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A reputation management and signalling account of moral disgust and moral
contagion

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requirements for the degree of Doctor of Philosophy in Psychology, the University of
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Abstract

Moral disgust is thought to be an emotion arising from perceptions of immorality as physically contaminating, in part based on experiments showing that participants are unwilling to contact immoral objects like a Nazi's armband. Here it is proposed that apparent contagiousness of immorality is driven by desire to avoid reputation harm by visibly associating with immorality. Hypothetical (Study 1) and behavioural (Study 2) evidence supported this account. Participants preferred to wear a Nazi armband under rather than over their clothing, even though this meant direct skin contact. The "under" preference was stronger with an audience. Participant reports revealed little contamination concern but strong reputation concern. Changing perspective, targets who touched but concealed the armband were not seen as contaminated or immoral (Study 3). If disgust reported towards immorality is not contaminating, it may not reflect activation of the full emotion of disgust. Instead, people may express disgust to communicate particular motives. Unlike anger, which can be seen as self-interested, disgust communicates a more principled, moral motivation. Studies 4 and 5 used scenarios to show that observers infer more moral motivation from an expression of disgust and more self-interested motivation from anger. Studies 6, 7 and 8 demonstrated that participants are more likely to choose to express disgust to show moral concern and anger to protest harm to one's self-interest. These findings offer a new perspective for understanding the role of disgust in morality: disgust is not expressed because people feel an internal state of disgust but because disgust effectively communicates morally motivated condemnation.

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Chapter 4. General Discussion

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1. General Introduction

The moment there is suspicion about a person's motives, everything he does becomes tainted.

-Mahatma Gandhi

There is no odor so bad as that which arises from goodness tainted.

-Henry David Thoreau, *Walden*

If evil is contagious, so is good...let us be infected by goodness.

-Pope Francis

But for supporting robbers, shall we now contaminate our fingers with base bribes.

-Shakespeare, *Julius Caesar*

You, hip and cool with a swastika on your arm at your party, are about as disgusting as a mouldy piece of food. I vomit.

Franz Josef Wagner, *Bild*,

The language of disease and disgust permeates moral discourse. This thesis aims to explain why. Was Prince Harry rendered disgusting because he was contaminated by physical contact with an immoral arm band? Was the disgust felt by Franz Josef Wagner the same emotion as he would feel towards mouldy food? Predominant perspectives in the academic literature on disgust answer yes to questions like these. Research participants routinely report feeling disgust towards

immoral actions like stealing or cheating and towards immoral individuals like robbers or Nazis. Experimental analogues of Prince Harry's real-life *faux pas* have shown that people are reluctant to contact immoral objects like a murderer's jumper, or a Nazi's armband. Such observations buttress the view that the disgust reported towards immorality is the same emotion as that reported towards physically disgusting stimuli. Immoral stimuli, it is argued, are perceived as contaminating, so they too elicit disgust, which motivates avoidance of the source of contamination (Horberg, Oveis, Keltner & Cohen, 2009; Rozin & Haidt, 2013). According to some accounts, this moral contamination is perceived to occur via the transfer of either a material substance, or a spiritual essence (Rozin, Millman, & Nemeroff, 1986; Rozin, Haidt & McCauley, 2008).

Here, the assumption that immoral stimuli are appraised as contaminating is questioned; instead the apparent contagiousness of immoral stimuli may primarily be motivated by a different concern: people avoid touching immoral stimuli because they intuit that touch, by signalling close association, has important consequences for observers' perceptions of the actor's morality. The actor's intuitions about reputation threat, not contamination threat, lead to discomfort touching, or otherwise closely associating with, immoral stimuli. This alternative account has important implications: if moral disgust does not depend on appraisals of contamination, yet contamination is a necessary appraisal for disgust (Horberg et al., 2009), then moral "disgust" may not reflect the activation of the emotion disgust. Further, if people do not intuit that immoral essences can be transferred by contagion, then questions are raised for existing perspectives on essentialism, magical thinking, moral cleansing effects and for the psychological basis of mental contamination associated with some cases of obsessive-compulsive disorder (OCD). Studies testing this reputation

management hypothesis of apparent moral contagion are presented in the first part of this thesis and also appear in a manuscript currently under review (Kupfer & Giner-Sorolla, 2017).

If reports and expressions of disgust towards immorality do not reflect activation of the full emotion disgust, then why do people consistently use this terminology and facial behaviour of disgust (e.g., Chapman, Kim, Susskind, & Anderson, 2009), and why, even after controlling for anger (e.g., Gutierrez & Giner-Sorolla, 2007), do people often prefer disgust to anger when condemning immorality? The second main hypothesis of this thesis is that people may choose to report and express disgust in preference to anger, even if they do not actually experience the emotion disgust, because it more effectively signals impartial, moral, condemnation. Studies testing this social signalling account of moral disgust form the second part of this thesis and are also reported in a published paper (Kupfer & Giner-Sorolla, 2016). The two empirical chapters of this thesis (Chapters 2 and 3) are linked in two main ways: firstly, if moral disgust is not associated with contamination, then it casts doubt on claims that reports and expressions of moral disgust really reflect internal feelings of disgust and the signalling account explains why people might choose to express disgust, despite not feeling disgust. Secondly, by avoiding association with immorality or by communication morally motivated condemnation, apparent moral contagion behaviour and expressions of disgust both serve the fundamentally important social task of maintaining a good moral reputation.

1.1 Disgust

1.1.1 Components. Emotions can be thought of as coordinated sets of components including physiological responses, facial expressions, subjective feelings

and action tendencies (Scherer, 2005; Frijda, 1987). Discrete emotions can be distinguished from each other by identifying their components (Roseman, Wiest & Swartz, 1994). Components that define disgust include feelings of revulsion, nausea, gagging and the urge to vomit, and desire to withdraw from the eliciting stimulus (Darwin, 1872; Oaten, Stevenson, & Case, 2009; Royzman, Leeman & Sabini, 2008; Rozin, Haidt, & McCauley, 2008). Disgust has a characteristic facial expression involving slightly narrowed brows, a curled upper lip, wrinkling of the nose, and sometimes visible protrusion of the tongue (Ekman, 1992; Rozin, Lowery, & Ebert, 1994). It is produced and recognised in a similar way and towards similar cues across cultures (Ekman & Friesen, 1971; Sauter & Eimer, 2010; Sauter, Eisner, Ekman & Scott, 2010) and is even produced in congenitally blind individuals (Galati, Scherer, & Ricci-Bitti, 1997). The disgust expression is often taken to be a reliable index of the degree to which the emotion is experienced (e.g., Chapman, Kim, Susskind, & Anderson, 2009).

Disgust may also have specific autonomic responses, such as reduced blood pressure, heart rate deceleration, decreased skin conductance (Ekman, Levenson, & Friesen, 1983; Stark, Walter, Schienle, & Vaitl, 2005), and decreased gastric activity (Harrison, Gray, Gianaros & Critchley, 2010; Shenav & Mendes, 2014). Disgust with these characteristic properties, especially feelings of revulsion, nausea, and the desire to withdraw, is referred to as core disgust (e.g., Rozin et al., 2008), pathogen disgust (e.g., Tybur, Lieberman & Griskevicius, 2009), prototypical disgust (Rozin et al., 1994), or bodily disgust (Russell & Giner-Sorrolla, 2013). Emotions are responses to the evaluation of external or internal stimuli that are of importance to the functions of an organism (Scherer, 2005; Frijda, 1987). As such, a key cognitive component of emotions is the evaluation of specific environmental inputs; a process known as

appraisal (Scherer, 2005). Different emotions appraise different environmental inputs and the key appraisal of disgust is often said to be contamination (Oaten et al., 2009; Rozin et al., 2008).

1.1.2 Function. Disgust has several properties that identify it as an adaptation serving the function of pathogen avoidance. Pathogens are typically microscopic and cannot be detected directly, so instead disgust is elicited by cues that are reliably associated with pathogens (Curtis & Biran, 2001). These cues include body products (faeces, urine, vomit, blood and mucus), lesions or rashes on the skin, decay and some odours such as putrescine. These cues are often produced by pathogenic microorganisms and are, therefore, reliable cues to their presence. Small animals like ticks or insects are often ectoparasites (or resemble ectoparasites); they and other animals like rats can be vectors of disease (Davey, 2011; Oaten, Stevenson, & Case, 2009). Injuries, gore or body-envelope violations have also been argued to reliably elicit disgust because they have the potential to transfer pathogens (Curtis & Biran, 2001; Oaten, Stevenson, & Case, 2009; Tybur et al., 2009) but a recent account suggests that disgust towards injuries may primarily be an empathic response, rather than a pathogen avoidance response (Kupfer, 2018; Shenhav & Mendes, 2014).

Research has confirmed that, across cultures, these stimuli reliably elicit disgust (Curtis, Aunger, & Rabie, 2004). Therefore, the inputs to disgust are consistent with an emotion that is adapted to disease avoidance function (Curtis & Biran, 2001). These cues are not invariably reliable indicators of the presence of pathogens – not all rotting meat is infectious and not all rashes are produced by infection. But the costs of failing to detect an infectious agent are generally higher (infection and possible death) than the costs of mistakenly avoiding an uninfected person, food or animal, so evolution has favoured a hypervigilant detection system that is prone to false alarms

(Haselton & Nettle, 2006; Nesse, 2005). In the modern day this adaptive feature can have some unfortunate consequences. For example, people are biased toward inferring that healthy people are diseased based only on superficial cues, or even any deviation from species-typical morphology (Kurzban & Leary, 2001, Schaller & Duncan, 2007). This may be why groups like obese people (Park, Schaller & Crandall, 2007), physically disabled people (Park, Faulkner & Schaller, 2003), and ugly people (Krendl, Macrae, Kelley, Fugelsang & Heatherton, 2006; Park, van Leeuwen, Stephen, 2012) might elicit the pathogen avoidance emotion which contributes to prejudice (Neuberg, Kenrick & Schaller, 2008). The components of disgust also appear well designed (by evolution) to perform a specific function, which is important because the fit between form and function is regarded as the key criterion for identifying adaptations, behavioural or otherwise (Mayr, 1983; Williams, 1966). The contamination appraisal identifies sources of pathogens; the withdrawal action tendency reduces the chance of contact with pathogens; feelings of nausea reduces the chance of ingesting pathogens; and vomiting and hygiene behaviour such as grooming remove pathogens that have not been successfully avoided (Curtis et al., 2011; Oaten et al., 2009; Royzman et al., 2008).

1.1.3 Acquisition. Many authors have suggested people are “prepared” by evolution to respond to cues that most reliably correlated with pathogen presence over evolutionary time (Curtis, de Barra, & Aunger, 2011; Oaten et al., 2009; Tybur et al., 2013), in the sense that disgust towards them is either easily learned (Seligman, 1971) or does not require any learning (Menzies & Clarke, 1995). Evidence for such preparedness is limited however. Some suggest that features like moisture, temperature and soft consistency might be prepared for disgust because they are associated with the conditions in which microbes grow best (Oaten et al.; Oum &

Lieberman, 2012). Odours like putrescine and cadaverine are good candidates for preparedness because they are reliably associated with rotting flesh and other sources of potential infection and there is evidence that some non-human animals respond innately to these chemicals (Hussain et al., 2013). However, direct evidence for disgust cue preparedness in humans is limited, if not absent.

There is also evidence that disgust reactions to certain cues might be learned. Unlike distaste reactions to bitter and sour chemicals, disgust reactions do not seem to be present at birth, but develop gradually from around two years of age (Rozin et al. 2008). Based on parent report, self-report and behaviour, Stevenson, Oaten, Case, Repacholi and Wagland (2010) found that children's disgust towards core elicitors manifest from around two years of age, whereas socio-moral disgust emerges from around seven years of age. Disgust towards body odours does not strongly appear until adolescence (Stevenson & Repacholi, 2003); leading Soo and Stevenson (2003) to suggest that body odours are a learned cue resulting from the development of modern hygiene standards in the twentieth century. Repacholi (1998) found that 14-month olds demonstrate aversion to objects if a disgust face was made towards them.

1.1.4 Contamination. Paul Rozin and colleagues conducted early investigations into the contaminating properties of disgusting stimuli and described their findings under the rubric of *the three laws of sympathetic magic* (Rozin et al., 1986). The laws were originally described by anthropologists, most notably Frazer (1890), who noted that many primitive people believe that essences can be magically transferred between objects, for example the Kai from New Guinea believed that everything a person contacts retains some of his 'soul stuff'. Rozin et al. elaborated on Frazer's laws and argued that they are intuitive beliefs of all people, including educated Western adults. The first law, "you are what you eat" states that the qualities of a food (e.g., a fierce

animal) transfer to the consumer. The second is the “law of similarity”: people perceive that objects that look similar possess similar essences, which was demonstrated by American students’ reluctance to consume chocolate fudge shaped like dog faeces (Rozin et al.). The third law of sympathetic magic, “once in contact, always in contact,” or the “law of contagion” refers to the transmission of an invisible essence from one object to another resulting in a permanent link between the two. This was demonstrated by participants’ reluctance to drink juice that has been in contact with a sterile cockroach (Rozin et al.) and by findings showing that participants are reluctant to touch morally disgusting objects (described in detail below). These laws are irrational in the sense that consuming a fierce animal does not really change one’s personality, eating faeces shaped chocolate is not harmful, and a sterile cockroach is not in fact contagious. However, Rozin and colleagues argue that the laws are intuitive beliefs that operate even among Western, educated student populations – their participants responded with aversion despite knowing that the cockroach and chocolate were harmless. These findings fit with the pathogen avoidance model of disgust: pathogens are easily transferred by touch, so an important adaptive feature of disgust is that it motivates people to avoid contact with contaminating stimuli and with objects that have been contaminated by touching those stimuli (Curtis et al., 2004; Oaten et al., 2009).

The perception of contamination does not require conscious assessment of infection likelihood, or knowledge of germ theory, because people respond to certain cues implicitly (Curtis et al., 2004; Rozin et al., 2008): people avoid contaminated objects, even if they consciously know there is no infection risk (Rozin et al., 1986). Furthermore, research suggests that children respond to food as if it could be contaminated as early as 4 years old (Rozin, Hammer, Oster, Horowitz & Marmora,

1986; Siegal & Share, 1990; Springer & Belk, 1994) without necessarily understanding that it is contaminated because of germs. For example, when interrogated, children reported that poisons, chemicals like pepper (Kalish, 1997), “doggy slime”, dirt, or little animals (Legare, Wellman & Gelman, 2009) might be the reason that touching contaminated objects causes harm. Poisons may be an adequate model for understanding infection by contamination, even if objectively inaccurate, because poisons are harmful, can easily transfer to other objects, and can make those objects harmful (Kalish; Keil, Levin, Richman, & Gutheil, 1999; Siegal, Fadda & Overton, 2011). Explicit explanations like the transfer of poisons, invisible particles, germs, or even evil essences, may constitute post-hoc reflective elaborations on intuitions deriving from an intuitive germ theory motivated largely by disgust. The intuitive germ theory can be summarised as the rule “if an object has contacted a substance that makes me feel disgust, then that object is now harmful and disgusting to contact”. Such reflective elaborations on intuitions are argued to be the source of many common beliefs (Boyer & Baumard, 2012).

