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Evaluative Mind: Extraneous Influences on Morality, Aesthetics, and Perception

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EVALUATIVE MIND: EXTRANEOUS INFLUENCES ON MORALITY, AESTHETICS, AND PERCEPTION

by

ANGELIKA L. SEIDEL

A dissertation submitted to the Graduate Faculty in Psychology in partial fulfillment of the requirements for the degree of Doctor of Philosophy, The Graduate Center of the City University of New York

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This manuscript has been read and accepted for the Graduate Faculty in Psychology in satisfaction of the dissertation requirement for the degree of Doctor of Philosophy.

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Abstract

Evaluative mind: Extraneous influences on morality, aesthetics, and perception

by

Angelika L. Seidel

Advisor: Stefano Ghirlanda, Jesse Prinz

In a series of experiments I examine extraneous factors that influence evaluative judgments and perception. Specifically, I focus on two kinds of evaluative states: moral evaluation and aesthetic evaluation. I use the domain of morality to explore the impact of emotions on moral value. I use the domain of art to explore influence of spatial features such as size and position, as well as attributions of fame of artist on aesthetic value. I show ways in which evaluation goes beyond the thing evaluated. I will in addition conclude with some exploratory work on valenced visual object recognition. This relates to the work on moral cognition by showing that emotions can influence perceptual judgment and also extends the general theme of this research by showing another domain where the response to a stimulus may go beyond the thing under consideration.
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CHAPTER 1
GENERAL INTRODUCTION

According to a traditional picture, the mind is neatly divided into independent systems that take on different responsibilities. For example, perception is for processing sensory inputs, thinking is for forming judgments about what is the case and solving problems, and emotion is for behaviorally reacting to events that bear on well being. It is sometimes assumed that these systems pass information to each other in a fixed sequence: we perceive the world, form a judgment about it, and, in some cases, the judgment causes an emotion, which motivates us to act. Within these systems, it is traditionally presumed that every domain has a restricted set of inputs to which is might respond. For example, in forming aesthetic judgments, it is often assumed that the formal qualities of a work (e.g., the colors on a canvas or the sounds of a symphony) are the primary, or perhaps even exclusive, source of information. The research presented here explores ways in which this tidy picture might require revision. Systems can communicate in ways that break from the traditional sequence, and information flows in ways that violate the assumption that domains are strictly regimented.

To explore this issue, I investigate three domains: moral judgment, aesthetic judgment, and perception. The first two domains have much in common: they are evaluative. Some judgments concern matters of objective fact: how things are regardless of out attitudes. With evaluations, we bring preference to bear, and assess things and good and bad. Because of this, these may be domains were factors other than mere evidence from the world may be important. Evaluative judgments may depends on going beyond what is presented to us, since they require our take on things. This openness to other factors may make such judgments vulnerable to extraneous influences: impact of factors that one might think, on refection, are not pertinent (or not pertinent in the right way) to judgments we are making.

The impact of extraneous factors is not limited to evaluative judgments. It can arise in perception, or perceptual judgment, as well. Perception is traditionally said to present the world as it is. But the current state of an organism may play a role in what gets perceived or how perception is interpreted. One might put this by saying perception is not neutral.

The first parts of the thesis concern morality and art. What factors influence people’s moral and
aesthetic judgments? How do we determine that an action is pleasing or that Goya’s *Saturn* (1823) is disturbing? In the *Enquiry Concerning Human Understanding*, David Hume, the 18th century Scottish philosopher proposed a striking thesis that, “morals and criticism are not so properly objects of the understanding as of taste and sentiment. Beauty, whether moral or natural, is felt, more properly then perceived.” Inspired by this insight, I sought to explore the impact of extraneous factors on evaluative cognition. Here I will focus on two kinds of evaluative states: *moral evaluation* and *aesthetic evaluation*. I use the domain or morality to explore the impact of emotions, closely following Hume’s insight. With aesthetics, I expand to consider other factors, including size, position, and attributions of fame to the artist. These examples illustrate ways in which evaluation goes beyond the thing evaluated (e.g., the moral situation or the colors and shapes in a painting), and include emotion, the way something is presented, and background knowledge.

I will in addition conclude with some exploratory work on valenced visual object recognition. This relates to the work on moral cognition by showing that emotions can influence perceptual judgment as well. It also extends the general theme of this research by showing another domain where the response to a stimulus may go beyond the thing under consideration. What we see in the world may depend on current valenced states.

In this introduction, I will begin by reviewing empirical and theoretical work on morality and emotion, since the majority of the research presented below falls into this domain. Work on morality has also been a source of inspiration for the larger project: the aesthetics work moves from morals to another evaluative domain and the perception research draws on the methods of emotion induction used in the morality studies. After discussing morality and emotion more generally, I will turn to the emotion research in this body of work, and then to the two other domains.

1. Emotion and morality

1.1 Theories linking emotion and moral judgment

We are living through an “affective revolution” in moral psychology. A growing body of empirical literature continues to demonstrate that affective “gut reactions” influence moral judgment and behavior (for a review, see Haidt, 2007). This insight is not new however; it was argued convincingly by David Hume, who linked moral judgment to the “work of the heart affective feeling or sentiment” (Hume,
Hume believed that we make moral judgments by introspecting how we feel, and crucially, different emotions underwrite different judgments. In response to Hume’s “sentimentalism,” Kant (1785/1959) developed rationalist ethical theory of moral judgment, and believed that the foundation of ethics can be deduced from human rationality. Kant argues that we should rely on reason when making moral judgment, but he leaves untouched Hume’s thesis that people, as a matter of fact, rely on emotion.

Consistent with Hume’s sentimentalism, a vast body of empirical data from neuroscience and mood induction experiments establishes a link between emotional processing and moral cognition, suggesting that our moral evaluation is influenced by our emotions. One explanation of these effects is to suppose that our moral judgments normally contain emotions as parts: to judge that something is morally good or bad is a matter of having an emotional response towards it (Prinz, 2007). Thus, when an emotion is extraneously introduced, it increases the intensity of the emotions that we rely on when making moral judgments. Empirical work supporting Hume’s sentimentalism has mostly focused on a single emotion: disgust. Several studies show that extraneously introduced disgust can make moral judgments harsher than they would otherwise be (Wheatley & Haidt, 2005; Schnall, Haidt, Clore & Jordan, 2008; Pizarro & Bloom, 2011). Other emotions that are presumed to be at least as important have been neglected.

For both theoretical and empirical reasons, anger is hypothesized to be the primary emotion that arises in response to harms and violations of rights (Rozin, Lowery, Imada & Haidt, 1999; Horberg, Oveis & Keltner, 2011). Happiness, or some other positive emotion, is hypothesized to be the primary response when making the judgment that something is morally good (Haidt, 2003). There has been ample research linking anger and positive emotions to behavior. More specifically there are studies linking anger to punishment and happiness to helping (e.g., Lerner, Goldberg & Tetlock 1998; Weyant, 1978). But there has been little work exploring the influence of these emotions on moral judgment. Anger has not been manipulated in studies of moral blame, and there have been virtually no investigations of the role that happiness or any other emotions play in moral praise. Thus, large regions of the moral emotional landscape have gone unexplored and, arguably, these are the most important regions.

Inspired by Kant’s rationalist theory of moral judgment, some contemporary researchers have
argued that some or all of our morality is based on cool assessment of events, rather than emotion (Bloom & Pizarro, 2003; Greene, Sommerville, Nystrom, Darley, & Cohen, 2001; Huebner, Dwyer, & Hauser, 2009). In contrast to these approaches, others propose that emotions are essential to morality (Haidt, 2001; Nichols, 2004; Prinz 2007) and influence moral judgment.

Jonathan Haidt’s (2001) social-intuitionist approach highlights the primacy of emotion in guiding moral evaluation. Moral intuition, he says, is fast, automatic and affect-laden. Although we engage in reasoning, it is often done post-hoc in an effort to find justifications for our initial moral evaluation. In support for social intuitionist model, Haidt noted that when people engage in moral judgment, reactions are swift and predicted by emotional states. Using a “dumbfounding” paradigm in which people are asked to justify their moral verdicts, he found that participants usually do not abandon moral convictions when they cannot articulate reasons for them, but rather appeal to or express emotions in support of their view. According to Haidt, judgments are based on “intuitions” and intuitions are emotional states. Importantly, for Haidt these emotional intuitions lead us to make moral judgments, but they are not components of those judgments, so, in principle, judgments could be made without emotions. Haidt does not indicate when this occurs, but he implies that, on rare occasions, we might arrive at a judgment through reasoning without intuition.

Others have argued that moral evaluation may be driven by two partly distinct processes; slow and effortful cognitive process and fast, automatic emotional process (Green, Nystrom, Engrll, Darley, & Cohen, 2004). To test this dual process model, Greene et al. (2001) used functional magnetic resonance imaging to track activation of brain regions while subjects considered trolley cases as probes. Personal moral dilemmas involve direct physical harm to another person. In the classic example, people are asked whether it is okay to push a stranger off a footbridge to stop a speeding trolley that would otherwise kill five others. When presented with this moral dilemma the overwhelming majority says this would not be okay. Green et al. found that such dilemmas were associated with significant activation in brain areas associated with emotion processing, such as the temporal pole, which is associated with emotion-laden mental imagery. On the other hand, impersonal moral dilemmas do not involve directly harming someone. For example, people are asked whether it is okay to pull a lever that will divert a speeding trolley towards one person and away from five others. In this scenario, the vast majority of participants
say this is okay. The impersonal moral dilemmas are less emotionally evocative and are associated with bilateral activation in parietal lobes and right middle frontal gyrus; structures associated with working memory. On the basis of these findings, Greene et al. (2001) argued that rationalist and sentimentalist perspectives may both be right, depending on the type of moral situation person evaluates.

A more integrative approach articulating the role of reason and emotion in moral processing has been proposed by Shaun Nichols (2004). Nichols argues that core moral judgments may depend on two dissociable mechanisms, an emotional response system and a normative theory. Normative theory according to Nichols is a body of mental representations highlighting what one should and should not do. Normative theory makes an independent contribution to our morality; norms are not emotions according to Nichols. But some norms on the other hand, especially those that prohibit harms, tend to cause emotions when violated. When this occurs, we judge that violation is morally wrong as opposed to merely conventionally wrong.

All these views are less thoroughgoing than Hume’s sentimentalist thesis. For Hume, the belief that something is morally good or morally bad is constituted by an emotional attitude. Unlike Haidt, emotions are not causes of our judgments, for Hume, but components of them. Unlike Greene, there is no way to make a moral judgment without an emotion, since our grasp of concepts like “good” and “bad” must always involve feelings. And similarly, unlike Nichols, Hume would deny that there could be a theory of what should be done without emotions, since emotions alone can bridge the gap from what is the case to what ought to be the case.

Adjudicating between these subtly different accounts is difficult, and that is not my goal here. But I want to note that the Humean view remains consistent with the evidence and may be simpler than the alternatives. Haidt implies that intuitions are separate from judgments, but he doesn’t tell us what judgments are or provide examples of judgments that occur without intuitions. A judgment cannot simply be a sentence of English (e.g., “Incest is bad”), since one can utter that sentence without knowing what the words mean, so we need an account of how people grasp the word “bad.” Haidt offers no such account, and his own evidence suggests that we apply this word by consulting our feelings. This could be explained by assuming that “bad” expresses an emotional attitude. There are many words that seem to express emotional attitudes (e.g., delicious, hilarious, bewildering, terrifying, fascinating, and gross), and
moral terms might fall into this category.

Greene would demur, saying that impersonal moral judgments are made without emotion. But his data do not support this conclusion; as compared to non-moral dilemmas, impersonal dilemmas do elicit emotions. The fact that such dilemmas engage cognitive structures of the brain may be a function of the fact that their solution depends on mathematical calculation. For example, when choosing whether to pull a lever that will change the course of a speeding trolley, one needs to decide which outcome is numerically optimal. But the belief that one should save lives may consist in an emotional attitude—perhaps even a positive feeling about helping. In personal cases, we usually do not engage in mathematical calculation, because the negative attitude toward killing is strong enough to trump the positive attitude toward helping, which renders the calculation unnecessary. Greene’s research shows that mathematical reasoning interferes with responses to impersonal dilemmas, but such responses may still be emotional in nature.

As for Nichols, the claim that people can represent a normative theory without any emotions requires more elaboration and defense. Nichols compares the normative theory to social conventions, such as etiquette rules, which then take on a moral cast when backed by emotions. Americans know that it is wrong to put elbows on the dinner table, but they may not have any feelings about that. For Nichols, moral judgments differ from etiquette judgments in that the former arise when we see that a norm is violated and have an emotional response. This is very close to Hume’s view, but there is an important difference. Hume would say that, without emotions, we can know that people avoid putting elbows on the table (a descriptive fact), but we cannot form the belief that they ought not to do this (a normative fact). A set of descriptive beliefs about behavior is not a normative theory at all, contrary to how Nichols describes it. Hume would say a belief is not normative until we feel its demand on us. He would probably say that even etiquette rules require emotions to be perceived as normative, though they may involve different (or less intense) emotions from moral rules. From the perspective on information processing, Hume’s view and Nichols’s may look like notational variants, but there is a subtle difference. Nichols account implies that we figure out whether something is good or bad by seeing whether it falls under a normative theory, which is construed as lists of behaviors. For Hume, we figure that out by introspecting how we feel. The list of behaviors that we already regard as good or bad will often determine how we feel about a new
case, but sometimes emotions that have been triggered by an extraneous environmental stimulus lead us to conclude that something is good or bad, independent of previously stored lists. This suggests that, when we form the judgment that some action is bad, the underlying psychological state is a feeling about that action, not a belief that the action belongs to a set of behaviors that we have deemed bad on other occasions.

According to emotional constitutional model (Prinz, 2007), moral judgment normally begins with the representation of an event. When we consider an event, we can classify it in relation to previously experienced events. This is often done automatically, especially when the event is of a familiar type. But it can also take extensive reasoning and deliberation to see that an event belongs to a previously considered category. There is, therefore, ample room for reasoning at this stage. When the event is compared to events stored in memory, some of these may be associated with emotions. For example, if the event involves taking property, we see it as an instance of the category stealing, towards which we have been conditioned by learning or evolution to have a negative emotional response. In addition, there may be extraneous emotions effect us at the same time. If we are in an emotionally evocative environment or experiencing a mood, emotions unrelated to the event will contribute to our overall emotional state. The way an event is presented to us (e.g., in neutral or provocative language) can also effect the emotions we feel. Extraneous and associated emotions result in an emotional attitude toward the represented event. On this model, the emotional attitude constitutes one’s moral judgment of the event. The emotions can then influence behavior, and different emotions will result in different action tendencies.

To illustrate, imagine that a friend in running late to a meeting with you, and you are already in a bad mood, and standing on a noisy street corner. You have negative associations with lateness stored in memory; you construe it as inconveniencing you, and, since that is a kind or harm, your friend’s lateness makes you a bit angry. In addition, your irritable mood, and the din of traffic contribute to this angry state. Now, when you reflect on your friend’s behavior, you feel very angry about it. That feeling is your judgment that the behavior was wrong. The feeling disposes you to act angrily, e.g., to march off in a huff or to berate your friend.

In summary, there are several theories that relate emotions to moral judgments. All of these
predict that emotions will influence what judgments people make. The Humean theory, which says that judgments are emotional attitudes, position also defended by Prinz (2007), remains a live option, since there is no clear evidence for moral judgments made in the absence of emotions. For our purposes, deciding between these theories will not matter, but the Humean account establishes the most consistent and direct way to explain findings like those we present below.

