emotion condition differences in humor response ( $t = 1.05$ ,  $p = .32$ ), nor was there an interaction effect in funniness between emotion condition and self-report disgust ( $t = 1.29$ ,  $p = .21$ ). Overall negative emotions score had no effect on judgment ( $t = .16$ ,  $p = .92$ ), nor did overall level of emotionality ( $t = .91$ ,  $p = .38$ ). Affective valence did not predict how funny the cartoon would be rated ( $t = 1.27$ ,  $p = .20$ ; all other comparisons in this model *NS*). Including the other primary emotion categories was similarly unenlightening.

## Discussion

Using memories of past experiences as an emotion prime had no effect on subsequent humor judgments. Three separate negative emotional memories, including disgust, had no effect on enjoyment of cartoons, whether to one another, or compared to a neutral control condition. The degree to which emotions were experienced, as measured by self-report, also made no difference in how the cartoons were rated.

These null effects go against both our hypotheses and the prevailing wisdom that emotional effects are congruency-based. They also go against previous experimental work showing that incidental fear and anxiety can increase amusement (Shurcliff, 1968; Cantor et al., 1974).

Given the failure to find any kind of emotional effect on these judgments, these results may be more profitably thought of as a limitation of the priming methodology rather than a failure to conceptually replicate previous findings. These results may point to the fragility of emotional priming methods more generally: several factors go into whether an incidental emotion will or will not have a net effect on behavior. One reason is that people can discount an incidental emotional state, especially if they are made aware of it before the target judgment is made, for example by making a self-report of the emotion (Schwarz & Clore, 1983). The self-report scale also increases the amount of time that passes before getting to the target judgment, thus allowing the emotion trace more chance to fade. Most of our past experiments have used repeated measures; this was a single-trial design (one memory, one judgment). The single emotional prime may not have been strong enough on its own, and having only one opportunity to see how the emotion affected humor judgment for each subject may have also reduced power. Proper experimental priming paradigms are engaged in a balancing act between having the emotion be strong enough that it's 'louder' than the noise created by other incidental factors (such as the subject's previous mood, their level of attention to the task, and the strength of their baseline judgment), but not so loud or obvious that the experimenter's intention is revealed.

It is certainly possible that this experiment reveals a legitimate boundary condition to the concepts under study: maybe memories serve as a bad prime for affecting humor judgments, and humor is only affected by a limited set of emotion inducers. It bears noting that the methods used here were modeled after methods used successfully by other researchers, and in fact were developed on the basis of guidance

provided from an emotion elicitation handbook (Coan & Allen, 2007). We were not using a novel or untested methodology, though it is one that does not appear to have been used for humor judgments before.

Another possibility is that the positiveness of the neutral condition gave humor ratings a boost in the same way as the negative emotions did, thereby leading to no net difference in ratings. This possibility is made less plausible by the observation that people who reported low levels of emotion, or neutral levels of affect, performed no differently on the task than those who reported strong emotional states. Nonetheless, a more emotionally neutral control condition would allow us to make that conclusion more definitively.

If nothing else, this experiment serves as a caution against strong generalizations made about the effects discussed elsewhere in this document. One of the themes running through this dissertation is that we should hesitate from saying that any given emotion always has the same kind of effect on downstream judgments. The same emotion can have opposing influences on judgment, and frequently, that emotion will have no measurable effect at all. The conditions outlined in this experiment provide one example of where negative emotions have no net effect on humor judgments. A task for future research will be outlining the precise conditions that can lead to the negation of an emotion's influence on judgment.

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