Contamination is a very useful property empirically because only disgusting stimuli are contaminating. More specifically, only stimuli that induce pathogen disgust are contaminating. Other emotions, like fear or anger, are not contaminating – if one’s toothbrush touched a lion, the toothbrush would not become frightening. But if the toothbrush touched a cockroach, it would become disgusting. In other words, contamination may be specific to disgust (Kupfer, 2017; Oaten et al., 2009). Although discrete emotions have a unique set of coordinated components, the individual components or properties of emotions are seldom specific to that emotion (Levenson, 2014; Mauss & Robinson, 2009). Arousal, increased heart rate and increased skin conductance are physiological properties that can be measured, but they are not

specific to one emotion, occurring with anger, fear and excitement (Kreibig, 2010). Similarly, aversion and avoidance are not specific to one emotion but can be an output of disgust, fear or contempt (Watson, Wiese, Vaidya & Tellegen, 1999). Patterns of gastric reactivity (Harrison, et al., 2010; Shenhav & Mendes, 2014), nausea and diminished appetite (Royzman, Leeman & Sabini, 2008) might seem like plausible candidates for components that are specific to disgust, given that they could index its prototypical properties (Chapman & Anderson, 2013; Oaten et al., 2009). But even these components are not specific to disgust because other emotions like fear, excitement and pain can also involve reduced gastric reactivity and nausea (Andersen & Krohg, 1976; Vianna & Tranel, 2006).

Unlike most other emotion properties contamination appears to be specific to one emotion, disgust. It could, therefore, be used to diagnose disgust and distinguish it from other affective responses. For example, Kupfer (2017) used a binary-choice behavioural avoidance task to demonstrate that injuries are perceived as less contaminating than equally disgusting infections. Based partly on this evidence, he argued that the disgust reported towards injuries is not pathogen disgust but an empathic affective response involving vicarious pain and harm which feels subjectively similar to pathogen disgust. Similarly, if moral disgust is the same emotion as disgust towards pathogen cues, then morally disgusting stimuli should be perceived as contaminating. Thus, the property of contamination affords the opportunity to investigate whether or not reported moral disgust reflects the full activation of the emotion disgust.

1.1.5 Variation in disgust. As for most complex biological traits, there is variation in the degree to which disgust is present in each individual, as revealed by measures of disgust sensitivity such as the Disgust Scale-Revised (DS-R; Haidt et al.,

1994, modified by Olatunji et al., 2007) and the Three Domain Disgust Scale (TDDS; Tybur et al., 2009). One reason for these individual differences might be that people have chronic variation in (perceived) susceptibility to disease (Duncan, Schaller & Park, 2009). Some of this variation might be functional. High disgust sensitivity might be more adaptive for women, for example, because childbearing results in greater fitness costs associated with contracting infection (Fleischman, 2014; Oaten, Stevenson, & Case, 2009).

Other variation in disgust may be due to trade-offs with competing motives like the motive to eat or to have sexual intercourse. The level of experienced disgust may be a result of a trade-off between these costs and benefits of physical contact with the stimulus – a motivational state that has been described as the *expected value of contact* (Tybur et al., 2013). The expected value of contact of a food, for example, would depend on its perceived infectiousness (e.g., via odours or colours cuing decay), a person's nutritional state, and the food's perceived nutritional value. To an especially hungry person, even mouldy corn could become palatable (Hoefling et al., 2009). This logic also applies to interpersonal disgust, including parent-offspring interactions. The smell and appearance of faces are typically treated as pathogen cues, but parents feel little disgust towards their own baby's diaper in comparison to an unknown baby's diaper, presumably because the benefits of contact with one's own offspring outweigh the costs of contact with pathogens (Case, Repacholi, & Stevenson, 2006).

Case and colleagues offered a somewhat different explanation for these effects, referring to the observation that disease-related cues from strangers are more disgusting as the 'source effect'. Stevenson & Repacholi, (2005) found that negative affect increased when the source of a body odour (e.g., faecal matter, feet, flatulence

and sweat) derived from a stranger rather than from the self. They suggested that this source effect might be due to the level of exposure and habituation to cues, or because strangers and outgroups might carry less familiar pathogens to which people are more vulnerable (Navarrete & Fessler, 2006). Remarkably, these source effects seem to have been demonstrated in children: Raman and Gelman (2008) found that children reported family members or liked people as less likely to be contagious than strangers or disliked people. In contrast, the expected value of contact explanation explains source effects as disgust resulting from a trade-off between the costs and benefits of contact with other people. The benefits of contact might be higher, for example, with an in-group member, because of potentially cooperative engagement, than with a stranger, so the disgust might be reduced to facilitate harmonious contact (Reicher, Templeton, Neville, Ferrari & Drury, 2016; Sacco, Young & Hugenberg, 2014).

Similarly, the benefits of contact with a high quality mate may outweigh costs from the transfer of potentially pathogenic body fluids, resulting in low or even absent disgust towards intimacy and intercourse (Borg & de Jong, 2012), though not all studies have found this effect (Zsok, Fleischman, Borg & Morrison, 2017). Equally, disgust cues can reduce sexual motives (Fleischman, Hamilton, Fessler & Meston, 2015). Similarly, interactions with people in general facilitate beneficial cooperative activities but also risk pathogen transmission due to proximity and contact. Disgust motivates avoidance of people, especially those with pathogen cues, and expressing disgust can be harmful to interpersonal relations (Giner-Sorolla & Espinosa, 2011; Harris & Fiske, 2006). Consistent with this, the level of disgust reported towards humans displaying pathogen cues (but not non-human pathogen cues) is lower for people high in agreeableness – a trait that indexes motives for maintaining harmonious relationships (Kupfer & Tybur, 2017). In summary, when explaining the

level of disgust a person experiences, expresses or reports, it is important to consider not just the perceived infection or contamination risk, but the overall costs and benefits of experiencing, expressing or reporting disgust; a principle that might also apply to moral disgust.

1.1.6 Evolution and phylogeny. Infectious disease and parasitism exerted strong selection pressures during animal and human evolution (Hamilton, Axelrod, & Tanese, 1990; Wolfe, Dunavan & Diamond, 2007), which led to the evolution of behavioural adaptations for disease avoidance in animals as well as humans (Hart, 2011). Comparison between animal and human behaviours can be informative (Cheney & Seyfarth, 1990; Hauser, Chomsky & Fitch, 2002), enabling inferences about the phylogeny and functions of existing traits, such as pathogen avoidance behaviour in humans (Darwin, 1859; Tinbergen, 1953).

Animal pathogen avoidance behaviours include selective defecation and faecal avoidance; grooming, preening, and behaviours like tail swishing, which mainly deter biting parasites; exclusion or avoidance of conspecifics that carry pathogens; selective sexual interaction to avoid infected mates; wound licking; nest fumigation with natural insecticides and self-medication with natural medicines; and avoidance of certain foods (Hart, 1990; 2011). Such behaviours are often present in phylogenetically distant species. For example, desert Iguanas generate “behavioural fever” by moving to warm microclimates to kill parasites (Kluger, Ringler, Anver, 1975). Birds have a wide array of parasite avoidance behaviours, including sunning, anting, dusting, preening (Clayton, Koop, Harbison, Moyer & Bush, 2010).

Many social species have been found to have behavioural mechanisms that enable them to detect and avoid specific individuals that are infected. For example, Sage Grouse are parasitized by lice which create hematomas on the air sacs of males and

females can detect these and then avoid lousy males (Boyce, 1990). The Caribbean spiny lobster is able to detect chemical signatures of the PaV1 virus in the urine of infected conspecifics and uses this cue to avoid sharing shelters with infected conspecifics (Behringer, Butler & Shields, 2006). Like many primates, Mandrills engage in allogrooming, in part for social benefits. Ingestion of skin fragments and ectoparasites during allogrooming can lead to transmission of protozoa but individuals avoid these costs by selectively avoiding grooming parasitized individuals. Avoidance was found to be mediated by the detection of odours found in higher levels in protozoan rich faecal matter (Poirotte et al., 2017). Evidence like this gives more plausibility to the claim that humans are evolutionarily prepared to detect and avoid cues of contamination by pathogens (Kavaliers & Choleris, 2011). Hart (2011) suggested that all of the disease avoidance strategies that are present in animals are also present in humans in some form, including medication and hygiene behaviour.

1.1.7 Pathogen-avoidance is not only disgust. Research on human disease-avoidance behaviour has focused predominantly on disgust and on clarifying the functions of the emotion (Lieberman & Patrick, 2014; Tybur et al., 2009; Rozin & Haidt, 2013). Less attention has been given to the possible existence of other behaviours in humans, despite the variety of pathogen avoidance behaviours in nonhuman animals. However, some researchers have suggested that disgust is only one part of a wider “behavioural immune system” (Schaller & Park, 2011; Schaller, 2014) and there is some evidence that perception of disease cues leads to upregulation of the immune system (Miller & Maner, 2011; Schaller, Miller, Gervais, Yager & Chen, 2010), which presumably does not require the activation of the emotion disgust.

As another example, recent research suggests that humans may have an ectoparasite avoidance system, at least partly distinct from prototypical disgust, that involves skin sensations such as itching and crawling (Blake et al., 2016), upregulation of skin sensitivity to touch in response to ectoparasite cues (Hunt et al., 2016) and scratching and self-grooming behaviour (Prokop, Fančovičová & Fedor, 2014). This ectoparasite avoidance system may be homologous with the adaptation underlying grooming and ectoparasite avoidance behaviour in primates and mammals (Kupfer & Fessler, 2017) and may be implicated in particular disorders, including delusory parasitosis, the belief that one is infested by ectoparasites (Hinkle, 2000); tryphobia, an aversion towards clusters of roughly circular objects that includes itching sensations and scratching behaviour (Kupfer & Le, 2017); trichotillomania, compulsive hair pulling (Fleischman & Fessler, 2011); and excoriation, compulsive skin-picking (Grant et al., 2012). Nevertheless, the study of moral disgust has focused on its relation to core or pathogen disgust its prototypical components, including nausea and contamination appraisal and avoidance.

1.3 From pathogen disgust to moral disgust

Although most researchers agree that disgust's original function was pathogen avoidance, there is no consensus about how it came to be involved in moral condemnation. However, accounts can be roughly divided into three groups: one argues that disgust evolved to take on a general role in morality, another that it evolved to respond to a specific class of moral violations, and a third argues that it only responds to the pathogen content of moral violations. A fourth type of account argues that moral disgust is used as a metaphor, but that it is tightly linked to the concept of physical disgust to the extent that a full disgust response is activated

including the urge to clean and remove contamination (Lee & Schwarz, 2016; Zhong & House, 2014); this account is evaluated in section 4.1 of the general discussion, along with a more general consideration metaphor.

1.2.1 General role. One type of perspective on moral disgust argues that pathogen disgust was co-opted and modified during evolution to take on a new general-purpose function in morality, responding to moral violations in general, such as cheating or stealing, that have no relevance to pathogens (e.g., Cannon et al., 2011; Chapman et al., 2009; Chapman & Anderson, 2013; 2014; Danovich & Bloom, 2009; Hutcherson & Gross, 2011; Tybur et al., 2009). Tybur et al. suggested that disgust was co-opted during evolution to perform the novel function of motivating avoidance of individuals who could inflict costs on one's self, kin or allies via norm-violations like lying, cheating or stealing.

The reuse of existing systems for new functions is thought to have been common in the evolution of the human brain (Anderson, 2010). For example, the physical pain system may have been co-opted to guard against social rejection with social pain (MacDonald & Leary, 2005). Later, Tybur, Lieberman, Kurzban and DeScioli (2013) also suggested that disgust was co-opted to perform a new role in morality but that its role was primarily as a signal to recruit and coordinate condemnation of people who violate norms that enhance the endorser's fitness. This account is similar to the signalling hypothesis given in the current thesis, except that they do not explain why disgust, rather than another emotion like anger, should perform this function, or why it would be necessary to feel the emotion, rather than just express it. Chapman and Anderson (2013) suggest that the co-option of disgust may have been selected for because it provides withdrawal motivation "which could have been a valuable

addition to the behavioural repertoire of our highly social species” (2013 p 322).

However, nonhumans already appear to have adaptations to motivating discriminate sociality (Kurzban & Leary, 2001), for example chimps have often been observed socially excluding particular individuals (Harcourt & de Waal, 1992; Wrangham, 1987). The evolution of moral disgust, therefore, may have been superfluous.

Based on findings showing that incidental disgust increased condemnation of purity and nonpurity violations, Schnall et al. (2008, p. 1097) gave a general definition of disgust as “an emotion of social rejection”. Similarly, Cannon, Schnall & White (2010 p. 326) argued that “disgust is a reaction to offensive objects as well as offensive actions”. Chapman et al. (2009) found that participants’ self-reports and their facial expressions showed that they felt disgusted by very unfair offers during ultimatum games and Cannon et al. found that participants showed facial electromyographic (EMG) activation specific to disgust but not anger when participants read about unfairness (e.g., someone cheating at cards). Danovitch and Bloom (2009) found that young children will describe moral violations such as “being very mean to someone” as disgusting, and agree that a disgust face can go with such violations. Findings like these are often taken to show that disgust may be a reaction to immoral acts in general because social rule violators are seen as “social contaminants” (Graham, Haidt & Nosek, 2009; Chapman & Anderson, 2013; Zhong & House, 2014). However, these findings do not provide evidence that participants do perceive violators as contaminating, nor do they show that the expression of disgust is accompanied by an emotional experience of disgust. As others have argued, facial expressions can be produced for communicative effect, in the absence of specific internal feelings (Fridlund & Russell, 2006; Royzman & Kurzban, 2011).

1.2.2 Pathogens as a specific cue. This account argues that disgust is involved in moral violations only to the extent that those violations contain cues to pathogens, or behaviours that could increase the risk of pathogen transmission, such as certain sexual and food consumption behaviours (Inbar & Pizzaro, 2014; Oaten et al., 2009; Schaller & Park, 2011). According to Oaten et al., (2009) violations of some social norms bring to mind physical disgust elicitors that have become associated, via socialization, with these norms. For example, in some cultures preparing food with the left hand would be disgusting because of the idea that other disgusting objects are likely to have been touched by the left hand. Royzman et al. (2014) make the same argument and found that the nausea, gagging and reduced appetite components of disgust are only elicited when moral violations that contain cues to pathogens; otherwise anger is the dominant emotion. Similarly, based on two studies finding that disgust was only reported towards immoral items that contained cues like urine or other body products, Kayyal, Pochedly, McCarthy and Russell (2015) also argued that the emotion disgust is only involved in morality when violations include pathogen cues. Accounts like these see disgust towards moral violations as arising from its pathogen content, not from its moral content, so they do not view moral disgust as a specific and discrete emotion. When disgust is reported towards pathogen-free violations, it is interpreted as a metaphor for another feeling such as anger (Nabi, 2002; Royzman & Kurzban, 2011).