### 1.2 Evidence linking emotion and moral judgment

There is considerable evidence demonstrating that neural circuits involved in processing of emotions are preferentially recruited when participants consider morally significant situations. Moll, Olivera-Souza, Bramati and Grafman (2002), employed functional magnetic resonance imaging fMRI while subjects overtly judged sentences that were either factual, “the painter used his hand as a paintbrush,” or moral in content “the elderly are useless,” as either right or wrong. In the moral, as compared to the factual condition, researchers found neural activation associated with the processing of emotions. Other imaging studies show emotional activation in response to photographs depicting moral content e.g. abandoned children and war scenes (Moll, Olivera-Sousa, & Eslinger, 2003), and when subjects donate to charitable organizations of their choice (Moll, Krueger, Zahn, Pardini, Olivera-Souza, & Grafman, 2006). Research also documents emotional processing when subjects evaluate moral but not semantic content of sentences, (Heekereen, Wartenburger, Schmidt, Schwintowski, & Villringer, 2003), when social rules are broken (Berthoz, Armony, Blair, & Dolan, 2002), or when subjects consider trolley cases (Greene, Sommerville, Nystrom, Darley, & Cohen, 2001).

Other lines of evidence linking emotion and moral cognition come from mood induction studies. For example, Wheatley and Haidt (2005) hypnotized participants to feel “a brief pang of disgust” when reading the otherwise neutral word “take” or “often”-embedded in moral vignettes. After hypnotically induced disgust, participants rated the behavior in these vignettes as more wrong than participants in a control condition. Studies report that severity of moral judgments is also amplified when people are seated at dirty desks, are exposed to noxious odors or are asked to ingest disgusting drink while making moral evaluations (Schnall, Haidt, Clore & Jordan, 2008; Eskine, Kacinic & Prinz, 2011). Taken together, imaging and behavioral experiments indicate that our morality is emotional, and more specifically, negatively valenced emotional primes amplify severity of moral evaluations.
David Hume (1739/1978) advanced a theory arguing that different moral emotions are elicited by different categories of moral violations. He noted that “[T]he mind, from the contemplation of the whole, feels some new impression of affection or disgust, esteem or contempt, approbation or blame.” Converging lines of evidence from behavioral and neuropsychological experiments provide support for this insight and document a link between distinct moral emotions arising in response to specific moral violations. For example, in a very interesting research Rozin, Lowery, Imada and Haidt, (1999) presented subjects with three distinct categories of moral vignettes describing autonomy violations, in which persons are harmed or treated unjustly (e.g., inmates at a concentration camp being led into the gas chamber by the Nazis), hierarchy violations (e.g., teenager refuses to give up a seat to an ailing elderly person), and purity violations which can be thought of as crimes against nature (e.g., romantic involvement between a teenage girl and an elderly man). Rozin et al. asked participants to match these moral violations with pictures of emotion faces depicting anger, contempt and disgust and to corresponding emotion words. They found that violations of autonomy were matched with anger, hierarchy violations were matched with contempt, and purity violations were matched with disgust. Similarly, Horberg, Oveis, Keltner and Cohen (2009), asked participants to report the extent to which vignettes depicting purity or justice violations make them feel “grossed out” or “angry.” Self-reported anger predicted harsher moral judgments of justice but not purity violations, and self reported feeling of disgust predicted harsher moral judgments of purity but not justice violations.

In a recent fMRI study, Parkinson, Sinnott-Armstrong, Koralus, McGeer and Wheatley (in press), presented participants with moral vignettes relating to harm, dishonesty and sexual disgust. While subjects underwent brain scanning, they evaluated transgressions committed by the characters in these vignettes as “wrong” or “not wrong.” Parkinson and colleagues found that dissociable brain regions were preferentially recruited depending on the category of moral transgression. These findings provide further empirical support linking distinct moral emotions arising in response to specific categories of moral violations.

Hume also proposed that different emotions underlie positive and negative moral judgment. He wrote, “[V]irtue is distinguished by the pleasure, and vice by the pain, that any action, sentiment or character gives us by the mere view and contemplation” and “when you pronounce any action or
character to be vicious, you mean nothing, but that from the constitution of your nature you have a feeling
or sentiment of blame from the contemplation of it” (1739: III.i.2). Thus, perceptions of virtue induce
positive feelings for Hume, and perceptions of vice induce negative feelings. This division has been less
vigorously explored empirically, but brain imaging studies have shown that there is activity in the ventral
striatum is associated with charitable giving (Moll, Krueger, Zahn, Pardini, Olivera-Souza, & Grafman,
2006), and such reward center activity has not been documented in any of the previously cited imaging
results, which investigate negative moral judgments.

2. Extending the evidence: Anger and happiness in moral judgment

Extensive empirical work demonstrates that anger is a dominant response to perceived threats
or as a response to frustration (Blair, 2012). In some contexts, anger may have no moral significance; it
is associated with aggression, which may be a capacity evolved for responding to threats from
conspecifics. But in human beings, there are many moral rules designed to guard against threats: we
have rules against insults, battery, property theft, and violations of rights. In all these cases, there is a
potential harm to a victim. Since anger is a natural response to interpersonal harm, it is not surprising
that it has become an important moral emotion. As we have seen, Rozin et al. (1999) show that anger is
the preferred choice when participants are asked which emotion arises in response to harms against
persons.

Fittingly, anger is also associated with the punishment of moral offenders. For example, Lerner,
Goldberg and Tetlock (1998) presented participants with video clip evocative of anger, and then in
ostensibly another experiment asked them to consider unrelated moral vignettes depicting individuals
engaging in various moral transgressions. After the anger induction prime, participants made more
punitive attributions to characters depicted in moral vignettes relative to the control group
participants. Along the similar lines, Carlsmith, Darley, and Robinson (2002) showed that individuals are
driven by retributive justice when recommending penalties for moral offenses, and moral outrage to these
offenses predicts individual’s punitive intent.

Anger has also been associated with support for vengeful justice-restoring policies (Lerner,
Gonzales, Small & Fischhoff, 2003) and rejection of monetary offers considered inequitable in economic
game situation (Pillutla & Murnighan, 1996). Unfair offers have been associated with heightened
activation of anterior insula, neural structure implicated in processing of negative emotions, especially anger and disgust, and stronger anterior insula activation to unfair offers resulted in their greater rejection (Sanfey, Rilling, Aronson, Nystrom & Cohen, 2003). Fehr and Gächter (2002) demonstrated that people are willing to punish moral offenders at considerable costs to themselves in social dilemma situations. Anger served as a proximate mechanism behind punishment, and un-cooperative individuals expected to incur anger from those that contributed their fair share in economic exchange. Interestingly however, Nelissen and Zeelenberg (2009) found that experimentally inhibiting anger reduced punitive intent.

2.1 Previous research on positive emotions

Like disgust, anger is a negative moral emotion. People do not enjoy being angry, and they get angry when they perceive something as wrong. But morality also has a positive side. We praise good behavior, and we feel motivated to do good things. In both cases we may experience positive feelings. Research documents systematic relationship between positive feelings and pro-social behavior. Positive emotions have been linked to decisions to aid someone in need (Isen & Levin, 1972; Fried & Berkowitz, 1979), help with charity work (Weyant, 1978), and influence deliberations of complex moral dilemmas (Valdesolo & DeSteno, 2006). For example, Isen and Levin distributed cookies to elevate positive mood just prior to asking subjects for help. Subjects in the positive mood induction condition were more likely to help the experimenter relative to the controls. Similarly, Fried and Berkowitz found that inducing positive mood with soothing music resulted in greatest amount of time participants were willing to volunteer to the experimenter. Positive mood has also been linked with willingness to help collect donations for charitable causes. Weyant induced positive mood with positive feedback on bogus aptitude test. Subjects in happy mood condition agreed to help collect donations even though the costs associated with helping were high e.g., participants had to go from door to door asking for donations.

In another study, Valdesolo and DeSteno (2006) presented participants with a standard footbridge case after inducing positive affect with short comedy clip from Saturday Night Live. In a footbridge dilemma, one person has to be killed by being pushed off a footbridge in order to stop runway trolley, which would otherwise kill five others. After positive mood induction, participants were three times more likely to endorse characteristically utilitarian position relative to the control participants, indicating that it is appropriate to sacrifice one person in order to save the five others. Prinz (2007) suggests that the
positive mood may have increased positive emotions associated with the reward of saving lives. This suggestion is further supported by another recent study demonstrating the relationship between positivity and endorsement of utilitarian position on trolley dilemmas; Strohminger, Lewis and Meyer (2011), found that experimentally induced mirth was associated with a preference for utilitarian solution to a footbridge case. Consistent with this, Shenhav and Greene (2010) found that reward centers of the brain are active when people consider trolley dilemmas in which sacrificing one person would save a large number of people.

2.2 Methodological challenges

Experiments that elicit moral disgust have been well designed because disgust can be easily elicited in ways that have little to do with the moral task: e.g., by foul smells, filthy environments or bitter flavors. But positive emotions and anger are more difficult to elicit in a way that has no bearing on morality. Extant manipulations of these emotions in moral psychological research often have moral content, and consequently there is concern that they may influence moral judgments by semantic priming rather than emotion. For example, to induce elevation, Keltner and Haidt, (1999) had participants listen to audio recordings of volunteers recounting moving stories about rewards associated with charity work. Stories about charitable work may prime moral concepts, and may also evoke empathy. Extant manipulations are also contextually complex and may induce various affective states over and above the intended ones. For example, Strohminger, Lewis and Meyer (2011), utilized audio recordings of stand-up comedy routines to induce mirth. Valdesolo and DeSteno (2006) manipulated positivity with comedy clip taken from “Saturday Night Live.” Stand up comedy routines may induce feelings of superiority. Jokes may provide opportunity to deride and ridicule. Similarly, Lemer et al. (1998) induced anger by showing a film clip about a bully, who behaves in way that participants are likely to consider morally wrong. Anger has also been induced through autobiographical recall (Labouvie-Vief, Lumley, Jain, & Heinze, 2003), but there is considerable concern that participants will remember events involving injustice or offensive behaviors that have a moral dimension.

To circumvent these potential confounds, I decided to induce emotions with instrumental music. Without lyrics that carry meaning, one could be more confident that the induction was not priming moral concepts, and that increased the confidence that emotions themselves, rather than associated thoughts
about morally significant situations were exerting an influence in our judgment tasks. In this sense, one can say that music induces "pure emotions." Research also demonstrates that instrumental music influences perception of visual stimuli (Logeswaran & Bhattacharya, 2009) and speed of recognition for emotionally congruent chord/word pairs in semantic priming paradigms (Sollberger, Reber, & Eckstein, 2003). I sought to extend such methods, by showing that music can influence an aspect of social evaluation.

Musical priming also offers a promising new way to investigate emotion specificity in moral evaluations. Psychological research suggests that music can successfully communicate basic emotions nearly as accurately as facial and vocal expression of emotions (Juslyn & Laukka, 2003). In one study, Logeswaran and Bhattacharya (2009) presented participants with music evocative of happiness or sadness and then asked them to evaluate images of happy, sad or neutral faces. The researchers found that emotional ratings of target faces were influenced by the emotional valence of the musical prime. Because emotional specificity is important to the moral domain, music provides a promising tool for differentiating emotional effects.

To accomplish methodological objectives, I induced anger with Japanese noise music, an avant garde musical genre consisting of electronic, acoustic, harsh, random and dissonant sounds produced by Yamazaki Takushi (Inner Mind Mistique). To induce happy state I utilized Edvard Grieg’s Morning Mood. Although musical primes have been used successfully in emotion induction experiments, (e.g., Adman & Blaney, 1995; Rickard, 2004; Logeswaran & Bhattacharya, 2009), this is the first research implementing music in moral judgment.

3. Factors Influencing Aesthetic Value

We often assume that aesthetic value of artwork is determined by its inherent goodness. Although this may be true, factors outside of quality of content and artistic skill appear to impact aesthetic worth as well. David Hume stressed the primacy of feeling when it comes to valuing art, a view also defended by Prinz (Forthcoming). Prinz argues that when we appreciate an artwork the appreciation itself consists of an emotional response and there is considerable empirical evidence to support this view. For instance there is work in psychological aesthetics showing that when we evaluate beautiful pictures brain areas implicated in emotion processing become activated (Kawabata & Zeki, 2004). Vartanian and Goel
(2004) observed cingulate activation for both positive and negative aesthetic judgments, and Jacobson et al. (2006) found activation in temporal pole as well as anterior and posterior cingulate, structures implicated in emotion processing. Emotion induction studies demonstrate that feelings may directly impact our aesthetic evaluation. In one experiment White et al. (1981) presented participants with emotionally evocative film clips and subsequently found that participants gave higher ratings of physical attractiveness. These studies demonstrate that feelings are associated with aesthetics and may directly impact evaluation. However feelings are not the only factors directing our aesthetic preferences. In the current research I explore impact of spatial features such as size and position of an artwork on its aesthetic worth. Linking size and spatial position to aesthetic value contrasts with the commonsense view that people assess artworks by their formal qualities (e.g., colors, shapes) and content and most research in aesthetics and the psychology of art has focused on such intrinsic properties--on what is in a picture--not the size or placement of the picture (e.g., Berlyne, 1970; Gratis & Leder, 2013; Ramachandran & Hirstein, 1999; Reber, Schwartz, & Wilkielman, 2004).

There is psychological research outside the domain of art showing a link between spatial orientation and value however. Meier, Robinson, and Caven, 2008 demonstrate that font size impacts processing speed, accuracy judgments, and evaluation (Meier, Robinson, & Caven, 2008) and Silvera, Josephs, & Giesler (2002) report that, when forced to choose, both children and adults tend to prefer larger geometric objects to a smaller ones.

There is also work demonstrating a positive relationship between vertical orientation and value. Metaphorically, people tend to associate highness with goodness and lowness with badness. In many world religions (Haidt & Algoe, 2004), divinity is known as the most high, and people tend to implicitly associate God with up, and Devil with down (Meier, Hauser, Robinson, Friesen & Schjeldahl, 2007). In one experiment, Meier and colleagues found that people encode God-related concepts faster if they are shown in a higher vertical position but slower when the words are presented at the bottom of the screen. Interestingly, Meier, Sellbom and Wygant (2007) found that people have an implicit associations between morality and up, and immorality and down.

4. Factors Influencing Perception

Just as there is a debate about whether judgment is dispassionate, there is a debate about
whether perception is dispassionate. The research reviewed above shows that some judgments (including moral and aesthetic judgments) are influenced by emotions. But what about perception? Can emotions determine what we see? According to a traditional “modular” view, visual processing is “informationally encapsulated” from higher-level cognition. This means that perception simply picks up information from the world using our senses, and it is unaffected by emotions. There is however a growing body of evidence showing that input systems interact cross-modally (Prinz, forthcoming).

In one interesting study, Sekuler and Lau (1997) showed that sound can alter how people interpret ambiguous visual motion event. In this experiment, participants looked at visually identical objects that can be interpreted as either bouncing or streaming. However even though the objects move in nearly identical trajectories, participants nevertheless tend to report that objects are traveling in streaming motion. Surprisingly, what Sekuler and Lau found is that when a brief sound is introduced at the moment that the targets coincide visually, participants tend to report that objects are moving in a bouncing motion. In another study Shams, Kamitani and Shimojo (2000) demonstrated “illusory flash effect” in which phenomenological quality of perceiving non-ambiguous stimuli is drastically altered by sound. In this illusory flash effect, when a single short visual flash is presented with a series of beeps, the single visual flash is perceived as a series of visual flashes.

Research on top down effect (e.g. emotion) on perception suggests that fear and anxiety may bias attention towards threatening stimuli. For instance people who are afraid of snakes or spiders find it easier to detect snakes and spiders in a visual search task (Ohman, Flykt, & Esteves, 2001). Other studies report that phobic individuals who are afraid of spiders tend to overestimate speed of approaching spiders (Riskind, Moore, & Bowley, 1995). Similarly to this, Rahman and Cuk (1992) found that people who were afraid of snakes tend to overestimate the flickering of a snake’s tongue.

However such findings are not restricted to clinical populations. Cole, Balcetis and Dunning report that people tend to underestimate the distance of threatening objects, and there is research showing that people overestimate size of threatening pictures relative to neutral or positive pictures (van Ulzen, Semin, Oudejans, & Beek, 2008). Stefanucci, Proffitt, Clore, and Parekh, (2008) found that estimates of steepness increase when participants are standing on a skateboard atop a hill in contrast to a stable surface (Stefanucci, Proffitt, Clore, & Parekh, 2008). Similarly, participants standing on the edge of
a balcony tend to overestimate distance to the ground (Stefanuci & Proffitt, 2009). Other findings indicate
that people perceive hills to be steeper when they are fatigued or anticipate physical strain (Proffitt, 2006).

The overall lesson of research on emotions and perception suggests that perception may not be neutral or dispassionate. By the time we arrive at an interpretation of what we are seeing, emotions have had a chance to exert influence on what we see. This fits with the broader picture defended in this thesis. Emotions have sometimes been described as separate from cognition (thought and perception). The research described here suggests that this division may be mistaken. Emotions influence cognition in important ways.

In the current study I wanted to test whether scary music would make people more likely to see ambiguous pictures as dangerous. To test this possibility participants were presented with newly devised set of ambiguous figures that can be seen as dangerous or as benign objects (alligator/squirrel, pot/clever, snake/rope). I wanted to know whether scary music would selectively impact how people perceive these pictures.

It might be objected that, in the studies just reviewed, emotions and my current research, the effects of emotion on perception reflect post-perceptual processes rather than perception itself. For the purposes of the research reported here, I will not take a strong stand on this debate. The current research cannot settle exactly were emotion impacts information processing from vision. The effects could occur at a low level, altering visual processing, or at the level of outputs, when we interpret a visual signal that has been fully formed. Either way, the effects are psychologically interesting, because they suggest that we make sense of visual information in a way that is informed by emotion and other states.

CHAPTER 2

MAD AND GLAD: MUSICALLY INDUCED EMOTIONS HAVE DIVERGENT IMPACT ON MORALS

“[V]irtue is distinguished by the pleasure, and vice by the pain, that any action, sentiment or character
gives us by the mere view and contemplation.” Hume (1739/1978)

David Hume, the 18th century moralist, advanced that revolutionary thesis that moral judgment is the “work of the heart, affective feeling or sentiment” (Hume, 1739/1978). He argued that positive and
negative moral judgments are underwritten by different emotions, which he sometimes called approbation and disapprobation. Approbation is a positive feeling according to Hume, and disapprobation is a negative feeling. There terms are now antiquated, but they may relate to discrete emotions that have been investigated in contemporary psychology. Of particular interest here are anger and happiness. Anger and happiness are important emotions to morality because they are associated with harming and helping, two opposing poles in moral domain. We sought to explore whether anger and happiness can impact moral judgments. We asked: Will people be more likely to judge action as wrong when feeling mad? Will people judge that an action is good and that they should perform it when feeling glad? To induce these emotions we used instrumental music. In addition to contrasting positive and negative moral judgments, we were also interested in testing whether this highly prevalent situational variable could have an impact on morality.

For both theoretical and empirical reasons, anger is hypothesized to be the primary emotion that arises in response to various kinds of harms, including physical assault, theft, rights violations, and unfair distributions (Horberg, Oveis, & Keltner, 2009; Rozin, Lowery, Imada, & Haidt, 1999). Anger has been studied in the moral domain, as we will see (e.g., Bodenhausen, Sheppard, & Kramer, 1994; Dunn & Schweitzer, 2005; Keltner, Ellsworth, & Edwards, 1993; Mackie, Devos, & Smith, 2000; Mullen & Skitka, 2006; Tiedens & Linton, 2001), but there are few studies that experimentally induce anger and measure its impact on wrongness judgments as such (Polman & Ruttan, 2012; Seidel & Prinz, 2012). Much of the research on wrongness judgments has focused on the impact of disgust (e.g., Eskine, Kacinik, & Prinz, 2011; Schnall, Haidt, Clore, & Jordan, 2008; Wheatley & Haidt, 2005). Survey studies indicate that disgust is primarily response to moral impurity rather than harm, which is associated with anger (Rozin, Lowery, Imada, & Haidt, 1999). Given the importance of harm to morality, we think investigating impact of anger on wrongness judgments deserves more attention.

There has also been little effort to compare wrongness to positive moral judgments. Happiness, or some other positive emotion, is hypothesized to be the primary response when making the judgment that something is morally good (Haidt, 2003). There has been research linking positive emotions to helping behavior (Fried & Berkowitz, 1979; Isen & Levin, 1972; Weyant, 1978) and moral acceptability
(Strohminger, Lewis, & Meyer, 2011; Valdesolo & DeSteno, 2006), but the impact of positive emotions on judgments of moral goodness and obligation has not been directly examined.

Here, using instrumental music, we sought to test and compare the impact of induced anger and happiness on moral judgments. Extant manipulations of these emotions in moral psychology sometimes have moral content, and consequently there is a concern that these manipulations may influence moral judgments by semantic priming rather than emotion. For example, Learner, Goldberg and Tetlock (1998) induced anger by showing a film clip about a bully who behaves in a way that participants are likely to consider morally wrong. Anger has also been induced through autobiographical recall (e.g., Labouvie-Vief, Lumley, Jain, & Heinze, 2003), but there is a concern that participants will remember events involving injustices or offensive behaviors that have a moral dimension. To circumvent these worries, we decided to induce emotions with instrumental music. Without lyrics that carry meaning, we could be more confident that music induction was not priming moral concepts, and that increased our confidence that emotions themselves, rather than associated thoughts about morally significant situations, were exerting an influence in our judgment task.

There is much research on anger and social judgment. For instance, angry individuals are more likely to offer guilty verdicts of stereotyped targets relative to people in both sad and neutral conditions (Bodenhausen, Sheppard, & Kramer, 1994), angry individuals appear to be less trusting than both happy and sad individuals (Dunn & Schweitzer), and are more likely to blame victims (Keltner, Ellsworth, & Edwards, 1993). Mackie, Devos and Smith (2000) showed that individuals who perceived the in-group as strong were more likely to report feeling anger towards the out-group and desired to take action against out-group individuals. Much of the extant research relating anger to morality has also focused on anger’s role in the punishment. For instance, Lerner, Goldberg and Tetlock (1998) presented participants with a video clip that evokes anger, and then, in an ostensibly separate experiment, asked them to consider moral vignettes depicting individuals engaging in moral transgressions. After the anger induction, participants made more punitive attributions to characters depicted in the moral vignettes relative to a control group. Along similar lines, Carlsmith, Darley, and Robinson (2002) showed that retributive justice drives people when recommending penalties for moral offenses, and moral outrage to these offenses predicts individuals’ punitive intent.
Anger has also been associated with rejection of monetary offers considered inequitable in economic games (Pillutla & Murnighan, 1996). Unfair offers have been associated with heightened activation of anterior insula, a neural structure implicated in processing negative emotions, especially anger and disgust, and stronger anterior insula activation to unfair offers has been associated with greater rejection rates (Sanfey, Rilling, Aronson, Nystrom, & Cohen, 2003). Fehr and Gächter (2002) demonstrated that anger served as a proximate mechanism behind participants’ willingness to punish “free riders” at considerable costs to themselves in social dilemma situations. Conversely, experimentally inhibiting anger has been shown to reduce the desire for punishment (Nelissen & Zeelenberg, 2009).

Despite these important findings, there has been less work directly investigating experimentally induced anger impacting wrongness judgment. As we just saw, much research investigated role of anger in relation to punishment. It is tempting to infer an increase in perceived wrongness from the fact that anger causes an increased desire to punish, but a transcranial magnetic stimulation study indicates that wrongness and punishment are dissociable (Knoch, Nitsche, Fischbacher, Eisenegger, Pascual-Leone, & Fehr, 2008). So it is important to study the impact of anger on wrongness judgments directly. Perhaps the most direct effort to date is a recent study by Polman and Ruttan (2012). They manipulated anger with autobiographical recall, and compared it with other negatively valenced emotions (e.g., envy and guilt). They subsequently found that angry individuals rated minor moral transgressions as less admissible, acceptable, or appropriate relative to participants in neutral condition. They did not explicitly probe attitudes towards wrongness, but negative admissibility judgments may express the same attitude. In the current experiment, we sought to investigate impact of anger on wrongness judgment explicitly and compare it to positively valenced emotion such as happiness. Moreover we sought to induce anger with novel methodology; irritating music.

In comparing the impact of anger to happiness, we sought to correct an oversight in much of the literature. Many recent experiments have focused exclusively on negative emotions. This is true of the anger studies just cited, as well as the aforementioned studies of disgust. Morality also has a positive side. We praise good behavior, and we feel motivated to do good things. In both cases we may experience positive feelings. Extant research documents a relationship between positive feelings and pro-social behavior. Induced positive emotions have been associated with decisions to aid people in need.
(Fried & Berkowitz, 1979; Isen & Levin, 1972), decisions to volunteer for charity work (Weyant, 1978), and judgments of moral acceptability (Strohminger, Lewis, & Meyer, 2011; Valdesolo & DeSteno, 2006). In a study linking positive mood to judgment of moral acceptability, Valdesolo and DeSteno induced positive affect with a short comedy clip from Saturday Night Live, and subsequently presented participants with a moral dilemma. In that dilemma, one person is killed by being pushed off a footbridge into the path of a runway trolley, which would otherwise kill five other people. After positive mood induction, participants were three times more likely to indicate that it is appropriate to sacrifice one person in order to save more lives. Prinz (2007) suggests that the positive mood may have increased positive emotions associated with the reward of saving lives. This suggestion is supported by a recent study; Strohminger, Lewis and Meyer (2011) found that experimentally induced mirth was associated with a preference for a utilitarian solution to the footbridge case. Consistent with this, Shenhav and Greene (2010) found that reward centers of the brain are active when people consider trolley dilemmas in which sacrificing one person would save a large number of people.

We are unaware of any work directly investigating the impact of induced happiness, or other positive emotions, on judgments of praise and moral obligation: good judgments and should judgments. Indeed, we are not aware of any research inducing happiness with instrumental music on such judgments. Notice that praise and obligation are slightly different. To praise something morally is to see that it is good, and to assess obligation is to judge whether something should be done. Normally, these go hand in hand, but it is possible to imagine cases where they come apart. A necessary evil is something that we judge to be bad but obligatory. A supererogatory act is one that we judge to be good, but not required; it is an act that goes above and beyond the call of duty. In the present research, we did not seek dissociations, because we were interested in exploring whether emotions can influence both kinds of positive moral judgments. We also sought to compare the impact of positive and negative emotions, in order to establish whether emotional valence relates to moral valence.

**Experiment 1**

**Introduction**

Empirical research on anger has often focused on determining its eliciting conditions (Blair, in press) and its relationship to punitive behavior. Correlational evidence documents that anger arises in
response to threats, insults and injustices (Rozin, Lowery, Imada, & Haidt, 1999). Some correlational studies find a link between self-reported feelings of anger in response to moral vignettes depicting violations of justice but not purity violations (Horberg, Oveis, Keltner, & Cohen, 2009). Other studies show anger’s link to punishment (Fehr & Gächter, 2002; Lerner, Goldberg & Tetlock, 1998; Nelissen & Zeelenberg, 2009). Using a novel methodology to induce anger—jarring noise music—we extend this work by looking at impact of anger and wrongness judgments.

Anger is a negatively valenced emotion, and we predicted it would increase the negatively valenced moral judgments. But what impact would a positive emotion such as happiness have? Here there is no strong reason to predict an impact on negative judgments in either direction. On the one hand, happiness has long been known to give people a positive outlook towards others (e.g., Johnson, 1937). On the other hand, happiness increases attribution of causal responsibility. Thus, when considering a moral transgression, these two tendencies may cancel each other out. As a comparison to anger, we were interested in testing whether happiness would impact negative moral judgments.

In summary, in this experiment, we ask: Will people be more likely to judge action as wrong when feeling mad? Will wrongness judgments be influenced in any way by feeling glad?

Methods

Participants

Sixty-six CUNY undergraduates (46 female, one participant did not report gender) volunteered to participate in this experiment for course credit or were recruited through the psychology department subject research pool.

Materials. To induce emotional states we selected two pieces of music: a piece of Japanese “noise music” consisting of harsh, dissonant, and jarring sounds made on acoustic and electronic instruments (Takushi, 1996); and a piece of classical music, namely Edvard Grieg’s “Morning Mood” (Grieg, 1875). The noise music was selected to induce a non-moral form of anger, and the classical music was chosen to induce feelings of uplifted happiness.

Procedure. Participants were told that the study was about listening to music and the ability to process information about characters that find themselves in various difficult situations. They were each tested individually and were randomly assigned to one of the three experimental conditions: angry music,
happy music, and a no music, or neutral, control group. Participants in the control group responded to moral situations in silence. Participants in the two music conditions listened to music for 60 seconds prior to responding to moral vignettes. This was done in order for the music to induce the hypothesized affect. Subsequently participants were given materials packets containing moral vignettes and a manipulation check. Music was playing throughout the experimental session until the materials were completed.

Moral Judgments. Severity of moral judgments was measured with three moral vignettes counterbalanced for order. Two of the vignettes were adopted from previous study (Schnall, Haidt, Clore, & Jordan, 2008), and one was developed by the researchers for the purpose of this experiment: a man finds a wallet on the street and keeps the money, a man fakes his resume credentials, and a man cuts in front of cars in order to beat the traffic. Utilizing a nine-point Likert type scale ranging from 0 (perfectly ok) to 9 (extremely wrong), participants evaluated the moral transgressions depicted in each of the three vignettes.

Manipulation check. Our manipulation check consisted of 8 items (angry/irritated, sad/heavy-hearted, afraid/anxious, happy/uplift) designed to determine the specificity of the emotions that particular pieces of music were intended to evoke. We created composite scores that reflected negative emotions related to sadness (summing sad and heavy-hearted for a total sadness score), negative emotions related to fear (summing afraid and anxious for a total fear score), negative emotions related to anger (summing irritated and angry for total anger score), and positive emotions (summing happy and uplift for a total uplifting happiness score). Emotion terms such as sad/heavy-hearted and afraid/anxious were included because we wanted to determine whether irritating noise music predominantly evokes a form of anger and not other negative emotions. Participants indicated their responses (e.g., at this moment I am feeling happy), on a seven-point Likert type scale ranging from 1 (very little felt) to 7 (very strongly felt).