1.2.3 Impurity as a specific cue. According to Rozin and colleagues, disgust originated as a bitter taste rejection system and through the evolutionary process of preadaptation, it later adopted the new role of avoiding pathogenic, or contaminated, foods like cockroaches (Rozin, Haidt, & McCauley, 2008). Still later, other elicitors were added, including animal-reminders, certain people and social groups, and moral

offenses involving purity, divinity or sanctity violations (Rozin, Lowery, Imada & Haidt, 1999). Rozin and Haidt (2013) explain that although the elicitors expanded, the outputs, especially “contamination sensitivity and a motivation to cleanse, avoid, or expel the contaminant”, were conserved. As noted by other authors (e.g., Russell & Giner-Sorolla, 2013), the cues included in the purity domain are not clearly defined, sometimes focusing on sexual purity cues but at other times on more general and metaphorical purity cues. For example, Koleva, Graham, Iyer, Ditto & Haidt (2012, p 185) argued that moral disgust responds to “various social contaminants like spiritual corruption, or the inability to control one’s base impulses” and claimed that its evolutionary function was to improve group cohesion by binding people together (Haidt, 2012). Horberg et al. (2009, p 964) also give a vague and general definition of purity as “anything perceived as likely to contaminate the self physically or spiritually or to threaten their status as civilized human beings”. Whereas Rottman, Kelemen and Young (2014 p 218) used a more specific religious definition of impurity as “transgressions that are considered wrong because they contaminate or degrade a sacred entity”. Haidt and Graham (2007 p 106) identify purity as the “virtues and vices linked to bodily activities in general, and religious activities in particular” and give the examples of “carnal passions (lust, gluttony, greed, and anger)”. Furthermore, as will be described below, when these researchers set out to measure disgust towards purity, it is not clear how their violation items fit with these various vague definitions.

Russell & Giner-Sorolla (2013) make a similar argument, claiming that disgust is elicited by violations that include cues to the body, or cues related to the body by association, including taboo food practices and sexual behaviours. They suggested

that non-bodily moral disgust requires a different explanation from bodily moral disgust, perhaps based on cues to bad character (Giner-Sorolla & Chapman, 2017).

Purity accounts sometimes reject evidence showing that disgust is reported and expressed towards general moral violations which have no pathogen, impure, or bodily content (e.g., Chapman et al., 2009) by arguing that the disgust is metaphorical. For example, Rozin, Haidt and Fincher (2009, p 1180) suggest that “only if evidence is found for a route from unfairness to the disgust evaluation system can it be concluded that disgust at unfairness is “the same” as disgust that is elicited through the core route (such as in response to cockroaches)”. They claim that, in contrast to general disgust elicitors, evidence from behavioural avoidance tasks (described below) shows that purity violations engage “full disgust” by demonstrating that they are appraised as contaminating. However, their assertion does not seem to be supported by the evidence they cite, given that (as described below) many of these “law of contagion” experiments purport to demonstrate that general elicitors like a liar, a murderer, or a thief, are contaminating. Royzman and Sabini (2001) also argue that evidence that people report or express disgust towards moral violations is insufficient to show that they elicit full disgust. They refer to this claim as the “moral dyspepsia hypothesis” and argue that prototypical disgust components like nausea, gagging and diminished appetite could show that disgust reported towards moral violations is full disgust (Royzman et al., 2008; Royzman & Kurzban, 2011).

The argument presented in this thesis agrees that for moral disgust to qualify as “full disgust”, the response to moral violations needs to be shown to consist of more than just words and expressions and should, in particular, include contamination appraisals. To assess the credibility of the claim that “full disgust” is elicited by purity

or general moral violations, the next section will review evidence that goes beyond showing reported or expressed disgust towards moral violations.

1.3 Evidence for moral disgust.

1.3.1 Neuroimaging. There is strong evidence that the insula is involved in pathogen or ‘core’ disgust. Lesions of human insula cortex impair both the experience of disgust and the recognition of disgust in others (Calder, Keane, Manes, Antoun, & Young, 2000; Hayes, Stevenson, & Coltheart, 2007) and recordings with depth electrodes in the anterior insula show responses to pictures of facial expressions of disgust but not to other emotional expressions (Krolak-Salmon et al., 2003).

Neuroimaging has also shown that the recognition of facial expressions of disgust, and disgust towards olfactory or visual cues, involve the insula (Hennenlotter et al., 2004; Phillips et al., 1997; Schienle et al., 2002; Wicker et al., 2003).

Findings like these have motivated two investigations into insula responsiveness towards moral violations. Moll et al. (2005) had participants read physically disgusting sentences (e.g., “a cat eating faeces” and “you saw rats in the pans”) and moral “indignation” statements (e.g., “the nurse had put a spider on the baby’s face” and “a dead cockroach floating on the soap pan”). They found that both types of statement resulted in similar patterns of neural activation, but in regions other than the insula. Furthermore, the inclusion of physically disgusting content in their moral statements limits any conclusions that can be made about where the brain processes moral disgust. Borg, Lieberman and Kiehl (2008) compared disgust eliciting sentences (e.g., “You sipping your sister’s urine”) with moral violations without pathogen content (“You burglarizing your sister’s home”) and found that core disgust and moral disgust elicited activation in overlapping brain areas. However, again these

areas did not include the insula, so it is not clear that the areas of overlap represent common feelings of disgust, or just processing of other information, such as the social situation described in the items.

Even if future studies did demonstrate insula activation during moral disgust, the insula has been implicated in many processes (Critchley et al., 2004), including empathy (Singer, Critchley & Preuschoff, 2009) and social exclusion (Eisenberger, Lieberman & Williams, 2003) and some have argued that it has a more general role in interoception (Craig, 2011). Therefore, evidence of insula activation during moral disgust would not warrant the reverse inference that the brain circuits of physical disgust are involved because insula activation could represent another process (Poldrack, 2006). In summary, the available neuroimaging evidence does not support the conclusion that the emotional response to moral violations is the same as that towards physically disgusting cues.

1.3.2 Disgust sensitivity and moral condemnation. A number of findings have investigated the association between individual differences in disgust sensitivity and moral judgments. For example, Graham, Nosek, Haidt, Iyer, Koleva, and Ditto (2011) found that disgust sensitivity measured using the Disgust Scale-Revised (DS-R; Haidt, McCauley, & Rozin, 1994, modified by Olatunji et al., 2007) more strongly correlated with the purity domain of the Moral Foundations Questionnaire than with the other four domains. The DS-R measures disgust towards a variety of physically disgusting cues (e.g., “You see maggots on a piece of meat in an outdoor garbage pail” and “A friend offers you a piece of chocolate shaped like dog-doo”), so the authors argued that the tendency to experience physical disgust towards cues like these also influences moral judgement.

People who score higher on disgust sensitivity have also been found to show more negative attitudes towards homosexuality and other deviant or threatening sexual practices, but not towards “pure” issues like welfare and gun control (Crawford et al., 2014; Inbar, Pizarro et al., 2009; Jarudi, 2009) and disgust sensitivity predicts opposition to gay marriage, premarital sex and abortion (Inbar et al., 2009; Smith, Oxley, Hibbing, Alford, & Hibbing, 2011). Horberg et al. (Study 3, 2009) found that highly disgust sensitive individuals endorsed stronger punishment of purity violations like “being sexually promiscuous” and “keeping an untidy and dirty living space”, but not harm or justice transgressions such as “kicking a dog that is blocking a doorway” or “leaving small tips”. Recent research by Wagemans, Brandt and Zeelenberg (2017) used the standardised set of Moral Foundations Vignettes developed by Clifford, Iyengar, Cabeza and Sinnott-Armstrong (2015) to investigate the relationship between disgust sensitivity measured using the DS-R and moral judgement. They found that disgust sensitivity more strongly predicted purity moral judgments than moral judgments in the authority, care, and fairness domains. Overall, findings like these appear to show that “disgust is uniquely associated with moralization of the purity domain” Horberg et al. (2009 p 972).

However, the relationship between disgust sensitivity and moral judgement could be due to non-moral content of the items and scenarios judged by participants. As discussed further, below, many of the purity or divinity items contain physically disgusting cues such as dog meat or touching a corpse, and disgust sensitivity questionnaires tend to measure sensitivity to similar content (especially core or pathogen disgust items). Therefore, findings like those described above do not distinguish the impurity account from the pathogen cue account (Inbar & Pizzaro, 2014; Oaten et al., 2009; Schaller & Park, 2011). For example, the Moral Foundations

Vignettes (Clifford et al., 2015) include purity (labelled “sanctity”) items with physically disgusting content, like “You see an employee at a morgue eating his pepperoni pizza off of a dead body” or “You see a story about a remote tribe eating the flesh of their deceased members” and with sexual content such as “You see a homosexual in a gay bar offering sex to anyone who buys him a drink” and “You see a woman having intimate relations with a recently deceased loved one”. At the same time, the DS-R contains items such as “You accidentally touch the ashes of a person who has been cremated” and “It would bother me tremendously to touch a dead body”. Thus, people who are highly sensitive to the latter items might rate the vignette items as more morally wrong because they are more affected by the physically disgusting content, rather than because they are more prone to experience *moral* disgust. Although disgust sensitive people may judge certain moral transgressions more harshly, this is not evidence that their condemnation is driven by their experiences of a *moral* disgust emotion, or that they perceive *moral* contamination. Rather, stronger experiences of pathogen disgust may make individuals more motivated to prohibit behaviours that lead to these feelings.

Even disgust towards sexual practices like homosexuality or incest might derive from non-moral forms of disgust. Any sexual interaction involves close physical contact and exchange of bodily fluids, which pose risk of infection by pathogens (Fleishman, 2017). Sexual acts with people that do not provide any benefits to the perceiver (such as homosexuals to heterosexuals) could arouse disease-avoidance motives without being tempered by competing mating motives (Tybur et al., 2013; Tybur & Gangestad, 2011). Even if people are only evaluating vignettes or items in a questionnaire, the contemplation of behaviours like homosexuality or bestiality may evoke disgusting mental images (Fessler & Navarette, 2003). These disgusting mental

images might then lead to a desire to proscribe and condemn the evoking behaviours. This mental imagery process might underlie moral condemnation of a wide variety of behaviours. For example, imagining another person eating meat might be disgusting for a vegetarian, which might contribute to their opposition to the behaviour (Fessler, Arguello, Mekdara, & Macias, 2003; Rozin, Markwith & Stoess, 1997). A similar moralisation process might underlie opposition to behaviours like smoking – the more disgusting an individual finds cigarette smoke, the more they will support proscription of smoking. Rozin (1999) described this process as the conversion of preferences into values.

Contact with potential mates might also be undesirable if they have low genetic quality, revealed by cues to physical attraction (Little, 2014; Willis and Todorov, 2006), infertility (e.g., old age or pre-pubescence; Tybur et al., 2009), or cues to genetically incompatibility due to being the wrong gender in homosexuality, the wrong species in bestiality, or too closely related in incest (Tybur et al., 2009). These cues to low mate quality or compatibility might serve as inputs to computations which output avoidance motives along with disgust-like feelings; this output has been referred to as sexual disgust (Tybur et al., 2013). Thus, a combination of pathogen cue avoidance and ‘genetic’ avoidance might be the cause of disgust reported to supposed moral violations like incest, homosexuality, necrophilia and bestiality. Although there could also be moral motives for objecting to these behaviours if they violate societal norms, findings that show a relationship between disgust sensitivity and condemnation of purity violations may be due to non-moral content relating to pathogen cues or low mate quality cues shared by both disgust sensitivity questionnaire items and impurity (or sanctity or divinity) items. If true, this explanation renders superfluous the argument that disgust sensitivity increases purity

condemnation because purity condemnation is driven intuitively by feelings of *moral* disgust and the appraisal of social or moral contaminants (Horberg et al., 2009; Wagemans et al., 2017).

Other research suggests that disgust sensitivity might be related to moral judgement more generally. For example, more disgust sensitive participants judged a target who had committed theft or fraud as guiltier and supported harsher sentences (Jones & Fitness, 2008) and Chapman and Anderson (2014) found that disgust sensitivity positively related to condemnation of violations outside of the purity foundation, such as “a student steals a library book” or “a student asks the teacher a question in class without raising her hand first”. These findings are taken to show that increased disgust sensitivity leads to more disgust experienced in response to immorality, leading to harsher judgements; Chapman and Anderson conclude “disgust underwent a dramatic shift in function upon entering the moral domain”.

However, such relationships could be accounted for by third variables, for example Chapman and Anderson (2014, Study 1) found that their effect was attenuated when controlling for anxiety. Other research has shown that disgust sensitivity is negatively related to openness to experience (Tybur & deVries, 2013), which could explain the relationship between disgust sensitivity and opposition to breaking norms. Furthermore, some research suggests that disgust sensitivity may not be specific to moral attitudes: it has been linked to negative attitudes towards threatening groups in general, including immigrants and socially deviant groups (Brenner & Inbar, 2014; Hodson & Costello, 2007) and with conservative ideologies in general (Inbar, Pizarro, Iyer, & Haidt, 2012; Terrizzi, Shook, & Ventis, 2010; Tybur et al., 2016). Van Leeuwen, Dukes, Tybur and Park (2017) found that the pathogen domain of the Three Domain Disgust Scale (TDDS, Tybur et al., 2009) had

weak relationships with the ingroup, authority, and purity foundations of the Moral Foundations Questionnaire (MFQ; Graham et al., 2011). However, sexual disgust also related to the MFQ domains and had a stronger relationship than pathogen disgust with the purity domain. Tybur, Inbar, Güler and Molho (2015) found that pathogen disgust had no relationship with conservative attitudes after controlling for sexual disgust. These findings also indicate that the relationship between pathogen disgust and moral condemnation might be explained by other shared variables. Overall, it is at best premature to argue that the reviewed correlational evidence demonstrates shows that moral condemnation is caused by experiences of moral disgust.

1.3.3 Incidental disgust and moral condemnation. Another line of research that has been argued to show that disgust leads to moral condemnation shows that inducing participants to feel disgust makes them subsequently condemn immoral actions more strongly. This research was largely inspired by Haidt's (2001) social intuitionist model, in which he argued that moral judgements are not the product of reason but of social intuitions that are then followed by post-hoc rationalisations. He argued that emotions, including disgust, are an important source of these rapid intuitions. For example, the thought of incest might result in "a quick flash of revulsion" which enables the person to "know intuitively that something is wrong" (Haidt, 2001, p. 814). Disgust facilitates tests of the social intuitionist theory because it can be induced using pathogen cues that are unrelated, or incidental, to a moral violation and then the emotion's effect on subsequent moral judgements can be measured. This approach has been called the *moral amplification* hypothesis (Landy & Goodwin, 2015; Pizarro, Inbar & Helion, 2011).