Results

Manipulation Check

As predicted, harsh Japanese noise music effectively induced anger $F(2, 65) = 37.61, \text{MSE} = 1.37, p < .001, \eta^2 = .54$. Independent sample $t$ tests confirmed that participants exposed to harsh Japanese noise reported highest levels of anger ($M = 4.10, SD = 1.63$), relative to participants in the happy music condition ($M = 1.42, SD = 0.63$), $t(43) = 6.88, p < .001, \eta^2 = .52$, and the participants in the
control group \((M = 1.61, SD = 0.85), t(44) = 6.25, p < .001, \eta^2 = .47\). To test whether harsh Japanese noise music induces anger specifically rather than negatively valenced emotions such as fear or sadness, we conducted paired-sample \(t\) test within the Japanese noise music condition. As expected, participants exposed to harsh Japanese noise music reported highest levels of experienced anger \((M = 4.10, SD = 1.63)\) relative to both fear \((M = 2.78, SD = 1.93), t(24) = 4.69, p < .001, \eta^2 = .47\) and sadness \((M = 2.16, SD = 1.60), t(24) = -5.53, p < .001, \eta^2 = .56\), suggesting that Japanese noise music specifically induces a form of anger and not other negatively valenced emotions (e.g., fear or sadness). As expected, Grieg’s Morning Mood successfully induced the highest levels of self-reported uplifting happiness \((M = 5.25, SD = 1.17), t(43) = 5.89, p < .001, \eta^2 = .44\), and the neutral control group with no music \((M = 3.85, SD = 1.15), t(39) = 3.83, p < .001, \eta^2 = .27\).

**Moral Judgments.** Before proceeding with the main analysis, we created a separate composite score for each participant by averaging responses across the three moral vignettes (wallet, resume, cutting cars). We then subjected these composites to a one-way between-groups analysis of variance (ANOVA) with music type (angry, happy, control) as a between subject factor. There was a statistically significant difference between groups on moral judgments, \(F(2, 63) = 12.49, MSE = 3.38, p < .001, \eta^2 = .28\). Planned contrasts revealed that participants listening to the angry noise music responded with significantly harsher moral judgments relative to participants in the happy music condition \((M = 6.10, SD = 1.28 vs. M = 3.48, SD = 1.55), t(63) = -4.75, p < .001, \eta^2 = .26\) and the neutral control group participants \((M = 4.19, SD = 2.52), t(63) = 3.52, p < .001, \eta^2 = .16\). (see Figure 1). We then sought to explore if feeling happy would decrease the severity of moral judgments relative to participants exposed to the neutral condition. A planned contrast revealed no statistically significant difference between participants in happy music condition relative to participants in the control group \(t(63) = -1.23, n.s.\)

**Discussion**

In this experiment, we show that induced anger amplifies the severity of moral judgments. Participants exposed to harsh angry noise music were more likely to judge minor moral transgressions as wrong relative to neutral control group participants or those in a happy music condition. Participants listening to music evocative of happiness did not differ significantly on severity of moral judgments relative to the controls. We wanted to further explore the role of positive emotion, suspecting that it may
contribute to positive moral judgments, even though it had no impact on negative moral judgments in Experiment 1. This is the purpose of Experiment 2.

Experiment 2

Introduction

Empirical literature points to a link between positive emotions and decisions to aid people in need (Fried & Berkowitz, 1979; Isen & Levin, 1972) and volunteering for charity work (Weyant, 1978). The two trolley studies cited earlier induce positive emotions and test for their impact on assessments of moral acceptability (Strohminger, Lewis, & Meyer, 2011; Valdesolo & DeSteno, 2006). This work is important, but needs supplementation. Both of these studies presented participants with moral dilemmas, which pit a decision to save lives against a decision to take a life by pushing a person off of a footbridge. This makes it difficult to directly interpret the impact of happiness on moral acceptability. Indeed, Valdesolo and DeSteno suggest that happiness may reduce the sting of harming rather than increasing the reward of helping. We wanted to know whether happiness would have an impact on moral judgments in cases where this alternative interpretation is unavailable.

In this experiment, we used instrumental music to test the impact of happiness on judgments of moral goodness. We also investigated the impact of happiness on judgments of moral obligation. Furthermore, we were interested in whether anger would have an impact on positive moral judgments. In conducting Experiment 1, we did not predict that happiness would have an impact on judgments about the wrongness of doing bad things. But, here in our second experiment, we thought anger might impact judgments about the goodness of helping. Existing literature suggests that anger increases the tendency to blame victims (Keltner, Ellsworth, & Edwards, 1993; Small & Lerner, 2008). Thus, when confronted with the opportunity to help someone in need, an angry person may judge that the needy individual is less deserving of help. Based on this prior work, we predicted that anger would decrease the sense of moral goodness and obligation in contexts of need. In summary, in this experiment we asked: Will people judge that an action is good and that they should perform it when feeling glad? Will feeling mad reverse these judgments?

Methods

Participants
One-hundred and fifteen CUNY undergraduates (83 female) were recruited through the psychology department subject research pool or participated for course credit.

Materials. Happiness and anger were induced using the same music as in experiment 1: Grieg’s “Morning Mood” and a piece of Japanese noise music composed by Yamazaki Takushi.

Procedure. We followed the same protocol as in Experiment 1.

Moral Judgments. Moral judgments were assessed with five moral vignettes designed by the researchers for the purpose of the current study. Vignettes depicted various characters in need of aid, e.g., a young mother in a train station struggling with a baby carriage as she walks down a flight of stairs, and a poor man asking for donations to support himself while unemployed. Utilizing a nine-point Likert type scale anchored from 0 (not good) to 9 (extremely good), participants reported their moral judgments: whether it was good to help these characters (i.e., How good would it be for you to help?). Participants were also given a nine-point scale to rate their sense of obligation (i.e., Do you think you should help?). We refer to these as good and should judgments.

Manipulation check. A manipulation check consisted of 4 items (happy/uplifted, and irritated/angry) designed to tap emotions evoked by “Morning Mood” and Japanese noise music. Participants indicated their responses (e.g., At this moment I am feeling happy) on a seven-point Likert type scale ranging from 1 (very little felt) to 7 (very strongly felt).

Results

Manipulation Check

A total happiness score consisted of adding of two items: happy and uplift. Anger consisted of adding irritation and anger items. One-way analysis of variance (ANOVA) revealed that there was a statistically significant difference between groups on self-reported happiness, \(F(2, 82) = 39.03, \text{MSE} = 1.71, p < .001, \eta^2 = .48\). As expected, participants listening to Grieg’s Morning Mood reported highest levels of happiness (\(M = 4.60, SD = 1.28\)) relative participants in the angry noise music condition, (\(M = 1.47, SD = 0.87\), \(t(61) = 9.88, p < .001, \eta^2 = .61\)) and neutral control condition (\(M = 3.77, SD = 1.65\), \(t(63) = 2.23, p < .029, \eta^2 = .07\)). Participants in the angry noise music condition reported the highest level of anger (\(M = 4.57, SD = 1.67\)) relative to both happy (\(M = 1.60, SD = 0.98\), \(t(62) = 8.90, p < .001, \eta^2 = .56\)) and control group participants (\(M = 1.71, SD = 0.95\), \(t(41) = 7.00, p < .001, \eta^2 = .54\)).
Moral Judgments. We created a separate composite score for each participant by averaging responses across the five moral vignettes. We then subjected these composites to two separate one-way ANOVA’s with music (happy music, angry music, and control) as a between subject factor, and judgments of goodness and obligation as dependent variables. There was a statistically significant difference between groups on judgments of goodness, \( F(2, 112) = 20.38, p < .001, MSE = 2.64, \eta^2 = .27 \). Planned contrasts revealed that participants in the happy music condition were significantly more likely to endorse judgments of goodness relative to control participants (\( M = 6.90, SD = 1.12 \) vs. \( M = 5.40, SD = 1.70 \)), \( t(92) = 4.96, p < .001, \eta^2 = .21 \), and participant in angry noise music condition (\( M = 4.30, SD = 2.24 \)), \( t(63) = 6.24, p < .001, \eta^2 = .38 \). Participants in the angry music condition were least likely to endorse judgments of goodness relative to both happy and control group participants (\( M = 4.30, SD = 2.24 \) vs. control \( M = 5.40, SD = 1.70 \)), \( t(69) = 2.25, p < .027, \eta^2 = .07 \).

As predicted, there was also a statistically significant difference between groups on judgments of moral obligation, \( F(2,115) = 15.08, MSE = 2.80, p < .001, \eta^2 = .21 \). Planned contrasts showed that participants in the happy music condition were significantly more likely to endorse judgments of moral obligation relative to the control group (\( M = 6.85, SD = 1.37 \) vs. \( M = 5.70, SD = 1.69 \)), \( t(92) = -3.57, p < .001, \eta^2 = .12 \), and participants in the angry noise music condition (\( M = 4.48, SD = 2.14 \)), \( t(63) = 5.42, p < .001, \eta^2 = .32 \). Participants in the angry noise music condition were least likely to endorse judgments of moral obligation (\( M = 4.30, SD = 2.24 \) vs. control \( M = 5.70, SD = 1.69 \)), \( t(69) = 2.58, p < .012, \eta^2 = .09 \).

In sum, these results reveal that individuals in an induced happy state were most likely to endorse good and should judgments. Angry/irritated individuals were least likely to endorse these judgments relative to both happy and control group participants (see Figure 2).

Discussion

This experiment provides direct empirical support for the thesis that happiness increases judgments of moral goodness and obligation. The results also show that anger reduces these judgments. As predicted, we found no difference between good judgments and should judgments, but future work will explore possible dissociations.

General Discussion
Aristotle believed that music was useful for inducing emotions, and that doing so could facilitate moral education. In his *Politics*, he tells us that, “rhythm and melody supply imitations of anger and gentleness,” and, “in listening to such strains our souls undergo a change, which resembles moral qualities” (p. 309). The present research suggests that there may have been some truth in Aristotle’s view. We utilized music to induce anger and happiness, which are believed to be the cardinal emotions underlying norms that involve harming and helping, and we show that these emotions have an impact on moral judgment.

We induced anger with Japanese noise music, a musical genre consisting of harsh, dissonant, and jarring sounds, produced by Yamazaki Takushi. To induce a happy state we utilized Edvard Grieg’s Morning Mood. We selected instrumental music as an emotion induction because we think that music without lyrics is unlikely to prime moral concepts such as injustice or virtue. One might say that the emotions induced are non-moral. It might sound strange at first to talk of non-moral anger, but we have words in English, such as irritating (which we use in our manipulation check) that convey this idea. Sometimes the term mood is used when referring to feelings of irritation. We prefer the term emotion, because these states do ultimately latch onto the vignettes that we present. But we take no strong stance on the mood/emotion distinction. The key point here is that musically induced affective states lack manifest moral content. That makes instrumental music an especially attractive way to measure how affective states can influence morality.

In the present work we cannot rule of the possibility that our harsh music caused moral anger. For example, people might associate harsh sounds with violence. However, this need not be a moral association (violence can be non-moral, as in the case of aggressive athletics). Also, if such associations exist, they may be weaker than in some standard anger inductions, which explicitly describe immoral conduct. Future work can examine whether harsh music induces any moral emotions or just an irritated state. If so, it does not diminish the interest of our findings. We have shown here that incidental music, a pervasive feature of the environment, can impact moral judgment.

In Experiment 1, we demonstrate that participants exposed to angry music were more likely to judge minor transgressions as wrong relative to participants in a neutral control condition and participants in a happy music condition. Although much empirical work demonstrates a link between anger and social
judgment (e.g., Bodenhausen, Sheppard, & Kramer, 1994; Dunn & Schweitzer, 2005; Keltner, Ellsworth, & Edwards, 1993; Mackie, Devos, & Smith, 2000; Mullen & Skitka, 2006; Tiedens & Linton, 2001) and anger and punishment, (Fehr & Gächter, 2002; Lerner, Goldberg, & Tetlock, 1998; Nelissen & Zeelenberg, 2009), there is less work explicitly documenting the causal impact of anger on wrongness judgment (Palman & Ruttan, 2012; Seidel & Prinz, 2012). Most extant studies on anger and morality use correlational methods (Horberg, Oveis, Keltner, & Cohen, 2009; Rozin, Lowery, Imada, & Haidt, 1999) or get at judgments of wrongness indirectly by looking at related constructs, such as punishment or blame (Fehr & Gächter, 2002; Lerner, Goldberg, & Tetlock, 1998; Nelissen & Zeelenberg, 2009). But research suggests that wrongness and punishment are dissociable (Knoch, Nitsche, Fischbacher, Eisenegger, Pascual-Leone, & Fehr, 2008). Much of the prior work looking at the impact of emotions on moral wrongness judgments has used disgust inductions (Eskine, Kacinik, & Prinz, 2011; Schnall, Haidt, Clore, & Jordan, 2008; Wheatley & Haidt, 2005). We think anger deserves equal attention.

In Experiment 2, we show that participants exposed to happy music were more likely to endorse judgments that it is both good and obligatory to help characters in need. Participants exposed to angry music showed the converse pattern, which was predicted based on prior work linking anger with the tendency to blame victims. Ample empirical evidence links positive emotions to moral behavior (Fried & Berkowitz, 1979; Isen & Levin, 1972), but there is little work linking positive emotions to judgments of moral goodness and moral obligation. Studies showing the impact of positive emotions on moral acceptability in trolley dilemmas are suggestive but difficult to interpret (Strohminger, Lewis, & Meyer, 2011; Valdesolo & DeSteno, 2006). It is unclear whether positive emotions directly increase the belief that it is acceptable to save lives in such studies, or merely decrease the resistance to causing harm. We sought to extend this work by using vignettes that involve forms of helping that do not require causing harm.

Future work should explore different kinds of happiness and their potential impact on moral judgments. Strohminger, Lewis, and Meyer (2011) distinguished mirth and elevation, and they found that mirth induction increased endorsements of utilitarian solution to footbridge dilemmas, but elevation did not. These differences in findings may reflect different properties of positivity. Alternatively, elevation may be a complex emotion that contains an element of empathetic sadness. Indeed subjects in this condition
reported feeling “chest warmth” and “tearing.” Strohminger et al.’s divergent findings for mirth and elevation may be explained by postulating a role for positivity in helping and for negativity (sadness) in not harming (Prinz, 2007). But we agree that there may be different forms of positivity, which we, and others are investigating (Algoe & Haidt, 2009). Furthermore, in this research we distinguished two kinds of positive moral judgments: good and should. Normally, these go hand in hand, but it is possible to imagine cases where they come apart. Here, we did not seek dissociations, but this distinction deserves exploration in future work. The finding that an emotion can impact judgments of obligation relates to David Hume’s famous principle that one cannot logically derive \textit{ought} from \textit{is}; we have not shown that such a derivation is impossible, but we have shown that sentiments promote a sense of obligation, which may suggest that the sense of obligation is emotionally based and hence not a mere logical consequence of factual statements.

These finding raise questions about why anger and happiness play their respective roles in morality. One possibility has to do with their associated action tendencies. Both anger and happiness are approach emotions (Harmon-Jones, Schmeichel, Mennitt, & Harmon-Jones, 2011). We approach things that make us happy or that we anticipate will make us happy, and we also approach things that make us angry, in order to stop them or aggress against them. These action tendencies are useful to morality. It is advantageous to aggress against those who harm and to approach those in need of help. Anger and happiness may get co-opted for moral decision-making they are conducive to these ends. Evolution or learning may establish associations between harm and anger and between helping and happiness, such that the thought of either automatically brings about the corresponding emotion, and each emotion puts us in a motivational states that is conducive to coping with the situation at hand.

We did not directly investigate the motivational impact of anger and happiness in the present work, but our findings suggest that emotions play a role beyond motivation: they carry information. Schwarz and Clore (1983) developed an “affect as information” model, according to which people acquire information about the situations they confront by means of their emotions. The present results add further support to this model. Anger increases judgments of wrongness and happiness increases judgments of goodness and obligation. This suggests that these emotions are consulted when arriving at such moral assessments. By combining motivation with information, emotions may be particularly useful in the moral
domain; they inform us about moral matters while also preparing us to stop wrongdoers and help the needy.

Our findings are important for several reasons. In agreement with prior work in moral psychology, our results suggest that emotions are not merely consequences of different kinds of moral judgments, but may also play a role in the formation of such judgments. We found that people are more likely to condemn bad behavior when mad, and more likely to praise good behavior when glad. This confirms the conjecture that there is emotional differentiation in the moral domain and shows that positive and negative moral judgments can engage positive and negative emotions respectively.

Previous studies in moral psychology have manipulated emotions with smells, tastes, movie clips, and autobiographical recall (e.g., Eskine, Kacinik, & Prinz, 2011; Lerner, Goldberg, & Tetlock, 1998; Schnall, Haidt, Clore, & Jordan, 2008). Sound still remains an underexplored modality. Indeed, we are not aware of any research inducing anger with music, but music is a highly pervasive variable in our lives. People are exposed to music in churches, political campaigns, and news broadcasts, and to the irksome din of rush-hour traffic. These exposures may influence our morals in very unexpected ways. Music may also affect evaluations outside the moral domain. It is widely used in television commercials, department stores, and restaurants. Here we have focused on the special case of morals, but our findings raise the possibility that music exerts an influence on how we negotiate our lives more broadly. As sixth-century philosopher observed, "for changing people’s manners and altering their costumes, there is nothing better than music." (Shu Ching, 6th Century, BC).
Figure 1. Moral judgments of wrongness as a function of mood. Error bars indicate standard error of the mean.
Figure Caption

Figure 2. Moral judgments of praise (good) and obligation (should) as a function of mood. Error bars indicate standard error of the mean.
CHAPTER 3

Sound Morality: Irritating and Icky noises amplify judgments in divergent moral domains

In recent months president Obama came under public scrutiny when his political opponent criticized him for having eaten dog meat as a child when he lived in Indonesia. In a quick counter attack, Obama was eager to point out that his political opponent, Mitt Romney put his dog in a crate fastened to the roof of the car while embarking on a 12–hour drive from Massachusetts to Canada because there was no place left for dog. Many Americans expressed moral outrage both at President Obama and Romney but their moral judgments may have been underwritten by two very different condemning emotions, anger or disgust that may ultimately play very different roles in how we arrive at moral condemnation.

David Hume, the 18th century Scottish moralist proposed a striking thesis that our morality “is the work of the heart; affective feeling or sentiment” (Hume, 1739/1978). Hume believed that we make moral judgments by introspecting how we feel about moral transgressions, and crucially, that different emotions underwrite different judgments. The most fundamental distinction was postulated between violations of autonomy, which are associated with anger, and crimes against nature, which are associated with disgust (Rozin, Lowery, Imada & Haidt, 1999). Examples of autonomy violations include crimes against persons, such as physical assault, theft, unfair distribution, cruelty, or trespassing of rights. Examples of crimes against nature include bestiality, incest and cannibalism. To date, however, no one has shown that the elicitation of these two morally condemning emotions anger and disgust selectively impacts these two moral domains; indeed, no one has directly tested for the impact of anger on wrongness judgments. Using irritating noise to induce anger (a novel induction method) and disgust using a vomit sound, we show that both of these emotions can make moral judgments more severe and their impact depends on the moral domain in question.

The idea of moral differentiation has it roots in anthropology. Shweder, Much, Mahapatra, and Park (1997), observed that moral values around the world divide into at least three categories, which he called autonomy, community, and divinity. Violations of autonomy are crimes against persons, such as physical assault, theft, unfair distribution, or trespassing against rights. Violations of community are
crimes against the social order, such as breaches of public trust, destruction of public goods, or disrespect towards those who are higher in a social hierarchy. Violations of divinity are conceived as crimes against gods in traditional non-secular societies; in secular societies, they are conceived as crimes against nature, such as bestiality, incest, or cannibalism. We prefer the term nature to divinity because it is more relevant to contemporary societies, and because it draws attention to the fact that certain crimes are construed as unnatural, even if no one is harmed. Unusual uses of the body (as with paraphilias and cannibalism) are prime examples.

A major advance came when Rozin, Lowery, Imada, and Haidt (1999), hypothesized that Shweder’s three moral domains may be underwritten by different emotions. Using a forced-choice questionnaire design, they found that people associate anger with crimes against autonomy, contempt with crimes against the social order, and disgust with crimes against nature. Rozin et al. call the resulting mapping between emotions and morality the CAD Model, which stands for community/contempt, autonomy/anger, and divinity/disgust. This was a watershed study because it suggested that moral domains are affectively differentiated; different emotions do different moral work. Rather than supposing that morality is a monolithic psychological domain based on principles of reasoning (Kohlberg, 1984; Turiel, 2002), this research suggested that there are several dissociable moral systems based on gut reactions to different kinds of cues, such as physical harm or perceived impurity.

Rozin et al. (1999) showed that people associate different emotions with different kinds of norms, but they do not show that these emotions actually play the postulated role. Significant progress was recently made by Russell and Giner-Sorolla (2011), who orthogonally manipulated harm, intent and taboo with various moral vignettes. They subsequently found that self-reported anger, responded independently of disgust to harm and self reported disgust responded independently to body violations. Gutierrez and Giner-Sorolla (2007) also showed that manipulating harmfulness and taboos increase self-reported anger and disgust respectively. Such findings are important, but they do not settle the question whether emotions selectively impact wrongness judgments or whether wrongness judgments selectively impact emotions.

Extending, Rozin et al., Horberg, Oveis, Keltner and Cohen (2009), asked participants to report the extent to which vignettes depicting purity or justice violations make them feel “grossed out” or “angry.”
They found that self-reported anger predicted harsher moral judgments of justice but not purity violations, and self-reported feeling of disgust predicted harsher moral judgments of purity but not justice violations. Related to this, Inbar, Pizarro and Bloom (2009) have shown that people who are prone to disgust are more likely to have a negative attitude towards norms that pertain to sexuality and reproduction, such as gay marriage and abortion. These findings are important. They suggest that anger and disgust may have different effects on our morality, but they are indirect. To show that specific emotions can differentially impact our morals, experimental induction of emotional states provides the most direct evidence.

Several studies have shown that disgust induction (elicited through hypnosis, smell, film clips, recall, and taste) can make moral judgments more severe in general (Wheatley & Haidt, 2005; Schnall, Haidt, Clore & Jordan, 2008; Eskine, Kacinik & Prinz, 2011). But these studies compare disgust to neutral or sadness condition. They have not established a selective effect of disgust on crimes against nature and they do not compare disgust to another morally condemning emotion like anger. For instance, in one study, Horberg, Oveis, Keltner, and Cohen (2009) induced disgust and compared it to sadness. They showed that disgust but not sadness influences judgments on crimes against nature. However potential concern is that sadness may not be an appropriate comparison condition. For instance, Schnall and colleagues (2008) found that inducing sadness with a video clip actually reduces the severity of moral judgments relative to the control participants. Since Horberg et al did not include additional control condition it is difficult to know whether sadness was reducing the severity of moral judgments as in Schnall et al, or whether disgust was increasing.

Furthermore, anger has received less attention than disgust in recent research. Keltner, Ellsworth, and Edwards (1993) used vignettes to induce anger, and found that anger it increases judgments of agency and unfairness when considering bad outcomes. Goldberg, Lerner, & Tetlock (1999) found that an anger vignette increase the likelihood that people would blame someone in an unrelated vignette for a harmful outcome and recommend harsher punishment. But we do not know of any studies that test anger on wrongness judgments directly, and compare anger to another morally condemning emotion; disgust.

The primary goals of this investigation therefore are three fold. First we sought to elicit anger with a novel induction method: irritating sound. Second, we sought to investigate impact of anger on
wrongness judgment. And third, we wanted to compare causal impact of two morally condemning emotions, anger and disgust selectively impacting our morality in divergent mortal domains.

Method
Participants. One hundred sixty six CUNY undergraduates (118 female, 46 male, 2 did not report gender) participated in this study for course credit or were recruited from the psychology department subject research pool.

Materials
We induced anger with “noise music,” a genre that uses electric and acoustic instruments to create harsh, jarring and dissonant sounds. The track we used was from Inner Mind Mystique, a recording composed by Yamazaki Takushi (1996, Relapse Records). Disgust was induced with the sound of an emetic event (a person vomiting).

Procedure
Each participant was tested individually and was randomly assigned to one of the three sound conditions (harsh noise, vomit sound, or control) and one of the two vignette types (autonomy or nature violations). Participants were told that the study was about the interference of sounds on the ability to process information. Participants were told that for the first minute they will listen to the sound alone “to get use to it” and that after one minute, they will then receive the reading materials from the experimenter. One minute of the sound alone was implemented in order to induce anger or disgust before participants were given moral vignettes. Participants listen to angry or disgusting sounds while at the same time responding to moral vignettes in order to keep induced emotions constant. Manipulation check and a demographic questionnaire followed moral vignettes.

Moral Judgments. Severity of moral judgments was measured with three moral vignettes depicting autonomy or nature violations. In order to avoid ceiling effects we created moral vignettes that presented moral violations with mitigating circumstances e.g., a father decides to cheat the government on tax returns because of increasing financial struggles related to his sick child. Vignettes depicting nature violations were inspired by previous research (Schnall, Haidt, Clore & Jordan, 2008), but we altered them for the purpose of this investigation. Potential worry with nature violations vignettes used in Schnall et al experiment, was that they may have depicted two moral violations in one vignette. For instance, one
vignette describes lone plane crush survivors as both killing and eating injured boy in order to stay alive. We think this vignette depicts both autonomy (killing the boy) and nature violation (eating the human flesh) thus in original form may respond to both anger and disgust manipulation. To address this worry, we describe the boy dying from his injuries.

Following Schnall, Haidt, Clore & Jordan, (2008) participants responded on a nine-point Likert-type scale ranging from 0 (perfectly okay) to 9 (extremely wrong).

Manipulation check. The manipulation check consisted of four negatively valenced emotion terms e.g., angry, irritate, annoy and gross designed to assess the specificity of the emotions induced by the sounds. Participants were asked to indicate what kind of emotions they are experiencing “right now”. They responded on a seven-point Likert-type scale ranging from 1 (very little felt) to 7 (very strongly felt).

Results

Manipulation check. To assess effectiveness of anger and disgust manipulation we conducted two separate one-way analyses of variance (ANOVA’s) with sound type (harsh noise, vomit sound, control) as between subject factor and emotion terms (angry, irritated, annoyed and gross) as dependent variables. There was statistically significant difference between groups on self reported anger, $F(2, 129) = 10.78, p = .000$. Post hoc analysis revealed that participants in the harsh noise condition reported a higher degree of felt anger ($M = 3.55, SD = 2.12$) relative to participants in the emetic sound ($M = 2.75, SD = 1.71$), $t(101) = 2.10, p = .038$ and control group condition ($M = 1.62, SD = 1.14$), $t(78) = 4.51, p = .000$. There was statistically significant difference between groups on feeling gross, $F(2, 129) = 43.60, p = .000$. Participants in the emetic sound condition reported higher degree of feeling gross ($M = 5.73, SD = 1.84$) relative to participants in the harsh noise condition ($M = 3.29, SD = 2.28$), $t(101) = 5.95, p = .000$, and control group participants ($M = 1.76, SD = 1.30$), $t(79) = 10.23, p = .000$. There was no statistically significant difference between groups on feeling irritated or annoyed in the emetic sound and harsh noise condition ($t’s .338 and .249 n.s.$). These results gave us more confidence that harsh noise and vomit sound induce core levels of two basic emotions, anger and disgust, and not simply general negativity.

Moral Judgments. CAD Model suggests that different emotions do different moral work. Anger is associated with autonomy violations; disgust with nature violations (Rozin, Lowery, Imada and Haidt, 1999). To examine this selective impact of anger and disgust on moral judgments we created two
separate composites consisting of autonomy and nature violations and subjected them to two separate one-way analysis of variance (ANOVA’s) with sound type (harsh noise, vomit sound and control) as a between subject factors and autonomy and nature violations as dependent variables. We found a statistically significant difference between groups in severity of moral judgments on autonomy violations, $F(2, 86) = 6.26, p = .000$. Post-hoc analysis revealed that participants exposed to harsh noise (anger condition) responded with more severe moral judgments ($M = 6.87, SD = 1.40$) relative to participants exposed to vomit sound ($M = 5.26, SD = 2.10$), $t(57) = 3.474, p = .001, \eta^2 = .17$ and the control group participants ($M = 5.41, SD = 2.33$), $t(58) = 3.049, p = .003, \eta^2 = .14$. As hypothesized, severity of moral judgments on autonomy violations was not affected by the disgust manipulation. Participants exposed to vomit sound ($M = 5.26, SD = 2.10$) did not differ from participants in the control group ($M = 5.41, SD = 2.23$), $t (57) = -.260, n.s.

To examine the selective impact of disgust on moral judgments on crimes against nature we then conducted another one-way analysis of variance (ANOVA) with sound type (harsh noise, vomit sound, and control) as a between subject factor and vignettes describing violations against nature as dependent variable. We found a statistically significant difference between the three groups, $F(2, 74) = 6.88, p = .000$. Post hoc analysis revealed that participants in vomit sound condition responded with more severe moral judgments ($M = 6.14, SD = 1.67$) relative to participants induced to feel angry ($M = 4.33, SD = 2.10$), $t(46) = 3.317, p = .002, \eta^2 = .19$ and the control participants ($M = 4.31, SD = 2.21$), $t(52) = 3.38, p = .001, \eta^2 = .18$. Participants induced to feel angry ($M = 4.33, SD = 2.10$) did not differ from control group in severity of moral judgments on vignettes describing crimes against nature ($M = 4.31, SD = 2.21$), $t(50) = .038 n.s. $ See Figure 1.

Discussion

The present findings provide the most direct empirical evidence demonstrating that anger (implemented using novel manipulation in moral psychological research) and disgust, both condemning moral emotions, selectively impact our moral judgments within distinct moral domains. We show that irritating noise (anger condition) amplified moral judgment on autonomy violations e.g., cheating on tax returns. Irritating noise did not impact nature violations e.g., eating ones dog. Conversely, experimentally induced disgust via vomit sound, increased severity of moral judgments on crimes against nature but it did not impact
moral judgments on autonomy violations. These findings are important for the reasons. First, we demonstrate that a highly prevalent environmental variable, sound, can profoundly alter how we think in very different ways. Second, anger has received too little attention in the moral judgment literature, given its postulated centrality to autonomy violations. There are few experiments investigating the role of anger on wrongness judgments as such, as opposed to agency and punitiveness (Seidel & Prinz, under review, Horberg, Oveis & Keltner, 2011), and there are no studies showing that induced anger selectively affects judgments of crimes against persons. Second, while many have postulated distinct causal impact of anger and disgust in divergent moral domains (see Rozin et al., 1999; Haidt & Joseph, 2004; Prinz, 2007; Parkinson, Sinnott-Armstrong, Koralus, Mendelovici, McGeer & Wheatley, 2011), this is the most direct evidence to date. By establishing that these emotions have distinct causal roles, we show that they are not merely consequences of different kinds of moral judgments, but that they can play a role in the formation of such judgments. People evidently use emotions as information (Schwarz & Clore, 1983) when deciding whether an act is wrong, and these two emotions carry information about different kinds of wrongness.