The first amplification studies were conducted by Wheatley and Haidt (2005) who used hypnosis to make participants feel disgust when they read sentences containing

harmless words like “often”. Participants subsequently rated behaviours (e.g., a student who stole library books) described in vignettes that included the trigger word as more immoral than the same behaviours not including the trigger word. The findings indicate that participants misattributed the source of the emotion to something that the target had done wrong (Schwarz & Clore, 1983). This suggests that behaviours with physically disgusting content could be judged immoral because physical disgust is taken as information that something wrong was done. In other widely cited research, Schnall, Haidt, Clore and Jordan (2008) found that participants exposed to flatulence spray rated violations as more immoral than participants not exposed to any odour. They also induced incidental disgust using a dirty work area, recollections of a disgusting experience, and a disgusting film scene. These manipulations also led participants to make harsher moral judgements, but only for individuals high in private body consciousness (Miller, Murphy, & Buss, 1981), the tendency to attend to one’s internal bodily states. Horberg et al. (2009) used the same film as Schnall et al. (2008) to induce incidental disgust but unlike them, found that it only amplified judgements of purity violations, not harm or justice violations. Seidel and Prinz (2013) induced physical disgust using vomiting sounds and also found that only judgements of purity violations were amplified.

Although these studies appear to support some version of the amplification hypothesis, which is argued to demonstrate the causal role of disgust on moral judgement (Hapman & Anderson, 2013; Horberg et al., 2009), other studies have shown that the effects may not be reliable. For example, Ugazio, Lamm and Singer (2012) reported a failure to replicate the effect of flatulence spray on moral judgement (Schnall et al., 2008) and in a similar design to Wheatley and Haidt’s (2005) hypnosis research, David and Olatunji (2011) used evaluative conditioning to condition

participants to feel disgust towards an innocuous word (“part”) but found no effect on subsequent moral judgements. These studies included manipulation checks showing that they did successfully elicit feelings of disgust, but the experience of disgust did not influence moral judgment.

A recent meta-analysis sought to formally assess the reliability of amplification effects based on 31 published and 19 unpublished studies (Landy & Goodwin, 2015). They found that published studies had a small but significant effect size ($d = 0.11$, $p = .002$) and unpublished studies had a mean effect size very close to zero ($d = 0.03$, $p = .59$). Furthermore, a funnel plot showed evidence of publication bias and correcting for this suggested that overall there is no significant effect of incidental disgust on moral judgment. Analysed separately, they found that effects were stronger for gustatory or olfactory disgust inductions. However, in some of these procedures, disgust inductions could have evoked moral disapproval and not just disgust (Baron, Royzman, & Goodwin, 2013; Landy & Goodwin, 2015), because experimenters had forced them to, for example, consume a bitter substance (Eskine, Kacirik & Prinz, 2011), or sit at a dirty desk (Schnall et al., 2008). In a reply to Landy & Goodwin, Schnall, Haidt, Clore and Jordan (2015) suggested that certain personality variables, especially Private Body Consciousness, might be “crucial for the effect”, otherwise the disgust induction might not be felt sufficiently. However, in a highly powered study ($N = 1412$), Johnson et al. (2016) found no effect of induced disgust on moral condemnation, nor any moderation by sensitivity to internal bodily state, or accessibility of mood state.

Although it can still be true that moral judgements are caused by rapid affective intuitions (Haidt, 2001), the incidental disgust literature does not provide strong evidence that disgust amplifies moral judgement. For this reason, it does not support

the claim that reported or expressed disgust towards immorality requires an internal state of disgust.

1.4 Moral contagion

Researchers generally agree that the primary function of disgust is to motivate avoidance of stimuli that are sources of pathogens (Curtis & Biran 2001; Oaten et al., 2009; Tybur et al., 2009), so the potential to contaminate is regarded as a key appraisal for the elicitation of disgust (Horberg et al., 2009; Rozin et al., 2008; Oaten et al., 2009). This is thought to extend to moral disgust: immoral people or objects are appraised as socially contaminating or impure, so they elicit disgust (Horberg et al., 2009; Rozin et al., 1999; Graham, Haidt & Nosek, 2009; Chapman & Anderson, 2013; Inbar & Pizarro, 2014; Zhong & House, 2014). This section evaluates the evidence usually taken to support the claim that immoral stimuli are contaminating, including anthropological observations, questionnaire data, and behavioural avoidance studies. Moral cleansing experiments are also taken to support the idea that immorality is contaminating, and these are evaluated in the general discussion.

1.4.1 Disgust towards purity violations. Ideas about purity or divinity were partly inspired by anthropological observations made by Richard Shweder and colleagues (Shweder, Much, Mahapatra, & Park, 1997) in India that practices relating to contact with food, the opposite gender and clothing were judged to be moral issues and not just physical or conventional issues. This led to the suggestion that the moral mind comprises three independent modes of ethical discourse, the “Big Three”, comprising the ethics of autonomy, community, and divinity (Shweder et al.). Similar observations had been made by other anthropologists and sociologists. For example, Durkheim (1912) noted that numerous cultures believe in “sacred contagion” whereby

animals, women during menstruation, and men after a nocturnal emission, are considered not just physically unclean, but spiritually unclean. Mary Douglas also surveyed the anthropological literature and concluded that “moral values are upheld...by beliefs in dangerous contagion, as when a glance or touch of an adulterer is held to bring illness to his neighbours” (1966, p 3) and that “primitives make little difference between sacredness and uncleanness” (p7). Meigs (1988) documented that a central idea regulating life for the Hua people of New Guinea is that a potentially polluting substance called “Nu” is transferred during all food and social transactions.

Later Haidt and colleagues expanded on these anthropological ideas by arguing that they applied to all people including Westerners (Haidt, Koller & Dias, 1993; Haidt, Rozin, McCauley & Imada, 1997). More formally, Rozin, Lowery, Imada and Haidt (1999) hypothesised specific ties between Shweder et al.’s (1997) three ethics and three other-condemning emotions (“C” for contempt towards community violations, “A” for anger towards autonomy violations, and “D” for disgust towards divinity violations). The CAD triad ethics were later expanded and rebranded as Moral Foundations Theory (MFT) in which the divinity ethic became the “purity” foundation (Haidt & Joseph 2004). The hypothesised inputs to the divinity and purity modules are similar: sacred or religious objects (e.g., flags or crosses), places (e.g., Mecca or Jerusalem), sacred individuals (e.g., martyrs or saints), and some secular but cherished ideals, such as freedom and democracy (Haidt, 2012), though, as noted previously, there is inconsistency in the literature about what constitutes a purity violation (e.g., Rottman et al., 2014). Objects, ideas and people who violate purity ideals would be perceived as impure, would specifically activate the purity mental module and would therefore elicit disgust and its concomitants like contamination

avoidance. These authors claim that specific correspondences between divinity or purity violations and disgust show that people perceive moral or social contamination.

Although the CAD hypothesis was aesthetically convenient “we cannot resist noting the coincidence that in the English language, the first letter of each of the Shweder ethics matches the first letter in the emotion word that we link to it” (Rozin et al., 1999 p 567) the idea that divinity or purity is specifically linked to disgust is questionable. As noted previously, disgust reported towards divinity or purity violations may arise from appraisals of physical impurity, rather than moral impurity, due to non-moral content such as dog meat or a corpse in their items (Hutcherson & Gross, 2011; Giner-Sorolla, Bosson, Caswell, & Hettinger, 2012; Royzman et al., 2014). In addition to dog meat and corpse items, Rozin et al. (1999) included “a person bites into an apple with a worm in it”, “a person is shaking hands with someone who has an incestuous relationship” and “a person is hearing about a 70-year-old male who has sex with a 17-year-old female” as divinity items. These items do not appear to have content relevant to divinity or sanctity, or, in the case of biting an apple, even of morality. Indeed, according to their own data, participants only chose the rotten meat, apple and incest items as divinity (rather than community or autonomy) violations and, even for these items still under 30% of participants agreed with the authors’ classification as divinity violations. Thus, responses to these items cannot be taken as evidence that a specific emotion (disgust) responds to divinity violations due to an appraisal of moral contamination.

Royzman et al. (2014) had participants imagining themselves in pathogen-free divinity violations (e.g., “using a large silver crucifix he inherited from his devout Protestant father as a doorstep”) in comparison to the original divinity items and found that only 1.7% of participants chose disgust as their predominant response,

compared to 94.3% who chose anger. In contrast, 92% chose disgust towards the original divinity items and 3.9% chose anger. The authors also used their *Oral Inhibition Index* (Royzman et al., 2008) to measure prototypical disgust feelings (feel like gagging, loss of appetite, feel nauseated) and found that their pathogen-free divinity items received a mean rating of only 0.12 on a 0-3 scale. In summary, the literature on divinity and purity violations does not provide strong evidence that disgust arises from the appraisal of moral impurity or contamination; when disgust is reported in these cases, it may be due to the appraisal of physical, pathogen-related contamination.

1.4.2 Moral contagion. The most direct evidence for moral contagion comes from experiments showing that many participants are unwilling to make contact with immoral objects. This line of research was also inspired by anthropology. For example, Marcel Mauss (1902 p 82) wrote about contagion “personal characteristics, illness, life, luck, every type of magical influx are all conceived as being transmitted along a sympathetic chain”. James Frazer (1890) also surveyed anthropological evidence and concluded that “to the crude intelligence not only of the savage, but of ignorant and dull-witted people everywhere” the law of contagion is applied: “things which have once been in contact with each other are always in contact” (p 20). Rozin and Nemeroff, (1986) built on these ideas but argued that they were not merely primitive ideas, but intuitive beliefs shared by all people, including American students. They also noted that the law of contagion appeared to apply particularly strongly to disgusting substances. In experimental tests of the law, subjects were sat at a table at a 90-degree angle to the experimenter and were asked to rate on a scale how much they would like to perform various actions such as drinking juice contacted by a dead sterilised cockroach, compared to uncontacted juice. Participants also rated how

much they would like to perform hypothetical actions such as wearing a shirt of a disliked person in comparison to a shirt of a liked person. Participants preferred to touch the control items compared to the ‘contaminated’ items and interpreted this as evidence that both people and objects can transmit “negativity by some sort of contact with disgust” (p 710).

A number of similar hypothetical and behavioural experiments have subsequently shown that people are reluctant to wear a Nazi’s hat or armband (Rozin, Haidt, McCauley, Dunlop & Ashmore, 1999), use a murderer’s sweater, bed, or car (Rozin, Markwith & McCauley, 1994), use an ‘unsavory’ person’s sweater or hairbrush (Rozin, Nemeroff, Wane, Sherrod, 1989), accept money from an immoral company (Stellar & Willer, 2014), or from a thief (Tasimi & Gelman, 2017), or eat with a thief’s fork (Tapp & Occhipinti, 2016). In addition, negative emotions have been shown to follow contact with immoral stimuli, such as a liar’s hand or a thief’s chair (Eskine, Novreske & Richards, 2013). People’s reluctance to touch these objects has been taken to show that immoral objects are appraised as contaminating. Researchers claim that people intuitively believe that contamination can come about via the transfer of a “material essence” or a “non-material, spiritual essence” (Nemeroff & Rozin, 1994; Rozin et al., 2008). Previously thought to be characteristic of primitive beliefs in systems of magic (Frazer, 1890), this “law of contagion” has been argued to be a pan-cultural psychological feature that operates in “a salient and frequent way in the thinking of educated, Western adults” (Nemeroff & Rozin, 2000, p 6).

However, none of these behavioural avoidance studies have excluded reputation concerns as an alternative explanation. Some features of these studies point to this possibility. Most studies were conducted in audience conditions in front of an experimenter (e.g., Rozin & Nemeroff, 1986; Eskine et al., 2013), or even in front of

a conspicuously positioned video camera (Rozin et al., 1999). Also, some results suggest that discomfort with visible association with immoral objects may drive the effects. For example, one study found that most participants were willing to hold a Nazi hat (84%) or armband (82%) but only a minority were willing to wear the hat (44%) or armband (44%), even though both acts entailed skin contact (Rozin et al., 1999). This may be because wearing the object would create more reputation threat than touching it by increasing visibility and by implying greater endorsement of the object. Even wearing an otherwise innocuous object might invoke reputation concerns if a participant knows that it is known by the experimenter to have belonged to a wrongdoer.

1.5 An alternative account

The main proposal in this thesis is that verbal and facial expressions of moral disgust, as well as its behavioural manifestation in the form of the apparent contagiousness of morally disgusting stimuli, are not products of disease-avoidance motivation, but instead serve the fundamentally important social goal of maintaining a good reputation. One important way to maintain a good reputation is by avoiding association with immoral people or immoral behaviours, especially if there is a risk of being observed by third parties. Behaviours that are usually assumed to be outputs motivated by the experience of disgust, including avoidance of immoral objects and apparent contamination concern towards them, may in fact be motivated by reputation management concerns – people do not want to be visibly associated with immorality.

Another important way to secure a good reputation is to condemn third parties' immoral behaviour, especially when being observed, in order to communicate opposition to the immoral behaviour. Emotions can be particularly valuable for

communicating condemnation because they are often perceived to reflect authentic and intuitive motives (Frank, 1988) but not all emotions communicate the same information about our motives (Barasch, Levine, Berman and Small, 2014). The other main proposal of this dissertation is that disgust is expressed towards moral violations because it effectively communicates morally motivated condemnation. Although anger can also communicate condemnation, it conveys a more selfishly motivated condemnation, so it is not as useful for conveying moral motives. Importantly, this account explains why disgust would be expressed in preference to anger even towards moral violations without pathogen content.

1.8 Reputation management

1.6.1 Cooperative reputation. Cooperation is essential to many activities that are key to human survival and reproduction, from large group endeavours like hunting and warfare, to small group or dyadic exchanges like trading food or cooperative breeding (Gurven & Winking, 2008; Hill & Hurtado, 2009). However, for human cooperation to have evolved individuals had to solve the problem of free-riding (Trivers, 1971). For example, a person in a raiding group might take his share of cattle but free-ride by advancing later, or retreating earlier, than his tribe mates (Mathew & Boyd, 2014), or he might even desert or malingering altogether (Chagnon, 1988). On more quotidian scale, a person might free-ride by accepting a favour of a food donation, or help building a shelter, but avoid returning the favour at a later date (Gurven, 2004). By taking benefits without paying costs these cheaters would have higher fitness than co-operators which undermines the evolutionary stability of cooperation. Evolutionary scientists have long sought to answer the question of how this problem was solved during human evolution (Fehr & Fischbacher, 2004). There is broad consensus that two of the most important solutions were punishment (Fehr &

Gächter, 2002; Price, Cosmides & Tooby, 2002) and reputation (Milinski, Semmann & Krambeck, 2002; Nowak & Sigmund, 2005). The evolution of punitive sentiment promotes cooperation by increasing the costs of cheating or freeriding, and decreasing the risk of losses through defection for those who initiate cooperation. However, punishment is costly to the individual who chooses to punish due to the risk of costs of retaliation from cheaters or free-riders, so people often avoid punishing and it does not provide a complete solution to the problems of cooperation (Dreber, Rand, Fudenberg & Nowak, 2008; Sigmund, 2007).