The division of labor between anger and disgust makes sense from a bio-cultural perspective. When a crime is committed against a person, such as a physical assault or theft, it is appropriate for that person to react aggressively, in self defense, which is the action tendency associated with anger. When a crime is committed against nature, such as eating a dead dog or attempting incest, it is appropriate to withdraw, which is the action tendency associated with disgust. It is plausible that these emotional responses, which provide natural defense against two very different kinds of threats, get socialized as the dominant means by which we register harms against persons and against nature, even when we are not directly harmed. Future research should explore whether aggression and withdrawal dispositions differentiate moral domains. Importantly, this research extends extant literature by further demonstrating that our morality is not a monolithic psychological domain, but rather consists of multiple separate systems with distinct moral correlates. It may also shed a light why the American public though it was morally wrong to put dog in the mouth or the roof-top.
Figure Caption

*Figure 1.* Selective impact of anger and disgust crimes against persons and against nature.
CHAPTER 4

Great Works: A reciprocal relationship between spatial magnitudes and aesthetic judgment

“Greatness of dimension is a powerful cause of the sublime.”

Burke (1757/2007)

Michelangelo’s Sistine Chapel ceiling is among the greatest achievements in the history of art. It not only exemplifies the artist’s exquisite rendering of form and innovative use of color, but it also impresses viewers in another way: its physical magnitude. At 131’ long and 43’ wide, it is enormous. Furthermore, it hovers high above viewers’ heads, forcing them to look up. It seems that these spatial features may contribute to its ability to impress. René Descartes (2001/1637: 263) observed that, “we feel more wonder for those things above us, then those things at our own level.” He was writing about the night sky, but his remark could equally apply to the Sistine Chapel ceiling. In the current work, we sought to test this link between spatial magnitudes and magnificence. Work in the psychology of art tends to focus on the content of artworks, rather than size or position, but research in domains such as metaphor theory and embodied cognition suggests that spatial features can play an important role in evaluation. Inspired by the work of the great 18th century aestheticians and psychological research in spatial cognition and aesthetic judgment, we sought to test the relationship between spatial magnitudes and magnificence. To do this, we developed a series of questions to explore experimentally. We ask: Would larger scale and higher wall position result in greater aesthetic value of paintings? Would more diminutive scale and lower wall position result in lower aesthetic worth? We also move beyond physical size of art, and also test the impact of the “magnitude” of creator. We ask: would paintings attributed to a great master (vs. a forger or a student) impact judgment of its scale and aesthetic value?

In a series of pioneering articles about the imagination, Joseph Addison (1711/1864: 139) wrote, “the mind of man naturally hates every thing that looks like a restraint upon it, and is apt to fancy it self under a sort of confinement, when the sight is pent up in a narrow compass... On the contrary, a spacious horizon is an image of liberty, where the eye has room to range abroad.” Addison refers to this spaciousness as grandeur, a term that came into vogue in the 18th century, which refers to both greatness in size and in quality.
A few decades after Addison, Edmund Burke reintroduced the ancient notion of the sublime into discussions of art. Scale is central to his theory. Works of art achieve sublimity, he argued, by evoking a sense of enormity. Bigger, for Burke, is better:

Greatness of dimension is a powerful cause of the sublime. This is too evident, and the observation too common, to need any illustration; it is not so common to consider in what ways greatness of dimension, vastness of extent or quantity, has the most striking effect. (Burke, 1757/2015: 59).

Henry Home (known as Lord Kames) arrived at similar conclusions in his Elements of Criticism, emphasizing both size and vertical position:

The ocean, the sky, seizes the attention, and make a deep impression: robes of state are made large and full to draw respect: we admire an elephant for its magnitude, notwithstanding its unwieldiness. The elevation of an object affects us no less than its magnitude: a high place is chosen for the statue of a deity or hero: a throne is erected for the chief magistrate; and a chair with a high seat for the president of a court. Among all nations, heaven is placed far above us, hell far below us. (Home, 1762/2005: 210)

In the 18th century similar ideas where explicitly applied to the aesthetic domain. The modern study of aesthetics emerged during this time, and many of the most influential authors discuss the relationship between scale and aesthetic judgment.

Such ideas were then taken up in German Aesthetics as well. The influential author, Moses Mendelssohn (1758/1997: 195) claimed that, “immensity arouses a sweet shudder that rushes through every fiber of our being.” Interestingly, Mendelssohn also observed that spatial conceptions of greatness can be extended to those who create art. “An enormous intellect, enormous and uncommon sensibilities, a fortunate imagination joined with penetrating sagacity, noble and passionate emotions that elevate themselves above the conceptions of commoner souls, and generally all great qualities of a spirit that take us by surprise sweep our soul up with them, elevating it, as it were, above itself” (p. 198). This is suggestive because it shows that notions such as “enormity” can be applied to people, and “elevation” can be applied to experience. Size and height are not just features that increase the impact of works; we
may also conceptualize great artists in spatial terms in ways that might impact our reactions to what they produce.

The Scottish Philosopher, Thomas Reid, elaborates on the conceptual associations between scale and quality. In his *magnum opus*, Reid (1775: 440) describes how spatial words get used as terms of praise; for example, “that which merits admiration we call grand.” Anticipating recent work on embodied cognition and metaphor theory, Reid notes that our evaluative vocabulary finds sources in the physical domain: “the names of grand and sublime, as well as their opposites, mean and low, are evidently borrowed from dimensions of the body” (p. 446). He also points to a link between physical magnitudes and aesthetic value. He sums this up by saying, “some analogy there is, without doubt, between greatness of dimension, which is an object of external sense, and the grandeur which is an object of taste” (p. 446).

This collection of 18th century views add up to a pair of complementary principles. First, when it comes to aesthetic judgment, the magnitude of a work can increase its magnificence. The second principle derives from the observation that admiration is associated with grandeur. This can be roughly approximated by the precept that the magnificence of a work can increase its magnitude.

The two principles can be expressed by saying that the leading aestheticians of the 18th century postulated a bidirectional relationship between spatial magnitudes and magnificence. These relationships stand in need of further explication and investigation, however. Despite its widespread endorsement by the founders of modern aesthetics, there has been little empirical effort to test the relationship between space and aesthetic evaluation. These time-honored principles cry out for psychological investigation.

One might have expected researchers to take up the relationship between magnitude and magnificence from the very start. Early psychologists were familiar with 18th century aesthetics, and some of the pioneers in the field, such as Fechner and Wundt, did extensive experimentation on aesthetic judgments. One reason for the neglect of these ideas may be that they are somewhat surprising. Linking size and spatial position to aesthetic worth contrasts with a commonsense view that people assess artworks by their formal qualities (e.g., colors, shapes) and content. Photographic reproductions of artworks typically reduce their scale dramatically and pay little attention to position. We think we can evaluate artworks based on their intrinsic appearance rather than their size or position in space.
Correspondingly, most research in aesthetics and the psychology of art has focused on such intrinsic properties—on what is in a picture—not the size or placement of the picture (e.g., Berlyne, 1970; Gratus & Leder, 2013; Ramachandran & Hirstein, 1999; Reber, Schwarz, & Winkielman, 2004). Form and content surely matter in art, but we think spatial features and masters’ fame (or grandeur) can have an impact as well.

The relationship between evaluation and space has not been completely ignored. There are encouraging studies outside of the domain of art that offer suggestive links between spatial orientation and value. For instance, studies show that font size impacts processing speed, accuracy judgments, and evaluation (Meier, Robinson, & Caven, 2008). In one experiment, Meier and colleagues showed that participants rated neutral words presented in a larger font as more positive than neutral words presented in a smaller font. In another study linking size to preference, Silvera, Josephs, & Giesler (2002) report that, when forced to choose, both children and adults tend to prefer larger geometric objects to a smaller ones.

In addition, there are a few experiments linking verticality with value. Metaphorically, people tend to associate up with good and down with bad. In many world religions (Haidt & Algoe, 2004), divinity is known as the most high, residing in the heavens above, and psychological research shows that people implicitly associate God with up, and Devil with down (Meier, Hauser, Robinson, Friesen & Schjeldahl, 2007). In one experiment, Meier and colleagues found that people encode God-related concepts faster if they were shown in a higher vertical position. In another experiment, Meier, Sellbom and Wygant (2007) found that people have an implicit associations between morality and up, and immorality and down. Research also showed that people tend to be faster at recognizing positive words when presented toward the top of a computer monitor (Meier & Robinson, 2004) and are more likely to represent positive words using lines that have upward orientation as compared to negative words (Lunholm, 1921).

There has also been some recent work indicating a relationship between aesthetic emotions and scale. There has been both theoretical work (Prinz, 2011; Prinz, forthcoming) and empirical work (Zentner, Grandjean, & Scherer, 2008; Silvia, 2015) linking aesthetic experiences to emotions of awe and wonder. These emotions, in turn, have been found to promote changes in self-assessments of size (Shiota, Kelter, & Mossman, 2007; Campos et al., 2013). When in the presence of something awesome
or wondrous, people report feeling smaller because the object under consideration seems grand or engulfing (Rudd, Vohs, and Aacker, 2012). Applied to art, this implies that great works might interact with size judgments: bigger works might appear more awesome, and highly valued works might be judged as larger than less valued works. There have been few direct investigations of awe and wonder in the context of art. Silvia (2015) investigates the impact of personality differences on awe and wonder in response to nature, and Zentner et al. (2008) examine the impact of music on wonder. We sought to build on this literature, bridging work on awe and size with work on awe in response to art.

We also sought to expand on the existing literature on authenticity. Recent research suggests that value ratings diminish for works when they are presented as inauthentic as opposed to authentic (Newman & Bloom, 2011; Locher, Krupinski, & Schaefer, 2015). Authenticity also has an impact on physiological measures, including brain activity (Huang, Bridge, Kemp, & Parker, 2011) and eye-movements (Locher et al., 2015). Such findings indicate that inauthentic works are viewed less positively and processes differently than authentic works. This raises questions about the impact of authenticity on spatial judgments. There has been no investigation, to our knowledge, of whether the diminished value of inauthentic works relates to impressions of diminished scale. To supplement extant literature, we asked whether inauthentic works, such as forgeries or works by students, are believed to be smaller than genuine works.

Inspired by the work of the great 18th century aestheticians and psychological research in spatial cognition and aesthetic judgment, we sought to test this bidirectional relationship between spatial magnitudes and magnificence. Our primary goal is to provide support for the existence of this bidirectional relationship, though we also offer some speculation about possible mechanisms in the general discussion. We wanted to know whether spatial magnitudes would impact judgments about quality, and whether information about quality (or, more specifically, attributions to famous painters) would impact judgments about spatial magnitudes. An affirmative answer to our questions would offer one important clue why we marvel at the Sistine Chapel ceiling, and other magisterial works that extend beyond intrinsic features, such as colors and forms.

Overview of Aesthetic Judgment Scale
To investigate aesthetic value of artworks, we developed aesthetic judgment scale that included six terms: amazing, good, inspiring, boring, interesting, and awe. Participants evaluated paintings on each of the six items anchored at 1 (Not at All) to 7 (Very Much). One item e.g., boring was reverse scored so that large number would indicate more positive aesthetic appraisal. We conducted a principal component factor analysis (PCA) to determine that the selected items measure one underlying “aesthetic value construct.” PCA analysis revealed the presence of a single factor with eigenvalue exceeding 1, accounting for 70% of the variance (see Table 1). Cronbach’s alpha coefficient of .908 also revealed that scale was reliable. We utilized aesthetic judgment scale in Experiment 2a, 2b, Experiment 3, and Experiment 5. When using the scale, we averaged ratings of the individual items onto a single “aesthetic judgment score.”

**Experiment 1. Greatness looms large: Great works are believed bigger**

Experiment 1 was designed to test whether attributions of greatness would impact spatial judgments. In particular, we tested whether artworks attributed to a master vs. a student would result in diverging beliefs about artworks size. Participants completed materials packet that reproduced two paintings presented as works by famous masters, or as students’ work and subsequently were asked to guess paintings’ scale.

**Method**

**Participants.** There were 40 City University of New York (CUNY) undergraduate students (24 females, 15 males, one did not report gender) who were recruited from psychology classes or from the psychology department subject research pool. Participants completed the study for chocolate or course credit.

**Materials and Procedure.** The study was presented as an aesthetic survey and was run on all participants at once in a college classroom. Each participant received materials packet containing high quality color pictures (5.5” wide by 4.5” long), each printed on a separate page. The images depicted *Sky Blue* (1940) by Wassily Kandinsky, and *Betrothal II* (1947), by Arshile Gorky. Each painting was introduced with a short vignette as follows:

This is one of the greatest paintings by a famous master (student artist). We would like you to estimate how big you think this work may be. Don’t worry about being right. Just go with your gut
feeling and guess the size of this painting. Please circle one option among the four choices that appear on the next page.

The last page in the materials packet asked for general demographics and whether participants have seen the paintings. The paintings were counterbalanced for order and were followed by four blank rectangles, representing possible sizes of the presented artworks. The rectangles were pictured horizontally in increasing size and each was presented next to a silhouette drawing of a human figure. The human figure was included so participants could compare the size of the blank rectangle next to the human body. Participants were instructed to “to go with their gut feelings” and estimate the size of each painting by selecting one of the four blank rectangles. None of the participants reported familiarity with the paintings. To investigate the impact of artists’ greatness on beliefs about paintings’ size, participants were randomly assigned to one of the two experimental conditions. In one experimental condition the artworks were described as paintings of great masters, in the second condition they were described as student’s paintings. Subsequently participants were asked to report their beliefs about the paintings’ sizes by selecting one of the four blank rectangles (See Figure 1).

Results

The dependent measure displaying the four rectangles was coded as 1 for the smallest, followed by 2, 3, and 4 for the largest rectangle. We then conducted a mixed model analysis of variance (ANOVA) with presentation (master vs. student) as a between subject factor and painting (Sky Blue and Betrothal II) as a within subject factor. There was a main effect of presentation $F(1, 38) = 10.66, \ p < .002, \ \eta^p = .22$. The painting attributed to Kandinsky was guessed to be larger when presented as a famous master’s work ($M = 2.90, \ SD = 0.85$) and smaller when presented as a student’s painting ($M = 2.25, \ SD = 0.96$), $t(38) = 2.26, \ p < .030, \ \eta^2 = .12$. Likewise, the painting attributed to Gorky’s was guessed to be larger when presented as famous master’s ($M = 3.10, \ SD = 1.02$), and smaller when presented as a student’s ($M = 2.30, \ SD = 0.97$), $t(38) = 2.53, \ p < .016, \ \eta^2 = .14$.

In sum, when participants thought they were looking at famous masters’ paintings, they estimated the works to be larger then when they thought they were looking at students’ paintings. This study demonstrates a link between magnificence of creator and belief about magnitude of creation.

**Experiment 2. Sizing things up: Is big art better then small art?**
Experiment 2 was designed to test whether merely altering physical scale of a painting would result in diverging opinions about aesthetic value. After exposure to a single painting (small version vs. large version), participants rated the painting on aesthetic judgment scale.