The benefits of cooperating can be gained without the costs of punishment if a person can choose their partner discriminately prior to investment in cooperation (Barclay, 2013; Noë & Hammerstein, 1994; Sylwester & Roberts, 2013). If people are choosy with regards to whom they cooperate based on people's reputation for cooperation, this creates a selective pressure for behaving so as to be chosen – what is sometimes referred to as “the evolution of cooperation by partner choice” (Dugatkin, 1995; Nesse, 2007). Even if people do not find themselves in a situation in which they can choose between partners, as may often have been the case in small, ancestral, populations, they can still condition their level of cooperation on the potential partner's reputation, by for example, withholding favours or making smaller donations (Nowak & Sigmund, 2005). This means that even without partner choice, there will be selection for those who encourage others to offer benefits by building and maintaining a reputation for being a good cooperative partner.

People assess the reputation of others not only by remembering the outcomes of their own past interactions with them but also by paying attention to information from third parties in the form of *reported reputation*, or *gossip* - the exchange of positive or negative social information about absent others (Dunbar, 2004). The

content of gossip frequently relates to norm violation and free-riding, and this gossip facilitates reputation spreading (Feinberg, Willer, Stellar & Keltner, 2012).

Simulation models (Giardini & Conte, 2012) and empirical studies (Wedekind & Milinski, 2000; Wedekind & Braithwaite, 2002) have shown that individuals who have a cooperative reputation (or “image score”) are more likely to receive benefits from third parties who have knowledge of the individuals’ reputation, because third parties choose who to cooperate with based on reputation. This mechanism, known as *indirect reciprocity* has been shown to be an effective and low-cost solution enabling the stable evolution of cooperation (Nowak & Sigmund, 1998).

The selective pressures created by people attending to reputations and conditioning partner choice on reputation are believed to have led to the evolution of psychological mechanisms for managing reputation (Baumard & Sperber, 2012; Haley & Fessler, 2005; Trivers, 1971). Accordingly, many studies have shown that people tend to be more cooperative when their reputation is at stake (Wu, Balliet & Van Lange, 2016; Feinberg, Willer, Stellar & Keltner, 2012; Filiz-Ozbay & Ozbay, 2014). For example, Piazza & Bering (2008) found that participants were much more generous in a dictator game when they were told that a third party would find out about the amount of money they had allocated to an anonymous receiver, even though the third party was given no power to punish the dictator. Milinski, Semmann, Krambeck and Marotzke (2006) found that when investment in a pool for climate protection had reputational consequences because donations were being observed by other participants, donations were much higher than in anonymous rounds. Ariely, Bracha and Meier (2007) found that participants made more effort to earn money for charity, by tapping on two keyboard keys for 5 minutes, if they did so knowing that they would subsequently tell the other participants in the lab how much money they

had earned for the charity. In another study they found that participants who earned \$1 per mile cycling on stationary bikes for up to 10 minutes, cycled further in a public area of the gym than in a private room of the gym.

Notably, generosity is enhanced in dictator games even if it is only the experimenter who could gain knowledge of the participant's level of generosity (Hoffman, McCabe and Smith, 1996). It was only in a double-blind condition, in which participants were guaranteed that no one, even the experimenter, could find out how much money the participants had given, that the majority of participants' generosity dropped to zero (Hoffman, McCabe, Shachat & Smith, 1994). Kurzban, DeScioli and O'Brian (2007) found that participants who observed a target cheat someone during an economic game would pay more money to punish the target under audience than anonymous conditions, even if the audience was only the experimenter.

Studies like these confirm that people are highly sensitive to threats to their reputation and they are strongly motivated to behave in ways to enhance or maintain a reputation as a good co-operator. In line with evolutionary models of cooperation by reputation, it has been suggested that the psychology underpinning reputation monitoring and management is a largely intuitive and innate adaptation (Haley & Fessler, 2005; Kurzban et al., 2007; Sparks & Barclay, 2013). For example, Haley and Fessler found that schematic pictures of eyespots placed in a lab were sufficient to increase participants donations in an economic game compared to pictures of the lab's logo. Although not all studies have replicated the effect of subtle eye spots (Sparks & Barclay), some other lines of evidence support the possibility that people have implicitly operating reputation management mechanisms, including the apparent presence of reputational concerns in other species and in pre-verbal infants, who are presumably not capable of deliberate, calculated cooperation for reputational gain.

Client fish visit cleaner stations on tropical reefs where cleaner fish eat their ectoparasites, but cleaner fish prefer to eat their client's more nutritious mucus and have often been observed 'cheating' by taking bites of mucus (Grutter & Bshary, 2003). Clients will often 'eavesdrop' on other client-cleaner interactions, gaining information on the cooperativeness of the cleaner fish. When cleaner fish can detect that they are being observed, they increase their apparent cooperativeness by eating ectoparasites rather than mucus (Bshary & Grutter, 2006). It is not known whether this is achieved due to an innate mechanism for reputation management, or by learning through associating eating ectoparasites in the presence of an observer with the reward of additional client visits. Nevertheless, the existence of an audience effect in fish suggests that reputation management mechanisms can operate implicitly (in humans and animals) and do not depend (only) on deliberate or explicit cost benefit calculation (Bshary & Grutter).

Reputations are also formed by nonhuman primates. Russell, Call and Dunbar (2008) allowed apes to observe a nice person giving food to a recipient and then a stingy person refusing to share food. They found that chimpanzees subsequently spent significantly more time in proximity to the nice compared with the stingy person. Similar research has shown that Orangutans, chimpanzees, and 2.5-year-old human children prefer to interact with a nice experimenter who they had observed giving food to a third party, compared to a mean experimenter who interrupted the food giving (Herrmann, Keupp, Hare, Vaish & Tomasello, 2013). Another study found that 5-year-old pre-school humans share more and steal less when they are being watched by a peer than when they are alone. In contrast, chimpanzees behave the same whether they are being watched by a groupmate or not (Engelmann, Herrmann & Tomasello, 2012).

Studies like these suggest that although reputation psychology is present at least in rudimentary form in primates, it is much more advanced in humans, to the extent that they know when they are being judged by others, and they adjust their behaviour to manage the impressions formed by observers. There is also evidence from developmental psychology showing that a concern for reputation develops at around 5 years of age: children of this age will act more generously by giving away toys or prizes if they know they are being observed (Fujii, Takagishi, Koizumi, & Okada, 2015; Leimgruber, Shaw, Santos & Olson, 2012). Children will also judge a target negatively for taking credit for another's work if taking credit leads to reputational gains (Shaw, Montinari, Piovesan, Olson, Gino & Norton, 2014). Eight to ten-year olds judge someone who behaves prosocially in private more favourably than someone who does so publically, suggesting that they are aware that other people act out of concern for reputation and adjust inferences about cooperativeness accordingly (Heyman, Barner, Heumann & Schenk, 2014; Heyman, Fu, Barner, Zhishan, Zhou & Lee, 2016). Furthermore, there is evidence that children's reputation management is strategically designed to promote behaviour for self-interest: 6 year olds will be less fair to others if they can do so without appearing to be unfair (Shaw, Montinari, Piovesan, Olson, Gino & Norton, 2014) and they will behave more generously, not only if they are being observed, but also if they know that the recipient will later be in a position to reciprocate (Engelmann, Over, Herrmann & Tomasello, 2013).

Although reputation management does not seem to develop before 5 years of age, the preference for interacting with good co-operators over non-cooperators, cheaters or free riders is present in infants (Warneken & Tomasello, 2009). Even 3 and 6-month-old infants have been shown to prefer an agent who acted prosocially over one who acted antisocially, shown by approaching or looking more toward the former

(Hamlin, Wynn, & Bloom, 2007; 2010). Eight-month-old infants preferred a puppet that pushed an unhelpful puppet down a hill (Hamlin, Wynn, Bloom, & Mahajan, 2011). These findings indicate that attention to others' moral reputation develops early and pre-verbally and affects behaviour towards those others, but according to the above evidence, a sophisticated and strategic concern for one's own reputation develops later. This suggests that children learn over time that they are being judged by others. Nevertheless, chimps do not learn this, so humans might at least have preparedness for reputation management (Engelmann et al., 2013).

1.6.2 Moral reputation. The evidence reviewed above focused on cooperative reputation, however most evolutionary approaches to morality hold that the biological function of moral behaviour to help individuals gain a reputation as good co-operators (Alexander, 1987; Krebs, 2008; Sperber & Baumard, 2012; Trivers, 1971), in which case the evidence described above on the importance of cooperative reputation is directly relevant to the importance of moral reputation – people who are uncooperative by, for example, cheating, freeriding or stealing, are the most likely to be regarded as immoral. And when researchers refer to moral attributes like trustworthiness, altruism and generosity, these are also the attributes of a good co-operator (Curry, 2016). Cooperative reputation and moral reputation, therefore, are psychologically very similar, even if they are often studied by different groups of researchers.

Similarly, therefore, people pay close attention to the moral reputation of others and use this information to make enduring character evaluations (Brambilla, & Leach, 2014; Wojciszke, Bazinska, & Jaworski, 1998). Research has shown that negative attributions about moral character are made readily and harshly, and are often based on minimal information (Martijn, Spears, van der Pligt & Jakobs, 1992; Reeder &

Spores, 1983; Skowronski and Carlston, 1992). As with cooperative reputation, negative character attributions can be especially harmful because they often spread beyond the observer by gossip (Dunbar, 2004; Piazza & Bering, 2008) and as with being seen as a poor co-operator, grave consequences can follow from a poor moral reputation, including exclusion and social ostracism (Darwin, 1874; Kurzban & Leary, 2001). People are not just sensitive to their cooperative reputation, therefore, but more generally to their moral reputation (Sperber & Baumard, 2012; Trivers, 1971).

Accordingly, people are not only more generous and cooperative in the presence of third party observers (Ariely Bracha, & Meier, 2007; Filiz-Ozbay & Ozbay, 2014; Milinski, Semmann, & Krambeck, 2002), but also judge moral transgressions more harshly when surveillance cues are present (Bourrat, Baumard, & McKay, 2011; Kurzban et al., 2007), presumably in order to demonstrate their moral credentials. A considerable literature on self-presentation and impression management, also attests to the importance people place on maintaining a good moral reputation (Baumeister, 1992; Leary & Kowalski, 1990).

1.6.3 Reputation by association. Reputation can be damaged by a person's own actions, but also by the company they keep because observers make attributions about people who associate with stigmatised individuals (Goffman, 1963; Pryor, Reeder & Monroe, 2012). For example, Neuberg, Smith, Hoffman, and Russell, (1994) found that heterosexual male targets were derogated when they were observed with their homosexual friends. Hebl and Mannix (2003) found that a male job applicant was rated more negatively if seen sat next to an overweight compared to a normal weight female and that just being in the mere proximity of an overweight woman was enough to trigger stigmatization of the male applicant, regardless of his relationship to the

woman. Research found that teenagers with parents stigmatized by alcohol abuse or mental illness were viewed as more socially negative (Burk & Sher, 1990) and partners of disabled individuals were less likely to be viewed as intelligent, sociable, or athletic (Goldstein & Johnson, 1997).

Of particular relevance to the prediction that wearing an immoral object like a Nazi's armband will result in immorality by association, negative attributions have been found to result from a person being incidentally associated with negatively valenced objects or symbols, like a flag or religious icon (Carlston & Mae, 2007). Notably, these stigma-by-association effects are analogous to physical contamination in the sense that both are transferred easily and by proximity, as emphasised by the use of contamination and infectious disease language in the stigma-by-association literature (e.g., Corrigan, Watson & Miller, 2006). As Pryor et al. (2012, p1) remark, "Like an infectious disease, social stigma can spread from a "marked" person to others who are somehow associated with this person... Why does stigma have this power to contaminate others?" However, these authors understand that the similarity is by analogy, not homology and they use disease language metaphorically, explaining their findings with mechanisms like association and trait inference, rather than by invoking an intuitive belief in the transfer of material or spiritual essences (Rozin & Nemeroff, 1986).

As would be expected from a species that is thought to have evolved to manage its reputation as a desirable co-operator, people feel uncomfortable and threatened if they are observed interacting with stigmatised others, presumably out of concern for their reputation (Blascovich, Mendes, Hunter, Lickel, & Kowai-Bell, 2001). Given the importance of moral information in person evaluations, it is reasonable to suggest that people might also feel threatened by contact with immoral people or objects, such as a

Nazi's armband. People might (implicitly) perceive threat to reputation because touching or wearing these objects would lead observers to make inferences of immorality by association. Choosing to wear a Nazi's armband would be the type of association that Goffman (1963) referred to as *meaningful association*, in which a person appears to choose to identify with a certain group, further justifying negative character attributions made by observers.

Thus, a considerable body of research and theory points to the hypothesis that people avoid associating with immoral stimuli because they intuit that visible association could lead observers to make negative attributions, thus damaging their moral reputation. People may act as if a Nazi armband or hat is contagious, but it may be reputation threat, not contamination threat, that motivates this behaviour.

1.9 Signaling

Avoiding association with immorality is only one means to managing one's reputation. Another is to advertise one's moral attitudes and beliefs by communicating condemnation. As Tennie, Frith and Frith (2010, p3) put it, "Reputation counts for little if it is not signalled." And as Boyer and Baumard (2012 p 27) point out, managing reputation does not just require implicit attention to cues that people may be watching, but more strategic abilities such as "the ability to anticipate the reactions of others to one's own actions and attitudes, including their reactions to our reactions, to the actions of third parties". Much of moral reasoning and argumentation, for example, may be strategically directed at protecting one's reputation by finding and communicating moral justifications for one's actions (Haidt, 2001; Mercier & Sperber, 2011) and the importance of maintaining a good reputation may be why the moral beliefs and attitudes that we claim to have often deviate from

our actual behaviour – moral hypocrisy (Kurzban, 2009). People who calculate when presented with the opportunity to behave morally are perceived as less prosocial (Everett, Pizarro & Crockett, 2016), whereas those who make uncalculating, quick and intuitive decisions are perceived as more moral (Critcher, Inbar & Pizarro, 2013; Evans & Van de Calseyde, 2016). Accordingly, participants have been found to engage in more uncalculating behaviour when their decision process was observable to others, showing that people can modify their behaviour to signal that they have genuinely prosocial motives as a reputation management strategy (Jordan, Hoffman, Nowak & Rand, 2016).

Emotional reactions are an effective way to signal one's moral motives because they tend to be uncalculating and impulsive and they can show that we are strongly and authentically motivated by moral concerns (Frank, 1988). For example, Barasch, Levine, Berman and Small (2014) found that targets who donated to charity because they felt "very emotional" were rated as more genuinely charitable than targets who donated because they "wanted to help as many people as possible". Emotions, as opposed to cold reasoning, may be perceived by people as reflecting an actor's true motives and dispositions (Ames and Johar, 2009). However, not all emotions provide the same information: Barasch et al. found that only targets with other-regarding emotions were rated as more authentically charitable and not those who gave to charity in order to feel happy. People may also express emotions to show strong and authentic condemnation of others' moral violations. But again, not all condemning emotions will be perceived equally. Anger, for example, might be perceived as more selfish, and disgust as more impartial and moral.