**Experiment 2a**

**Method**

**Participants.** There were 48 (CUNY) undergraduate students (36 females, 12 males) who were recruited from psychology classes or from the psychology department subject research pool. Participants completed the study for chocolate or course credit.

**Materials and Procedure.** As in the previous experiment, we presented this study as aesthetic survey research. In this experiment we utilized a high quality reproduction of Pablo Picasso painting, *Three Musicians* (1921) and we hung it on the wall at participants’ eye level. Each participant was tested individually. To investigate impact of scale on aesthetic value, participants were randomly assigned to one of the two painting size conditions (large version 32” x 32” or small version 12” x 12”). Subsequently each participant rated the painting from three feet away. To assure that participants were viewing the work from the same distance, we marked the floor with a tape 3 feet away from the painting. Using the Aesthetic Judgment Scale, participants rated the work on six items (*amazing, good, inspiring, boring, interesting, and awe*) anchored at 1 (*Not at All*) to 7 (*Very Much*).

**Results**

We averaged ratings on the Aesthetic Judgment Scale onto an aesthetic judgment score and subjected it to a one-way analysis of variance (ANOVA) with painting size (large version or small version) as a between subject factor. As predicted, there was a statistically significant difference between groups on aesthetic value. Participants assigned to a larger version of the painting evaluated it more positively ($M = 5.15, SD = 0.85$) relative to participants who were assigned to the smaller version ($M = 4.06, SD = 0.96$), $F(1, 46) = 13.81, \ p < .001, \ \eta^2 = .23$.

In this study we show that mere manipulation of magnitude alters aesthetic value of art. When the large version reproduction of Picasso’s, *Three Musicians* (1921) was presented, participants gave higher aesthetic ratings relative to participants who evaluated the smaller version. Magnitude increased magnificence.
Experiment 2b

One limitation with using Picassos’s *Three Musicians* (1921) is its visual complexity. The difference in aesthetic judgment between larger vs. smaller painting condition could have resulted from people’s capacity to perceive more intricacies in the larger picture. To address this concern, we decided to replicate our findings with a visually simpler painting consisting of just a few geometric shapes. For this purpose we utilized reproduction of Joan Miro’s *Blue II* (1961). Miro’s *Blue II* consists of a uniform blue background with a single red line and a series of black dots stretched across the canvas.

Method

Participants. There were 46 (CUNY) undergraduate students (35 females, 11 males) who were recruited from psychology classes or from the psychology department subject research pool. Participants completed the study for chocolate or course credit.

Materials and Procedure. As in the previous experiment, we presented this study as aesthetic survey, and as before, each participant rated the painting (in this case, Miro’s *Blue II*) on the aesthetic judgment scale from three feet away. Each participant was tested individually. To investigate the impact of magnitude on aesthetic worth, we randomly assigned participants to one of the two painting conditions (either the large painting version: 30” x 40,” or the small painting version: 8” x 12”). Subsequently, each participant rated the work on six items (amazing, good, inspiring, boring, interesting, and awe) anchored at 1 (Not at All) to 7 (Very Much).

Results

As before, we created a single aesthetic judgment score by averaging all 6 items on the Aesthetic Judgment Scale and subjected this composite to a one-way analysis of variance (ANOVA) with painting size (large vs. small) as a between subject factor. As predicted, there was a statistically significant difference between groups on aesthetic value. Participants exposed to larger painting rated it more positively ($M = 3.96$, $SD = 1.33$), relative to participants who were exposed to the smaller painting ($M = 2.68$, $SD = 1.12$), $F(1, 44) = 12.13$, $p < .001$, $\eta^2 = .21$.

Using a visually simple stimulus consisting of just few geometric shapes on a uniform blue field, we replicated findings from Experiment 2a linking magnitude to aesthetic value. A larger reproduction of Miro’s *Blue II* was evaluated more positively than a smaller reproduction. This finding gave us more
confidence that mere manipulation of size impacts aesthetic worth over and above stimulus visual complexity.

**Experiment 3. Delusions of grandeur: Can attributes of greatness alter perceptual judgments?**

Experiment 3 was designed to show that presenting a painting as a work by a great master or a fake would alter perceptual judgments about the painting’s size and proximity. We also demonstrate that master’s art is evaluated more positively than the visually identical painting believed to be a forgery.

**Method**

**Participants.** Participants were 54 CUNY undergraduate students (35 females, 19 males) who were recruited from psychology classes or from the psychology department subject research pool. Participants completed the study for chocolate or course credit.

**Materials and Procedure.** We presented this experiment as a perceptual judgment research. We utilized a high quality reproduction of a painting attributed to Vincent Van Gogh, *Portrait of a Man* (1886). The actual size of the reproduction was 17” x 11” and it was hung with the base at 5’. This is eye level for most North Americans (average height is 5’ 9.5” for men and 5’ 4.5” for woman; Fryer, Gu, & Ogden, 2012). Each participant was tested individually and rated the painting from 4 feet away. To assure that participants were viewing the work from the same distance, we marked the floor with a tape 4 feet away from the painting. Participants were told that the painting represented one of Van Gogh’s greatest artistic achievements (great art condition) or that it was a fake (forgery condition). To investigate the impact of artworks greatness on size and distance estimations we randomly assigned participants to one of the two painting conditions (great or fake). Participants were then asked to provide “a feeling of size” estimates of the painting’s height and width (in inches) while looking at it; we added these to arrive at a total size value. Participants were also asked to provide “a feeling of distance (in feet) without looking at the floor,” between themselves and the painting. After providing these measurements, participants rated the work on Aesthetic Judgment Scale.

**Results**

As in experiment 2, we averaged participants’ aesthetic ratings onto a single aesthetic judgment score. We then conducted multivariate analysis of variance (MANOVA) with condition (great art vs. fake) as a between subject factor, and size, distance, and aesthetic judgment score as dependent variables.
There was a statistically significant difference between groups on all the dependent variables. Participants estimated the painting to be larger when they thought it was Van Gogh’s masterpiece ($M = 26.37$, $SD = 6.21$), but estimated it as smaller when they thought it was a fake ($M = 22.06$, $SD = 5.30$), $F(1, 52) = 7.50$, $p < .008$, $\eta^2 = .13$. Participants also estimated themselves to be closer to the masterpiece ($M = 3.18$, $SD = 1.11$), relative to the participants in the fake painting condition ($M = 4.18$, $SD = 1.01$), $F(1, 52) = 12.07$, $p < .001$, $\eta^2 = .19$. As hypothesized, there was statistically significant difference between groups on aesthetic value. Participants in “great art” condition evaluated the portrait more positively ($M = 4.45$, $SD = 0.86$), relative to participants in the “fake art” condition ($M = 3.61$, $SD = 1.12$), $F(1, 52) = 9.51$, $p < .003$, $\eta^2 = .15$ (this last result replicates Leder, 2001, experiments 4 and 5).

In this study we demonstrate that presenting the painting as “a great” or “a fake” alters perceptual judgments of size and proximity. Participants’ estimations of size and distance varied as a function of authenticity, with “great work” being assessed as bigger and closer. As expected, we also found that participants gave more positive aesthetic appraisals when they thought the Portrait of a Man (1886) was Van Gogh’s, and lower aesthetic judgments when they thought it was a fake. Here we show that magnificence increases magnitude and aesthetic value.

**Experiment 4. Raising Standards: Is master’s art placed higher than student’s work?**

Experiment 4 was designed to show that creator’s greatness would result in differential recommendation of artwork spatial arrangements in a hypothetical gallery.

**Method**

**Participants.** There were 42 CUNY undergraduates (23 females, 19 males) recruited from psychology classes or from the psychology department subject research pool. Participants completed the study for chocolate or course credit.

**Materials and Procedure.** The study was run in a group setting in a college classroom. Participants were told that the study is about art arrangement in a hypothetical gallery. Each participant received a materials packet that contained high quality color reproductions (5.5” wide by 4.5” long) of Wassily Kandinsky, *Sky Blue* (1940), and El Lissitsky, *Proun Composition* (1924), each printed on a separate page. The last page in the materials packet asked for general demographics and whether participants have seen the paintings. Each painting was introduced with a short vignette that appeared on
the top of the page above each painting. In one of the experimental conditions, the prints were described as works of a great master. The other experimental condition described them as student’s work. Paintings were counterbalanced for order and were followed by a dependent measure developed by the researchers. The dependent measure consisted of a multiple-choice item depicting four blank rectangles representing hypothetical wall placements for a work of art (see Figure 2). The rectangles were pictured horizontally ranging from lowest position to highest. Each was presented next to a silhouette drawing of a human figure. The human figure was included so participants could compare the position of the blank rectangle relative to the human body. Participants were instructed to select one rectangle out of the four choices that represented the best gallery display position for the painting that they just saw. The first blank rectangle was placed in such a way, that the human figure drawn next to it would need to look down on it in order to see the work. The last blank rectangle would require human figure drawn next to it to look up to see the painting. The middle options fell between these two extremes. As in study 1, the dependent measure displaying the four rectangles was coded as 1 for the lowest rectangle position, followed by 2, 3, and 4 for the highest rectangle position. None of the participants reported familiarity with the paintings.

To investigate the impact of creator’s greatness on artworks spatial arrangement, participants were randomly assigned to one of the two experimental conditions (master’s art vs. student’s art) and subsequently were asked to recommend each paintings’ wall placement in a hypothetical gallery by selecting one of the four rectangle options ranging from lowest spatial orientation to highest.

**Results**

We conducted a mixed model analysis of variance (ANOVA) with creator (master’s art vs. student’s art) as a between subject factor and painting (Sky Blue and Proun Composition) as a within subject factor. There was a main effect of creator $F(1, 38) = 10.66, \ p < .002, \ \eta_p^2 = .22$. Kandinsky’s work was recommended to be “placed higher” when described as great master’s painting ($M = 3.19, SD = 0.87$) and lower when described as a student’s work ($M = 2.38, SD = 1.28$), $t(40) = 2.39, \ p < .022, \ \eta^2 = .12$. Likewise, as expected, participants recommended Lissitsky’s work to be placed higher when participants believed it was painted by a master ($M = 3.09, SD = 1.00$), but lower when they believed it was a student’s painting ($M = 2.33, SD = 1.06$), $t(40) = 2.40, \ p < .021, \ \eta^2 = .13$. 
In sum, this study demonstrates a link between a creator’s magnitude and spatial preference. Participants recommend that a master’s works should hang higher than student's paintings. These recommendations would require viewers to look somewhat upward when looking at a master’s paintings, and somewhat downward when looking at a student’s work.

Experiment 5. High art: Is art placed high better than art placed low?

Experiment 5 was designed to show that merely altering the physical location of a painting would impact its aesthetic value. In this study, participants rated reproduction of a painting by Wassily Kandinsky, *Sky Blue* (1940) appearing at various spatial locations. The painting was hung either above the participants’ eye level, mid position, or below eye level.

**Method**

**Participants.** There were 77 CUNY undergraduate students (58 females, 19 males) who were recruited from psychology classes or from the psychology department subject research pool. Participants completed the study for chocolate or course credit.

**Methods and Procedure.** The study was presented as an aesthetic survey. Each participant was tested individually in the lab. For the purpose of this experiment we utilized a reproduction of Wassily Kandinsky’s *Sky Blue* (1940). The reproduction was 20” by 30”. To investigate the impact of spatial location on aesthetic value, we varied the physical location of *Sky Blue* by hanging it above the participants’ eye level (6 feet at base), mid position, or below the eye level (4 feet at base). Participants were randomly assigned to one of the three viewing orientations and were subsequently asked to provide their opinion about the painting. Each participant rated the painting from three feet away. As in Experiment 2, 3 and 4, painting was rated on the Aesthetic Judgment Scale, comprised of six items (*amazing, good, inspiring, boring, interesting, and awe*) anchored at 1 (*Not at All*) to 7 (*Very Much*).

**Results**

We averaged participants’ ratings onto a single aesthetic judgment score and subjected it to one-way analysis of variance (ANOVA) with painting position (above eye level, at the eye level, or below eye level) as a between subject factor. There was a main effect of painting location $F(1, 74) = 37.17$, $p < .0001$, $\eta^2 = .50$. Participants who evaluated Kandinsky’s work while looking up gave the highest aesthetic ratings ($M = 5.67$, $SD = 0.78$), relative to participants who evaluated it at eye level ($M = 4.19$, $SD$
= 0.94), t(49) = 6.06, p < .0001, η² = .43, or below eye level (M = 3.62, SD = 0.88), t(49) = 8.74, p < .0001, η² = .61. Participants who looked down at the painting gave the lowest ratings (M = 3.62, SD = 0.88 vs. eye level M = 4.19, SD = 0.94), t(50) = 2.28, p < .027, η² = .09.

In sum, this study shows that participants who looked up while evaluating Kandinsky’s *Sky Blue* (1940) rated the painting most positively, while participants who looked down gave the lowest aesthetic appraisals. This finding confirms a link between spatial magnitudes and aesthetic value.

**General Discussion**

Inspired by the work of the great 18th century aestheticians, we sought to explore the bidirectional relationship between magnitudes and magnificence. In experiment 1, we demonstrate that works by great masters are believed to be large. Experiment 2 established something like the reverse of this effect: when presented at a larger scale, the same painting struck participants more positively. In experiment 3, we demonstrate that painting presented as a master’s piece or a fake alters judgments about its size and distance. When participants believed the painting was famous master’s it was judged as physically larger and closer than when presented as a fake. Participants also judged the master’s work to be more aesthetically valuable than a fake painting (as also shown by Leder, 2001). In experiment 4, participants recommended that paintings by great master be hung higher in a gallery then student paintings, perhaps suggesting greater reverence for the master’s artworks. In experiment 5 we show that a painting presented above eye level induced greater aesthetic value judgments than the same painting presented below eye level, while eye-level presentations received judgments in between. Our findings demonstrate that scale and height can increase aesthetic worth, and that beliefs about aesthetic greatness can make paintings seem closer, larger, and worthy of being placed higher for viewing. Together, these findings suggest that aesthetic value is associated with largeness, with highness, and with master’s fame.

We deployed between-subjects designs in this research, because we wanted to discourage participants from relying on simple comparative heuristics. For example, when comparing works attributed to masters to works attributed to forgers or students (experiments 3 and 4), participants were exposed to just one of these attributions, so they could not rely on a simple rule assigning greater magnitudes or value to the higher status category. Between-subject designs reduce the possibility that
participants would have inferred our manipulations. For example, when presented with a large reproduction of a painting (experiment 2), participants would not have known that others were presented with a smaller version.

In this work, we did not test for mechanisms responsible for the current effects. But the work in metaphor theory and embodied cognition suggests that spatial features can play an important role in evaluation. A metaphor is a figure of speech in which one concept is understood in terms of another (Lakoff & Johnson, 1980). Embodied versions of this approach emphasize metaphorical links mediated by bodily experiences e.g., feeling happy is experientially related to upright posture, and thus things that make as happy may be metaphorically linked to higher elevation. In the current context, such cross-domain mappings between valence and space, can allow paintings that appear high to be evaluated as good, but paintings that appear low to be evaluated as bad. This interpretation aligns with a study by Crawford, Margolies, Drake, and Murphy (2006) in which memory for location on the vertical axis was found to be associated with stimulus valence. It is possible that embodied emotions can also play a more direct role linking physical magnitudes with evaluation. For example, looking upward may directly increases positive emotions and attitudes without metaphorical mediation. Work on bodily feedback suggests that posture can impact emotion (Riskind, 1983). This offers one possible mechanism underlying the results of experiment 5, in which height increased judgments of aesthetic value.