This suggestion aligns with the recognition that emotions do not only regulate individual behaviour, but also have a communication function in signalling social

motivations to others. This perspective derives both from the behavioural ecology view of emotion expressions as signals of intent toward other individuals (Hinde, 1985; Fridlund, 1994), and from perspectives on the communicative and interpersonal functions of emotions (Fischer & Manstead, 2008; Giner-Sorolla, 2012; Hareli & Hess, 2012; Parkinson, 2005; Van Kleef, 2009). In contrast to this perspective, other researchers suggest that emotional expressions are automatic read-outs of emotional experience and that measuring facial expression is sufficient to know what emotion a person is experiencing (e.g., Cannon et al., 2011; Chapman et al., 2009). This idea largely derives from Ekman's Basic Emotions Theory: internal emotional mechanisms are automatically and causally linked to prototypical emotional faces by "Facial Affect Programs" (Ekman, 1972; Ekman & Friesen, 1971; Izard, 1993). This view leads to the idea that if one records a disgust expression, for example with facial behaviour coding or with EMG, then the participant must be experiencing the corresponding disgust emotion, including components like nausea (e.g., Cannon et al.; Chapman et al.). Even if it is sometimes true that strong emotions are automatically linked to particular facial expressions, there are many reasons to doubt that this assumption always holds. Facial expressions may not have evolved as adaptations "for the expression emotion" (Hinde, 1985).

1.7.1 Behavioural ecology. Behavioural ecology shows that nonhuman animals can produce signals for strategic communicative reasons, even when the signals do not reflect their internal state (Krebs & Dawkins, 1984). Signals that do not always reflect the internal state of the signaller include alarm calls. For example, the fork-tailed drongo follows other species living in the Kalahari, such as meerkats and pied babblers. The drongo makes alarm calls when a predator (owl, fox or mongoose) approaches, leading signal receivers to run away (Flower, 2011). But the drongo also

makes false alarm calls when there are no predators around and then it steals the food abandoned by the signal receivers (Flower, Gribble & Ridley, 2014). Here, then, the drongo produces a signal as a strategic emission and not as an accurate readout of an internal state elicited by a predator. Signalling mechanisms evolve as adaptations serving the interests of signallers, and their interests are not always served by accurately conveying their internal state (Krebs & Dawkins, 1984). For this reason, we should not expect emotion expressions to be automatically and necessarily tied to particular internal states (Hinde, 1985).

As another example, Batesian mimicry, in which a harmless species such as a hoverfly has evolved to imitate the warning signals of a harmful species such as a wasp, the mimic gains an advantage without having to pay the cost of arming itself with toxins (Ruxton, Sherratt & Speed, 2004). These species emit signals (e.g., bright coloration) that do not accurately reflect its internal state. The signal receiver nevertheless attends to the information because of a rule previously set up in its mind of the relationship between the signal and a quality such as distastefulness (Dawkins & Guildford, 1991). This is analogous to the signalling function of moral disgust proposed here: the meaning of disgust expressed towards physical stimuli like rotten meat or faeces is understood early in life to mean strong offense and rejection. This association between the disgust expression and its meaning in the minds of receivers can subsequently be used by signallers to communicate strong offense towards other types of stimuli, such as the signal receiver's, or a third party's, objectionable behaviour. This account suggests that the use of disgust to express moral condemnation develops over the course of an individual's life due through the flexible use of facial behaviour. As such, the account is more parsimonious than accounts

claiming that moral disgust is a discrete adaptation with its own evolutionary history (e.g., Tybur et al., 2013).

Of course, the signalling behaviour of primates is much more flexible than the colouration of Batesian mimics. Whiten and Byrne (1988) documented many examples of primate behaviours used strategically in the absence of the usual corresponding internal state. They described, for example, several observations of individuals remaining overtly calm while approaching an opponent before launching of a sudden and unexpected attack. Taking inspiration from biologists, Fridlund (1991; 1994) developed the Behavioral Ecology View (BECV) of human facial behaviour as an alternative to Basic Emotion Theory. Like animal signals, he argued, human facial displays, communicate the intent of the displayer toward others in a social interaction. Anger, for example, might communicate the intent to attack or threaten, while a smile might display the intention to be friendly, cooperative or appeasing. However, these intentions do not imply any particular internal state, because it might serve one's interest to signal the intention to attack using anger, even if one internally experiences fear (Fridlund & Russell, 2006); or to communicate the intention to cooperate even if one's internal experience is contempt, disgust or pain (Kunz, Prkachin, & Lautenbacher, 2013).

One argument against the idea that expressions are only signals of intent with little relation to internal feelings (Fridlund, 1994) is that signalling systems must be 'honest' in that the signal reliably reflects some underlying quality of the signaller, because if a signal is not reliable, the evolutionary consequence would be that the signal becomes no longer used by receivers (Zahavi, 1987). This idea also derives from behavioural ecology, but it has been extended to human emotions: they must contain honest and reliable information about a signaller's internal state, otherwise

receivers will not know how committed to a particular course of action the signaller is (Bryant & Aktipis, 2014; Frank, 1988). However, this argument neglects that the costs may not be high to signallers or to receivers and the cost of true assessment will often not be justified by what could be gained from uncovering a cheat (Dawkins & Guildford, 1991). Costs might be paid by receivers, for example, in terms of time and attention paid to signallers to determine the veracity of their signal. In any case, as described above, much evidence shows that signals do not have to honestly reflect an animal's internal state.

Nevertheless, it might still be useful to tell involuntary and affectively produced expressions from those that are more voluntary because signallers might try to show that they intend to be more cooperative than they really are and receivers will benefit from adjusting their cooperation accordingly. Owren and Bachorowski (2001) suggested that this dynamic could have resulted in an evolutionary arms-race for being able to produce effective voluntary smiles versus discriminating between voluntary and involuntary smiles. Bryant and Aktipis (2014) found that volitional laughs were judged as real on average 37% of the time and suggested that this intermediate result might be the consequence of a co-evolutionary arms race shaping senders and receivers of volitionally controlled vocal signals, such as laughter and smiling. Laughter is also thought to be a signal of cooperative intent (Gervais & Wilson, 2005; Mehu & Dunbar, 2008), originally deriving from laboured breathing during play, like that seen in apes like chimpanzees. In a large cross-cultural study Bryant et al. (2016) found that people were able to distinguish pairs of laughers who were friends from pairs who were strangers that had just met. The authors suggested that group laughter provides a reliable cue with which an audience, and the laughers themselves, can assess the degree of affiliation between laughers.

Nevertheless, expressions that do not correspond to internal states may still contain useful information. A “polite” smile or laugh might often be a prosocial signal despite not being entirely spontaneous (Fridlund, 1991). Similarly, an expression of disgust might be informative even if the expresser isn’t experiencing an internal state like nausea typically associated with the expression.

1.7.2 Social psychology of emotion expressions. The social psychological literature on the communicative and interpersonal functions of emotions has come to similar conclusions as the behavioural ecology view of emotion expression (Fischer & Manstead, 2008; Frijda, 1986; Giner-Sorolla, 2012; Parkinson, 1996; Van Kleef, 2009). Research and theory on the social functions of emotion has concluded that others' emotional expressions provide information not only about expressers' private feelings and internal states, but also their attitudes, motives and behavioural intentions (Keltner & Haidt, 1999; Parkinson, 2005) and even their character dispositions (Hareli & Hess, 2012). Put another way, emotion expressions communicate states of ‘action readiness’ and these states can be appraised by observers to gain useful information about the expresser’s likely behaviour (Frijda, 1986; Frijda, Kuipers & ter Shure, 1989). If disgust, even in the absence of internal feelings like nausea and contamination, contains information about the attitudes, motives and behavioural intentions of an expresser, then it could still contain useful information to a receiver.

An early study along these lines found that infants were more likely to cross a visual cliff when their mother smiled at them than when she looked fearful (Klinnert, Campos, Sorce, Emde, & Svejda, 1983). The infant can be thought of as using emotional expressions not to decode the internal feeling state of the mother, but to provide intentional information about threats in the environment. Clark, Pataki and

Carver (1996) found that when adults express sadness, they often do so to solicit help and this may not always be in proportion to their internal feelings of sadness. In another study participants inferred from negotiation partners who expressed guilt or regret that the expresser felt they had asked for too much, and participants responded by increasing their own demands (Van Kleef, De Dreu, & Manstead, 2006).

Expressions of emotion, both verbal and non-verbal, can influence perceptions of the person's character and how much the person is liked (Knutson, 1986). For example, Clark and Taraban (1991) found that in close relationships and in business relationships, expressions of happiness increased liking whereas expressions of irritability decreased liking. Hareli and Hess (2010) found that a person who reacted with anger when they were blamed for being late was perceived as more aggressive and self-confident, but also as less warm and gentle than a person who reacted with sadness to the blame.

1.7.3 Anger and disgust as signals. In summary, evidence from behavioural ecology and social psychology indicates that people can express emotions for their communicative effects, even in the absence of the internal state that usually corresponds with that emotional expression. The reason people express disgust towards moral violations even if they do not have any bodily, pathogen or impure content, therefore, could be that the disgust expression communicates useful information to observers. Furthermore, the disgust expression may communicate different information from an anger expression, explaining why people may choose to express disgust towards a moral violation, even if the violation seems to be an anger-eliciting situation.

The more specific hypothesis is that observers infer more self-interested motivation from anger but more impartial, moral, motivation from disgust. Thus,

people express anger or disgust depending on whether they seek to communicate moral versus self-interested motivation. From this perspective, disgust is not just an expression of an inner reaction to impurity, but a signal that advertises a moral position. Complementary perspectives on moral disgust have been given by Tybur et al. (2013) and Royzman and Kurzban (2011). Tybur et al. suggested that disgust functions as a signal to recruit observers to help condemn and punish the violator of a rule that the expresser favours. The current research does not test whether disgust effectively inspires collaborative behaviour but, based on the assumption that people can be motivated to communicate their moral position whether or not they expect to influence observers' behaviour, we test the compatible hypothesis that the decision to express disgust versus anger depends on the motives the expresser seeks to communicate. Whereas other authors claim that disgust is felt and then signalled (Hutcherson & Gross, 2011; Molho, Tybur, Güler, Balliet & Hofmann, 2017), the current perspective is more in line with behavioural ecology approaches to animal signalling, because it argues that disgust does not need to be felt in order to be expressed, and it can even be expressed when some other emotion like anger is felt.

1.7.4 Anger Protects Direct Self-interest. Anger arises when a person perceives their interests to be harmed (Frijda, 1994; Keltner & Haidt, 1999; Kuppens et al., 2003). An expression of anger communicates the intention to approach and aggress, and that the recipient of anger should make concessions (Van Kleef, De Dreu & Manstead, 2004). For example, one study showed that expressing anger when complaining led to greater compensation because it enhanced the credibility of the claim and, presumably, the credibility of threat (Hareli et al., 2009). Anger and the threats that it communicates can also discourage future transgressions towards the expresser (Sell, Tooby & Cosmides, 2009).

Although anger serves the very important function of defending one's interests, a person who expressed anger too readily could suffer social and reputational damage. Participants who negotiated with someone who expressed anger became angry themselves, disliked the counterpart, and were less willing to meet again, compared to those whose negotiation partner expressed happiness (Van Kleef, De Dreu & Manstead, 2004). Work teams with an angry leader also became angry themselves and developed a negative impression of the leader, in comparison to teams with a happy leader (Van Kleef, Homan, Beersma, Van Knippenberg, Van Knippenberg & Damen, 2009). Studies have found that compared to the expression of emotions like happiness and gratitude, anger can lead to reduced trust in the observer (Dunn & Schweitzer, 2005). The expression of anger can even lead to the desire to take revenge on the expresser (Van Kleef & Cote, 2007) or to exclude the anger expresser from a coalition (Van Beest, Van Kleef & Van Dijk, 2008).

Due to these potential costs, anger should only be deployed when violations that have clear, countervailing costs to the individual. Purely moral concerns that transcend an individual's self-interest would fail this cost-benefit logic of anger. Accordingly, although anger can be aroused by moral concerns like injustice, it is more consistently aroused by selfish concerns like goal blockage (Hutcherson & Gross, 2011; Kuppens, 2003). Assuming that people have some folk-psychological understanding of anger and its causes, observers of an anger expression are likely to infer that it is motivated by self-interest, especially in socially ambiguous situations; hence a different emotional expression might be more useful to signal unselfish moral concern.

1.7.5 Disgust communicates unselfish condemnation. Unlike anger, disgust does not prepare aggressive action (Roseman, Wiest & Swartz, 1994), so it may be

appraised as less self-serving. Furthermore, because things are usually disgusting by consensus, at least within a cultural group (e.g. foods, sexual acts), an observer of a disgust expression would appraise, not so much that a selfish goal has been blocked, but that a consensually offensive stimulus has been encountered. These features underlie the prediction that, in contrast to anger, people will infer disgust expressions to be motivated more by moral concern than by self-interest. And if expressers have implicit knowledge that observers make motive inferences from expressions, they should strategically express anger and disgust to communicate these motives. If the expression of disgust does communicate moral motives, then it could serve an important role in the management of moral reputation.

1.10 Overview of studies

Chapter 2 reports the studies investigating the reputation management account of apparent moral contagion and Chapter 3 presents tests of the social signaling hypothesis of moral disgust.

Chapter 2 studies. Study 1 presented a hypothetical decision to wear a Nazi armband visibly or hidden but against the skin. Participants' reasons for their decision were assessed. Study 2 replicated Study 1 but in a lab environment with a real Nazi armband and including audience versus private conditions. Study 3 assessed third party judgements of targets who wore the armband in each way.

Chapter 3 studies. Studies 4 and 5 presented a scenario in which a target expressed anger or disgust towards a wrongdoing and participants' inferences about the target's moral versus self-interested motivation were measured. Studies 6 gave participants a scenario in which their aim was either to communicate self-interest or moral concern and measured which emotion they chose to express. For a more

stringent test, Studies 7 and 8 used a concrete scenario involving harm to the self, to see whether the aim of communicating moral motivation would increase disgust expression under conditions that would normally predict anger (Hutcherson & Gross, 2011). All measures, all manipulations, data exclusions, and *a priori* sample size rationale are reported. Studies 5, 6 and 7 were preregistered¹, including all hypotheses described.

¹ Preregistrations and data can be found on the OSF website, <https://osf.io/4ac5p/>

Chapter 2. Reputation management explains apparent moral contagion

The studies presented in this chapter investigated whether reputation or contamination concerns primarily motivate avoidance of morally disgusting stimuli. Following Rozin and colleagues (1999) a Nazi armband was used because, in Western populations, Nazis are reliably found to be highly immoral and disgusting (Rozin, Haidt & McCauley, 2008). A behavioral choice paradigm was devised that enabled a direct competition between contamination and reputation motives by giving participants a choice between direct contact with the armband and display of the armband. Study 1 gave participants a hypothetical behavioral decision and measured what motivated their decisions. Study 2 replicated Study 1 using real behavior in a lab environment, and introduced audience versus private conditions to test a clear prediction of the reputation management account - that preference for avoiding display would be enhanced under audience conditions. Study 3 investigated third-party judgements of targets who chose to wear the Nazi armband in the ways described in Studies 1 and 2.

2.1 Study 1

In a hypothetical scenario, participants chose between wearing a Nazi armband on top of their t-shirt sleeve, so that it was visible but not directly touching their skin, or underneath their t-shirt sleeve so that it directly against their skin but not visible. This paradigm facilitated contrasting predictions: The reputation management account predicted that participants would choose to put it under the t-shirt to avoid displaying it, whereas the contamination avoidance account predicted that participants would choose to put it on top of the t-shirt to avoid direct skin contact. After making

their decision, participants rated items assessing the importance of contamination concern and reputation concern to their decision.

Method

Participants.

Based on a medium effect size ($d = 0.35$), a power analysis using GPower 3.1.9.2., recommended a sample size of 96 at 95% power to test a binomial preference in a single sample. This was increased by 10% to allow for incomplete responses and exclusions based on the manipulation check question. Amazon Mechanical Turk was used to recruit 102 (55 male) participants from the United States ($M_{\text{age}} = 36.78$, $SD_{\text{age}} = 11.08$).

Materials and procedure.

Participants imagined a scenario in which they had come to a psychology lab at a nearby University to take part in a study into attitudes towards wearing historical clothing. They were informed that they would be asked to wear a red arm band with a Nazi swastika on the front that had belonged to a member of the Nazi party. They were told that they could choose how to put the arm band on: over the top of the sleeve of their t-shirt with the swastika facing outwards or directly onto their arm underneath the sleeve of their t-shirt.

Scaled decision. After indicating their decision, participants were asked “How certain are you that you would make this choice?” and indicated their preference for from 0, “definitely not this way” to 6, “definitely this way”. They were then asked “How much did the following items affect your decision?” and completed the following dependent measures in a randomised order. All items were items rated on a 7-point scale ranging from 0, “not at all”, to 6, “a lot”.

Contagion. To measure the influence of contagion concern, which according to Rozin and colleagues can be by either a material or spiritual essence (e.g., Rozin, Haidt & McCauley, 2008), participants indicated their level of agreement with the statements “I did not want to get contaminated by touching it” and “The evil essence of the arm band could have passed into me”. There was a high correlation between these items ($r = .75$; Spearman-Brown Coefficient = .86), so they were combined into a composite *Contagion* measure.

Reputation. To measure the influence of reputational concerns, participants indicated their agreement with the statements “I would not want to seem like I support Nazis” and “I would not want to seem like I approve of what the Nazis did”. There was a high correlation between these items ($r = .90$; Spearman-Brown Coefficient = .95), so they were combined into a composite *Reputation* measure.

Convention and positive appeal. It was also expected that convention might influence participants’ decisions, so they were asked to indicate the importance of convention with the statement “This is the way armbands are supposed to be worn”. To check for the influence of the positive appeal of trying on a Nazi arm band, they indicated their agreement with the statement “I wanted to see how it felt to be like a Nazi”.

Manipulation check. To exclude any participants who didn’t think that the Nazis were immoral, they were asked “How immoral are the Nazis?” and to check that participants could in principle believe that an immoral essence had passed onto the arm band, participants were asked “How morally bad is the person who originally wore the arm band?” Although these items correlated only moderately, ($r = .30$; Spearman-Brown Coefficient = .46) they were combined to provide a single manipulation check measure.

Results

Two participants were excluded from analysis because they did not agree with the basic premise that Nazis were immoral; that is, they indicated below the scale midpoint on the rating of Nazi immorality. The mean immorality rating for the remaining participants was 5.39 ($SD = 0.76$) on the zero to six point scale. Where data violated sphericity, adjusted values are reported.

Binary choice. As can be seen from Figure 1, significantly more participants (61) chose to wear the arm band underneath their t-shirt sleeve, so that it was against their skin but hidden, than chose to wear it on top of their sleeve so that it was visible (39), $\chi^2(1, N = 100) = 4.42, p = .036$, Cohen's $w = .21$. Thus, as predicted, participants had a clear preference for wearing the Nazi arm band so that it was not visible, even though it would bring the immoral object into direct contact with their skin, suggesting that participants were more strongly motivated by reputational concerns than by contamination concerns.

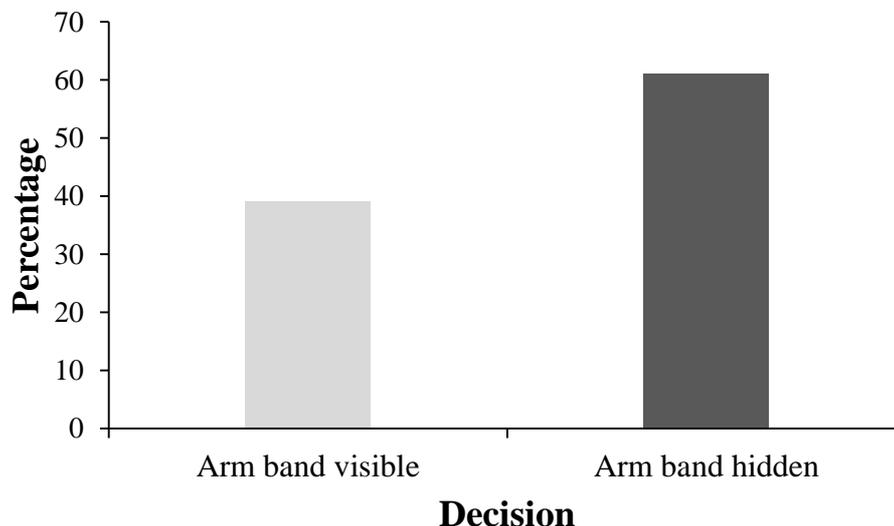


Figure 1. Participants' decisions about to wear the Nazi arm band, Study 1.

Scaled decision. Participants reported that they would prefer to wear the arm band underneath their t-shirt sleeve ($M = 4.37, SD = 2.18, 95\% \text{ C.I.} = 3.94 \text{ to } 4.80$),

compared on top of their t-shirt sleeve ($M = 1.95$, $SD = 2.40$, 95% C.I. = 1.47 to 2.43). A paired samples t-test indicated that this difference was significant, $t(99) = 5.50$, $p < .001$, $d = 1.93$.

Reasons for choices made. A mixed ANOVA with Reason (4 levels) as a within-subjects variable and Choice (2 levels: under vs. over t-shirt sleeve) as a between subjects variable, was conducted to assess how important each reason was for participants who indicated that they would wear the arm band under their t-shirt, compared who to those who chose to wear it on top. There was a significant main effect of Reason, $F(3, 241.38) = 99.17$, $p < .001$, $\eta_p^2 = .51$, but not of Choice, $F(1, 96) = 3.32$, $p = .07$, $\eta_p^2 = .03$. There was a significant interaction between Choice made and Reason given, $F(3, 241.38) = 26.49$, $p < .001$, $\eta_p^2 = .22$. Mean importance ratings for each Reason by the Choice made are shown in Figure 2.

Analysis of simple effects revealed that participants who chose to wear the arm band underneath their t-shirt sleeve rated reputation as a more important reason, $F(1, 96) = 22.21$, $p < .001$, $\eta_p^2 = .19$, than did participants who chose to wear the arm band on top of the sleeve so that it was visible. Notably, those who chose to wear the arm band visibly did not rate Contagion as any more important to their choice than did participants who wore it hidden, $F(1, 96) = 0.03$, $p = .86$, $\eta_p^2 = .00$. But participants who wore it over the t-shirt sleeve rated convention, $F(1, 96) = 36.17$, $p < .001$, $\eta_p^2 = .27$, and positive appeal, $F(1, 96) = 8.30$, $p = .005$, $\eta_p^2 = .08$, as more important to their decision than did participants who chose to wear the arm band under the t-shirt sleeve.

Overall participants rated contagion close to the bottom of the scale, suggesting that it had little influence on their behavior when interacting with the morally disgusting object. In fact, 60 of the 100 participants rated “I did not want to

get contaminated by touching it” as 0, “not at all” important as a reason for their decision, while 71 rated “the evil essence of the arm band could have passed into me” as 0, “not at all” important as a reason for their decision.

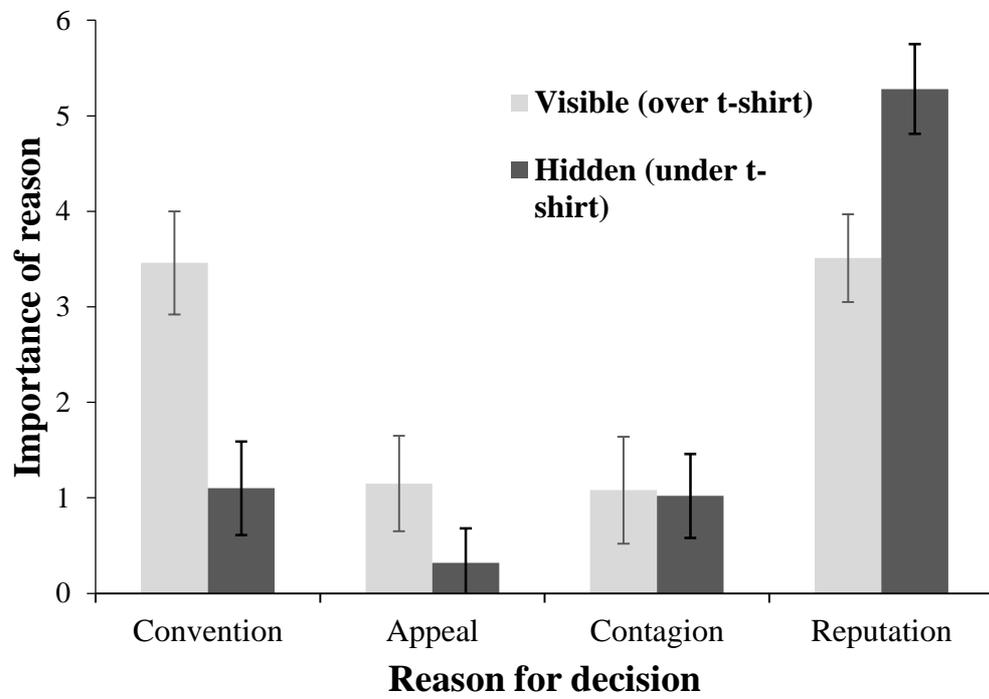


Figure 2. Reasons given by participants for their choices in Study 1. Error bars represent 95% confidence intervals.

Discussion

Findings were more consistent with the idea that people recognize that displaying their association with an immoral object may be seen as endorsement, thereby harming their reputation, so the avoid visible association with it. Nevertheless, a substantial minority (39%) chose to wear the armband visibly on top of their t-shirt. These participants did not seem to do so because of contamination concern, which they rated to be of minimal importance to their decision. Instead, they reported being somewhat less concerned about reputation and agreed more that they

were following convention (“This is the way armbands are supposed to be worn”). It may be that in the absence of strong reputation concerns, participants habitually decided to put the armband on in a conventional manner. One limitation of this study is that because it was conducted using a hypothetical scenario, it could be argued that moral contagion concerns were not as salient as they would be in a more ecologically valid situation, or in real life. Study 2 aimed to address this criticism by replicating the experiment in a lab with a real Nazi armband. Another potential criticism is that contagion concerns could have been revealed if they hadn’t been disguised by stronger reputation management concerns due to the presence of an audience (the experimenter). Study 2 addressed this limitation by including private and audience conditions.

2.2 Study 2

To replicate the findings from Study 1 using actual behavior, a lab experiment was designed using a real Nazi armband. Participants wore a sleeveless shirt and a jacket and chose to put the arm band either over the sleeve of the jacket (low contamination potential but visible) or underneath the jacket directly on their arm (high contamination potential but hidden). The experiment also included audience and private conditions. Based on the reputation management account, we predicted that participants would predominantly wear the armband underneath the jacket in the audience condition and would report doing so because they were motivated by reputational concerns, not by contamination concerns. In the private condition, reputation concerns would be less salient, so we predicted that participants would be more likely to wear the arm band on top of the jacket, but that they would still not necessarily report doing so because of contamination concerns.

Method

Participants.

Based on small to medium effect size ($\eta_p^2 = 0.10$), expected for interaction effects, a power analysis using GPower 3.1.9.2., recommended a sample size of 84 at 95% power. This was increased by 10% to allow for incomplete responses and exclusions based on the manipulation check question. Ninety (15 male) student participants ($M_{\text{age}} = 19.61$, $SD = 3.00$) gained course credit for participating in the experiment advertised as “a study into attitudes towards wearing historical clothing”. Before signing up, participants were told that they would need to wear (or bring) a sleeveless shirt. Participants were warned that the experiment might include some unpleasant (Nazi) material.

Materials and Procedure.

A real Nazi armband was obtained from an online war memorabilia store and it was placed in a wooden presentation box. The ostensibly ‘historical’ jacket was a brown corduroy second hand item obtained from a charity shop. New plain white sleeveless shirts were obtained from an online store for use by any participants who forgot to follow the instructions to wear a sleeveless shirt to the experiment.

On arriving at the lab, participants were shown to the private experimental cubicle and were told to read through the instructions on the computer. The experimenter pointed out the two items of historical clothing: one was hanging on the door (the jacket) and the other inside a box by the computer (the Nazi armband). To emphasize the privacy of the cubicle, the participant was told that they could lock the cubicle door (from the inside) during the experiment. The instructions told participants that two historical artefacts had been borrowed from the history department at the university. To make clear that the arm band could in principle be

contaminated by an immoral essence, participants were told that it had been worn by a member of the S.A. branch of the Nazi party. In the audience condition, participants were informed that once they had put the items of clothing on, they would be leaving the cubicle to walk to the experimenter's desk in the lab.

Participants were informed that they could choose how to put the jacket and armband on, since it would not affect the experiment. They could either put the armband on their arm and then put the jacket on over the top, or put the jacket on first and then put the armband on over the top of the jacket. After making their choice and putting the items on, they were given different instructions in the audience and private conditions. In the private condition, they were told to click a button to proceed to the questions about how they felt wearing the items (described below). In the audience condition, they were instructed to exit the cubicle and go to the experimenter to be given further instructions. Upon leaving the cubicle, the experimenter directed the participant to another cubicle where they answered the questions on a different computer.

Dependent measures. Participants were first asked to indicate how they had decided to wear the arm band and chose from “over the jacket” or “underneath the jacket”. Next, they rated the importance of reasons for their decision using the same items as in Study 1. In the current study, the Contagion items correlated adequately ($r = .59$ and $r = .63$, in audience and private conditions, respectively), so they were combined into a composite *Contagion* measure. The reputation items also correlated adequately ($r = .67$ and $r = .59$, in audience and private conditions, respectively), so they were combined into a composite *Reputation* measure.

Participants answered the same manipulation check questions as in Study 1 to ensure that they perceived the original wearer to be immoral. In addition, to confirm

that participants found the stimulus to be not only immoral, but morally disgusting, they were asked “How disgusting are the Nazis?” and “How disgusting is the arm band and swastika?” and rated their agreement from 0, “not at all” to 6, “extremely”.

Results

Four participants were excluded from analysis because they did not score above the midpoint on the items assessing immorality and disgust. The mean rating across the manipulation check questions for the remaining participants was 5.36 ($SD = 0.73$) on the zero to six point scale, showing that moral disgust was successfully elicited.