The discovery that great art looks closer (experiment 3) fits with research demonstrating that people underestimate the proximity of things they desire (Balcetis & Dunning, 2010). This is consistent with a recent neuroimaging study in which works by masters as opposed to forgeries were associated with greater activation in reward centers of the brain (Huang, Bridge, Kemp, & Parker, 2011). Thus desire and reward may play a role in distance judgments.

Our findings also contribute to the emerging literature on awe. There is research showing that awe is associated with self-diminishing appraisals (Shioto, Keltner, & Mossman, 2007). Awe makes people feel smaller. Awe is said to alter spatial relationships between self and world. With this, one might expect the world to also appear larger when experiencing awe. Some confirmation of this comes from a study by Rudd, Vohs, and Aaker (2012). They did not measure judgments about physical size, but they did find that awe leads to an expansion of time. Thus, one might say that awe relates to expansive
information processing. Awe was an item on our scale, and, in line with these findings, we found that awe is among the responses that increase with spatial features. In particular, awe is associated with largeness of the presented stimulus (experiments 1 and 2) as well as perceptual judgments of largeness (experiment 3).

Our findings may also relate to previous work on attention. Our scale includes items related to interest (interesting and boring), and it is plausible that interesting items engage our attention. Attention, in turn, has been found to increase size estimates (Anton-Erxleben, Henrich, & Treue, 2007). Attention may therefore play a role in our finding that works by masters are assessed as larger (experiment 4).

In this discussion, we have focused on our findings that relate artistic merit to spatial magnitudes. In experiment 3, we also obtained results linking authorship to evaluation. In particular, when we told participants that a master as opposed to a forger created a painting, higher evaluations were obtained. This finding may relate to the literature on persuasion. Petty and Cacioppo (1984) defend an Elaboration Likelihood Model, according to which positive assessments can be impacted by elaborative processing, such as the retrieval of associated stereotypes; their model includes a peripheral pathway, which uses heuristics to inform assessments. For example, arguments presented by a high prestige source are rated as more compelling than arguments from a low prestige source (Petty, Haugtvedt, Heesacker, & Cacioppo, 1995). Applied to the present case, attributions to masters and forgers may facilitate activation of stereotypes about the quality of great artists and hacks, respectively. These results may also be mediated by emotions. Perhaps attribution to masters and forgers elicits positive and negative feelings, and these, in turn effect evaluation (cf. Schwarz & Clore, 1983; Seidel & Prinz, 2012). Future work will be needed to determine whether either of these processes contributes to the reported effects.

The experiments reported above do not establish the mechanisms mediating the relationship between spatial features and evaluation. We cannot confirm whether metaphor, posture, expansive information processing, attention or persuasion contribute to the association between magnitudes and magnificence. Before such work can be undertaken, it is important to show that such an association exits. That was our goal here. We sought to confirm the bidirectional relationship that captivated the 18th century authors who established the study of aesthetics. Having found preliminary evidence for this bidirectional relationship between magnitudes and magnificence, future work should test the underlying
mechanisms. Another next step is to test whether the impact of artist fame on perceptual judgments is influencing visual processing or merely post-perceptual assessments. Within aesthetic psychology, we also hope that this work contributes to future investigations of ways in which assessment is influenced by factors other than content and form.

Does it follow that bigger and higher are always better? We think not. In India, for example, there have been traditions of miniature paintings. In ancient Greece, mosaics were often placed on the floor under foot. These exceptions warrant investigation. Historically speaking, however, the relationship between great magnitudes and magnificence has been a dominant theme in the history of art. Cathedrals, mosques, and pyramids soar high above us. Lofty scale has also been a feature of totem poles, monoliths, and marble statues. In Medieval and Renaissance painting, important figures are depicted as larger and higher than others. The link between largeness, highness and value may also contribute to an understanding of natural wonders. Why are mountains magisterial? What about ancient trees, the night sky, and vast ocean? We hope our findings will motivate further exploration linking spatial features and aesthetic value.

Our interim moral is a resounding confirmation of the 18th century authors who posited a link between magnitudes and magnificence. The impact of the Sistine Chapel ceiling may owe something to its scale and position, and not just to Michelangelo’s exquisite use of paint. And knowing that it is by a famous master may make it appear even grander. These results may prove useful for artists, curators, and critics, and they further our understanding of the ways in which spatial dimensions relate to evaluation.
Table 1

*Factor loadings based on (PCA) for each of the six items comprising Aesthetic Judgment Scale*

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Component 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inspire</td>
<td>.895</td>
</tr>
<tr>
<td>Amaze</td>
<td>.893</td>
</tr>
<tr>
<td>Good</td>
<td>.829</td>
</tr>
<tr>
<td>Awe</td>
<td>.807</td>
</tr>
<tr>
<td>Boring</td>
<td>.806</td>
</tr>
<tr>
<td>Interest</td>
<td>.775</td>
</tr>
</tbody>
</table>

*Note.* Each item was answered on a scale from 1(Not at All) to 7(Very much).

One item, "boring" was reverse scored so that larger number would indicate higher wonder score.
Figure 1. Multiple-choice items used in experiment 1. Participants guessed the size of paintings by selecting one of the rectangles.
Figure 2. Multiple-choice items used in experiment 4. Participants indicated their recommended placement for paintings by selecting one of the rectangles.
CHAPTER 5

Alligator or Squirrel: Musically Induced Fear Reveals Threat in Ambiguous Figures

According to conventional wisdom, fear arises when we see something that we believe to be dangerous. But can the converse also be true? And even more strongly, can potentially benign objects look dangerous when we are afraid? To test this possibility we used new induction method, scary music to induce fear, and we investigate whether fear can alter the meaning of newly devised ambiguous figures that can be interpreted as something dangerous, an alligator, or benign, a squirrel. We asked: Can fear make the threatening interpretation more likely?

Recent research suggests that emotions are not merely consequences of what we see, but can also exert a causal impact, and neurobiological research shows that the brain contains bidirectional connections between visual processing pathways and the amygdala, which has been implicated in emotion processing (Freese & Amaral, 2005). Behavioral studies investigating perception in phobic individuals show that those who are afraid of spiders tend to overestimate speed of approaching spiders (Riskind, Moore, & Bowley, 1995), and those who are afraid of snakes tend to overestimate the flickering of a snake’s tongue (Rahman & Cuk, 1992). Furthermore, people who are afraid of snakes or spiders find it easier to detect those objects in a visual search task (Ohman, Flykt, & Esteves, 2001).

Research also demonstrates that fear can bias perception in individuals without phobias. Cole, Balcetis and Dunning (in press) found that people tend to underestimate the distance of threatening objects, and there is research showing that people overestimate size of threatening pictures relative to neutral or positive pictures (van Ulzen, Semin, Oudejans, & Beek, 2008). Stefanuci, Proffitt, Clore, and Parekh, (2008) showed that estimates of steepness increase when participants are standing on a skateboard atop a hill in contrast to a stable surface (Stefanuci, Proffitt, Clore, & Parekh, 2008). Similarly, participants standing on the edge of a balcony tend to overestimate distance to the ground (Stefanuci & Proffitt, 2009).

There is also research looking at the impact of motivation on picture perception (Balcetis & Dunning, 2006). In one study, participants briefly saw an image on a computer screen that could be interpreted as a number or a letter. Some participants were told that if a letter appeared they would drink
freshly squeezed orange juice rather than a green, noxious-smelling drink. Others were told that if a number appeared they would drink the desired beverage. Researchers found that participants interpreted the ambiguous figure in the direction that led to the most desirable outcome.

The foregoing research shows that fear can impact the salience of emotionally relevant information, exaggerate features, and distort what people see. There is research showing that motivation can also influence picture perception. However, we are not aware of any studies that investigate the impact of fear on the interpretation of ambiguous pictures. We are also unaware of work that tests the impact of fear on perception using a musical induction method. Here we wanted to test whether scary music would make people more likely to see ambiguous pictures as dangerous. To explore this possibility, we presented participants with a newly devised set of ambiguous images that can be seen in two very different ways: as dangerous or as benign objects. One figure can be seen as a squirrel or an alligator, another as a snake or a rope, and a third, as a cleaver or a cooking pot (Figure 1). We intentionally created figures whose dangerous interpretations included both animals (a snake and an alligator) and artifacts (a cleaver), because it is widely believed that we are biologically prepared to fear certain animals (snakes, and perhaps also alligators, given the prevalence of such ancient predators in our ancestral environments). We wanted to know whether fear would selectively impact interpretation of any of these figures, and, if so, would the effect be limited to the ones representing biologically ancient threats. We predicted that fear would have an impact on the interpretation of all these figures.

We coded participant responses as 0 when the image was seen as innocuous and 1 when the image was seen as threatening. This allowed us to test for the proportion of “positive” (benign) and “negative” (threatening) interpretations for all the images. We then subjected these responses to an ANOVA. Research demonstrates that ANOVA with binary outcome variables (0, 1) produces estimates of the same response probabilities that can also be obtained from a multiway contingency table (Overall, 1980); the ANOVA F statistic is algebraically similar to the contingency chi-square (D’Agostino, 1972), and is robust, as has been demonstrated with extensive Monte Carlo studies (Lunney, 1970). Because use of ANOVA technique is justified on binary outcome responses, we performed a mixed-model analysis of variance (ANOVA) with music (fearful, happy, no music) as a between-subject factor and ambiguous figures as a within-subject factor. As predicted, we found a significant main effect of music, $F(2, 90) =$
Planned contrasts revealed that participants in the fearful music condition were more likely to interpret the cleaver-pot figure as something dangerous, e.g., as a knife, a machete, or an ax ($M=.94$, $SD = .23$), relative to participants in the happy music condition, ($M=.40$, $SD = .49$), $t(65) = -5.708$, $p < .001$, $\eta^2 = .33$, and neutral condition ($M=.53$, $SD = .50$), $t(59) = -4.153$, $p < .001$, $\eta^2 = .23$.

Participants in the happy music and no music condition were more likely to interpret the same figure as innocuous, e.g., as a pot, a bucket, or a container, relative to participants in the fearful music condition. Also, as predicted, participants exposed to fearful music were more likely to report seeing an alligator in the alligator-squirrel figure ($M=.57$, $SD = .50$), relative to participants in the happy music condition ($M=.28$, $SD = .45$), $t(65) = -2.466$, $p < .016$, $\eta^2 = .09$ and neutral condition ($M=.26$, $SD = .45$), $t(59) = -2.423$, $p < .018$, $\eta^2 = .09$. As expected, participants in the happy music and no music condition tended to interpret the same figure as benign, e.g., as a rabbit, a beaver, or a squirrel, relative to the participants in the fearful music condition. In the snake-rope figure, planned contrasts revealed that the snake was seen to a greater extent in the fearful music condition ($M=.71$, $SD = .49$), relative to participants exposed to happy music ($M=.37$, $SD = .49$), $t(65) = -2.923$, $p < .005$, $\eta^2 = .12$, and no music neutral condition ($M=.30$, $SD = .47$), $t(59) = -3.387$, $p < .001$, $\eta^2 = .16$. Again, as expected, the snake-rope figure was seen as non-threatening, (e.g., rope, scarf) by the majority of participants in the happy music and no music control condition. There was no statistically significant difference between the happy music and neutral condition for any of the three figures ($t$’s $.995$, .10, and .538 n.s.). Results are summarized in Figure 2.

In this paper, we asked whether potentially benign objects can appear dangerous when we are afraid. Results of this study suggest an affirmative answer. Here we show that the majority of participants exposed to scary music interpreted each ambiguous figure as something dangerous; they were more likely to report seeing a cleaver, an alligator, or a snake relative to participants in the happy music and no music control conditions. The majority of participants in both the happy music and no music condition interpreted the same ambiguous figures as benign; they were more likely to report seeing a cooking pot, a squirrel, or a rope. These findings demonstrate that when we are afraid, potentially harmless objects might look dangerous to us. Importantly, the effect worked for both animals and artifacts, suggesting that it is not restricted to stimuli that are biologically prepared. Fear allows us to more readily recognize both learned threats, such as cleavers, and threats that may be known innately.
In addition, these findings bolster research showing that hearing influences vision (Shams, Kamitani, & Shimojo, 2000), and they raise questions about how emotions influences perception: if emotions make a threatening interpretation dominate over a benign interpretation, then perhaps both interpretations are available for selection prior to awareness. It is possible that this is mediated by attention. Research has implicated attention in ambiguous picture perception (Chambers & Reisberg, 1985; Libert & Burk, 1985), and fear is known to increase attention to threatening stimuli (Mogg, Mathews, Bird, & McGregor, 1990). Musically induced fear may direct attention to threatening objects hidden within ambiguous stimuli. This process may be mediated by the amygdala, which is responsive to threatening stimuli and able to interact with visual areas at a low levels of visual processing (LeDoux, 1996). There may be important real-world implications of such effects. Fear causes perceptual distortions in phobic individuals (Riskind, et al.1995), and the present result suggests that these effects may extend to people without phobias.

Future research might explore ambiguous figure perception in phobic and anxious individuals, as well as the impact of emotion on interpretation in the context of threatening jobs (e.g., are law enforcement officers more likely to see benign object as guns?). Future work should also address limitations of this study. Might other negative emotions have similar effects on perception? Does fear interact with visual processing or just with the interpretation of what is seen? Our findings cannot settle these issues.

For now, the crucial conclusion is that emotions do not merely distort perception and alter salience; they can dramatically alter the meaning of what we see.

**Method**

Pilot research confirmed the efficacy of our fear induction. Participants listened to the music and reported fear and nervousness, on a 7-point Likert type scale ranging from 1 (very little felt) to 7 (very strongly felt). We created a composite of these scores ($M = 5.00$, $SD = 1.68$) and compared this to a composite of self-reported happiness and calmness ($M = 1.33$, $SD = .68$), which was significantly lower, $t(17) = 7.406$, $p < .001$. Pilot research also confirmed the efficacy of our happiness induction. Participants listened to happy music and reported feeling happy and excited. We again created a composite of these scores ($M =
3.68, $SD=.89$) and compared this to self-reported fear ($M = 1.06, SD=.25$), which was significantly lower, $t(16) = 11.619, p < .001$.

We investigated the impact of emotions on visual perception by randomly assigning 97 participants (64 female) to fearful music, happy music, or no music conditions. Using headsets, participants in the fearful music condition listened to Krzysztof Penderecki’s *Threnody to the Victims of Hiroshima* (Penderecki, 1960); participants in happy music condition listened to Grieg’s *Morning Mood* (Grieg, 1875). Subsequently, participants were presented with three newly devised ambiguous figures (see Figure 1), displayed on a 17-inch MacBook Pro monitor and presented in Microsoft PowerPoint. They were counterbalanced for order and presented for one second each. After looking at each image briefly, participants were asked to write their best guess of what they just saw. In the fearful and happy music conditions, the music played throughout the experimental procedure. In the no music condition, participants performed the same task in silence.

Figure Caption
Figure 1. Ambiguous figures used in experiment: (a) alligator-squirrel, (b) snake-rope, and (c) cleaver-pot.
Figure Caption

*Figure 2.* Mean interpretations as benign (= 0) and dangerous (= 1) for ambiguous figures in no music, happy music, and fearful music condition.
References


D’Agostino, R. B. (1972). Relation between the chi-squared test and ANOVA test for


Overall, J. E. (1980). Calculation of adjusted response frequencies using least square


Seidel, A., & Prinz, J. J. (submitted). From Glad to Good and Mad to Bad: Music