Binary choice. A chi squared test of independence revealed a relationship between condition (private vs. audience) and choice of how the arm band was worn (over vs. under the jacket), $\chi^2(1, N = 85) = 11.93, p < .001$, Cohen’s $w = .37$. As shown in Figure 3, in the private condition, participants chose to wear the arm band over the jacket significantly more frequently than under, $\chi^2(1, n = 42) = 13.71, p < .001$, Cohen’s $w = .57$, but participants in the audience condition chose to wear the armband under the more frequently than over the jacket but this difference was not significant, $\chi^2(1, n = 43) = 1.13, p = .29$, Cohen’s $w = .16$. Thus, as predicted, participants in the audience condition were more likely to wear the arm-band under their jacket than participants in the private condition. This suggests that concerns about reputation had an important influence on behavior.

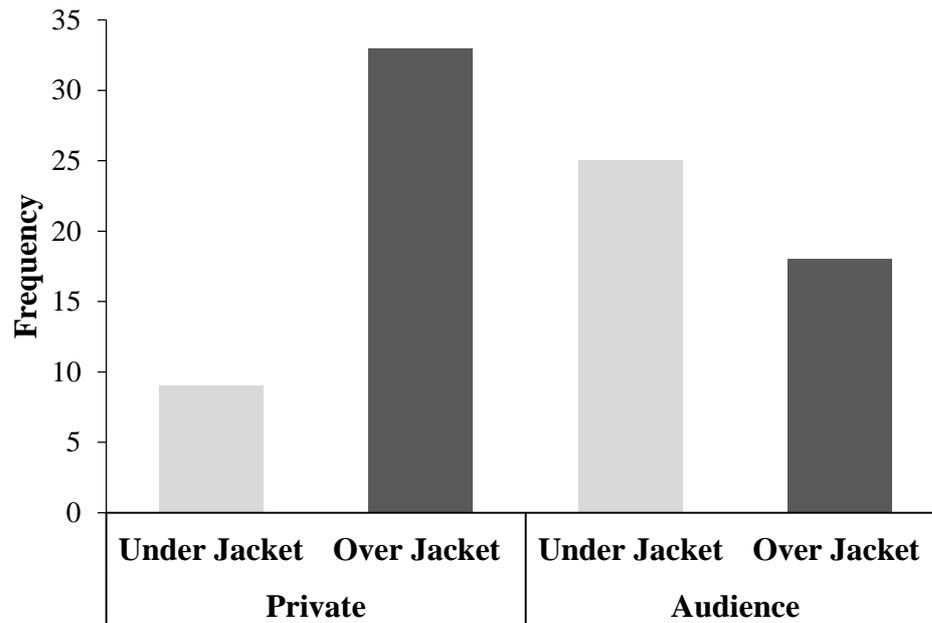


Figure 3. How participants chose to wear the Nazi arm band, Study 2.

Reasons for choice made. A mixed ANOVA with importance of reason (4 levels) as a within-subjects variable and condition (audience vs. private) and choice (under vs. over jacket) as between subjects variables, revealed significant main effects of reason, $F(3, 243) = 46.10, p < .001, \eta_p^2 = .36$, and choice, $F(1, 81) = 30.92, p < .001, \eta_p^2 = .28$, but no main effect of condition, $F(1, 81) = 0.00, p = .97, \eta_p^2 = .00$. There was no significant interaction effect between condition and choice, $F(1, 81) = 1.09, p = .30, \eta_p^2 = .01$, nor between condition and reason, $F(3, 243) = 0.96, p = .41, \eta_p^2 = .01$, nor a significant three way interaction, $F(3, 243) = 0.60, p = .62, \eta_p^2 = .01$.

Mean ratings for each reason are shown Figure 4, for participants who chose to wear the arm band over the jacket versus under the jacket, collapsed across private and audience conditions. Paired t-tests were conducted using a Bonferroni corrected p value of .00625 to compare the importance of the four reasons within choice.

Participants who chose to wear the arm band over the jacket rated contagion as a significantly less important reason for their decision than convention, $t(50) = 5.28, p <$

.001, $d = 1.78$. Contagion was also less important than reputation, $t(50) = 6.30, p < .001, d = 1.78$, and of similar importance to appeal, $t(50) = 1.00, p < .001, d = 0.28$. Reputation was rated as a more important reason than appeal, $t(50) = 6.59, p < .001, d = 1.86$, and of similar importance to convention, $t(50) = 0.09, p = .93, d = 0.01$, which was also more important than appeal, $t(50) = 7.44, p < .001, d = 1.78$.

Participants who chose to wear the arm band underneath the jacket rated reputation as a more important reason than contagion, $t(33) = 11.86, p < .001, d = 4.13$, appeal, $t(33) = 10.72, p < .001, d = 3.73$, or convention, $t(33) = 9.10, p < .001, d = 3.17$. Contagion was reported to be of similar importance to appeal, $t(33) = 0.99, p = .33, d = 0.34$, and convention, $t(33) = 0.41, p = .68, d = 0.14$. Appeal was rated similarly to convention, $t(33) = 0.84, p = .51, d = 0.29$.

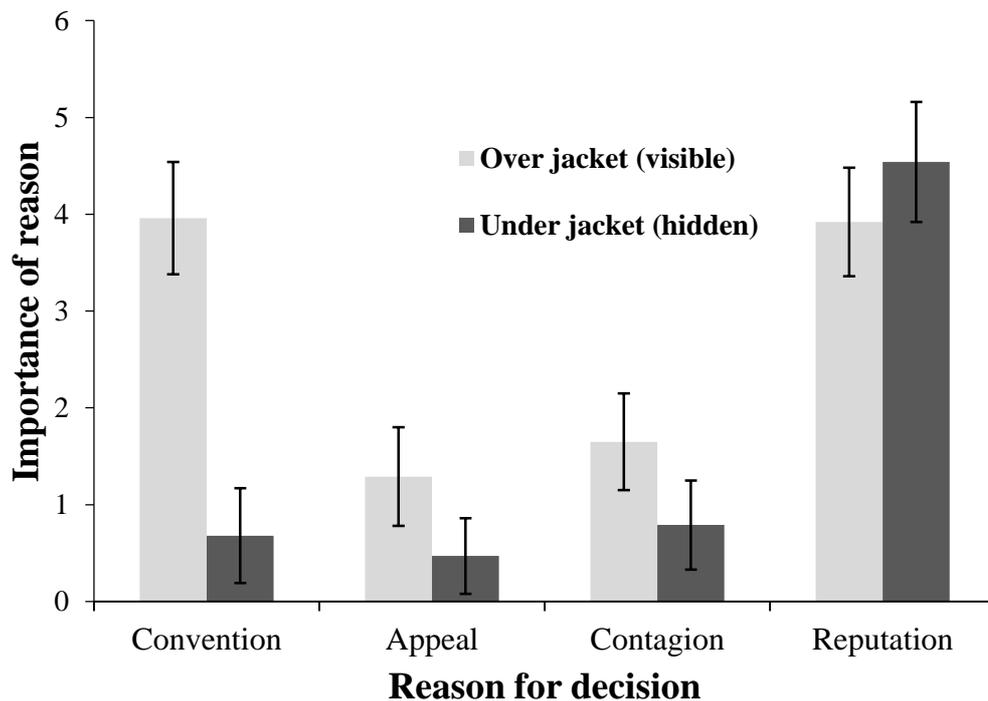


Figure 4. Reasons given by participants for their choices in Study 2, collapsed across private and audience conditions. Error bars represent 95% confidence intervals.

Discussion

The Nazi armband was rated as highly immoral and disgusting, yet contagion was of little importance to participants, even to those who decided against putting the armband directly on their skin, and even if they wore the Nazi armband in private. Remarkably, contagion concern was of no more importance to participants than the positive appeal of feeling like a Nazi. Instead, participants reported that reputation concern was most important to the decision to hide the armband, and following convention was also important to the decision of those who wore it visibly.

As predicted by the reputation management account, the presence of an audience considerably increased the proportion of participants who chose to wear the armband underneath the jacket so that it was not on display. In contrast, most participants in the private condition chose to wear the armband on top of the jacket. This finding might at first seem like it supports the idea that when in private they do not want to make skin contact with the disgusting object, perhaps because they do perceive it as contaminating. However the reported reasons dispute this interpretation because very little contagion concern was reported. Instead, convention was rated as highly important. When in private reputation concerns were probably not sufficient for most participants to overcome the convention of wearing the armband in a traditional way. In addition a limitation to the design of the study was that it was easier to put the jacket on first and then the armband on top, because the jacket then held the armband in place, whereas putting the armband on first around the bare arm required holding it in place while putting the jacket on. It may simply have been harder to put the armband on under the jacket, so the cost was only worth paying when there was sufficient reputation concern in the audience condition.

Another limitation was that, as in Study 1, a substantial minority of participants in the audience condition still chose to wear the armband on top of the jacket and the number was not significantly different from the number who wore it underneath. This may have been because the presence of the audience did not have a strong enough effect on participants' reputation concern. In the original study (Rozin et al., 1999) participants were also asked to wear the Nazi armband in front of the experimenter, but there was also a "conspicuously positioned" video camera present in the lab. Had this been included in the current study, fewer participants might have worn the armband visibly. Furthermore, the participants were all psychology undergraduates who are used to taking part in psychology experiments in the lab, so they are likely to be more conformable in those conditions compared to members of the general public. If a similar experiment was conducted with participants who were not students, audience effects may have been stronger. In addition, participants knew that the audience (the experimenter) was aware of the situation and of the requirement to wear an armband, so they might reasonably have expected the experimenter not to judge them as immoral even if they wore it on display. Had an audience been present who were unaware of the experimental conditions, participants might have been more concerned about displaying the armband. Another possibility is that there were individual differences in dispositional tendencies to worry about reputation, which might have influenced the decision about how to wear the armband.

2.3 Study 3

Study 3 measured third-party judgements of people who had worn the Nazi armband under versus over their clothing, to investigate whether the reputation concerns revealed in Studies 1 and 2 could serve to prevent harm to moral reputation.

If third party observers judged a person who wore the Nazi armband visibly more negatively than a person who wore it hidden (but against their skin), this would demonstrate that participants were making a decision that functions to preserve moral reputation, whereas if third parties judged a person who wore the armband directly against their skin as more immoral, this might indicate that immorality is intuitively believed to transfer contagiously by contact, as suggested by previous researchers (e.g., Nemeroff & Rozin, 2000). Although being seen to abhor physical contact could also be a reputation management tactic, it would be different in kind from being seen to care about the appearance of supporting Nazism. This study investigated third party perceptions of the morality of the two decisions and also third party perceptions of whether immorality could have transferred from the Nazi armband to the participant in each condition.

Method

Participants.

Based on a medium effect size ($d = 0.50$), a power analysis using GPower 3.1.9.2. recommended a sample size of 315 at 95% power. MTurk was used to recruit 332 (186 male) participants from the United States ($M_{\text{age}} = 36.93$, $SD_{\text{age}} = 11.41$).

Materials and procedure.

Participants were told that they would be making judgements about a person who had ostensibly taken part in an investigation into “attitudes towards wearing historical clothing”. Participants were given same details as given in Study 1, but from a third-person perspective. In a between-subjects design, participants were told that the target had chosen either to wear the Nazi armband on top of his shirt sleeve, so that it was not touching his skin but visible, or had worn it underneath his shirt sleeve, so that it was touching his skin but not visible. In a third condition, the target

chose to put the arm band underneath his shirt sleeve, so that it was not visible, but it was not touching his skin because he had a t-shirt on underneath his shirt. This condition was included for comparison with the underneath shirt against skin condition, so that the influence of contact with the arm band could be tested while keeping the target's decision to hide the arm band constant.

Dependent measures. First participants were asked to make a binary judgement as to whether the target had made the more moral choice, indicating either “yes” or “no”. Next, participants were asked to rate how likable, immoral, disgusting and morally contaminated the target was using a 7-point scale ranging from 0, “not at all” to 6, “extremely”. Participants also indicated how likely the target was to have “sympathy for the Nazis”, to “approve of the Nazis”, to be “contaminated by the evil essence of the arm band”, to be “morally contaminated by a substance from the arm band” and to be “tainted by the armband”. These items were also rated on a 7-point scale ranging from 0, “not at all” to 6, “extremely”. Participants answered the same manipulation check questions as in Study 2 relating to immorality of the Nazis.

Results

Five participants were excluded from analysis for failing the attention check question and seventeen were excluded because they did not score above the midpoint on the manipulation check items assessing immorality and disgust towards the Nazis. The mean rating across the manipulation check questions for the remaining participants was 5.52 ($SD = 0.73$) on the zero to six point scale.

Binary moral judgement. A chi squared test of independence revealed a relationship between condition and moral judgement, $\chi^2(1, N = 310) = 126.02, p < .001$, Cohen's $w = .64$. When the target was described as choosing to wear the arm band visibly, participants judged that he had made the less moral choice (71 vs. 34),

$\chi^2(1, n = 103) = 12.34, p < .001$, Cohen's $w = .35$. The target who chose to wear the arm band hidden was judged to have made the moral choice, whether this led the armband to touch his skin (100 vs 7), $\chi^2(1, n = 107) = 79.1, p < .001$, Cohen's $w = .86$, or not (90 vs. 8), $\chi^2(1, n = 98) = 66.94, p < .001$, Cohen's $w = .83$. Judgements in these two conditions were not significantly different, $\chi^2(1, n = 205) = 0.20, p = .66$, Cohen's $w = .03$, indicating that, inconsistent with a "law of contagion" account, participants did not perceive direct contact with the Nazi armband to have any bearing on immorality when display was held constant.

Scaled judgements. A MANOVA was conducted to investigate the effect of condition (visible vs. hidden touch vs. hidden no touch) on judgements of how immoral, disgusting and morally contaminated the target was. There was a significant effect of condition on immoral, $F(2, 307) = 33.69, p < .001, \eta_p^2 = .25$, disgusting, $F(2, 307) = 39.41, p < .001, \eta_p^2 = .20$, morally contaminated, $F(2, 307) = 24.25, p < .001, \eta_p^2 = .14$, and likeable, $F(2, 307) = 52.05, p < .001, \eta_p^2 = .25$.

Post-hoc Sidak tests revealed no significant difference between the hidden touch and hidden no touch conditions, for how likable the target was rated $p = .99, d = 0.05$, nor how disgusting, $p = .92, d = 0.12$, or morally contaminated, $p = .91, d = 0.11$. Immoral ratings differed marginally between conditions, $p = .08, d = 0.36$. However, as seen from the descriptive statistics shown in Table 1, when the armband was hidden it was the no touch condition in which the target was judged as more immoral (and just about as disgusting) than the touch condition, suggesting that contact with the morally disgusting armband was not perceived by participants to transfer immorality. Another finding was notably inconsistent with the contagion account: ratings of the target as morally contaminated were no higher in the touch condition than in the no touch conditions.

The target was rated as significantly less likable in the visible no touch condition compared to the hidden touch $p < .001$, $d = 1.24$, and hidden no touch conditions, $p < .001$, $d = 1.14$. The target was judged more disgusting in the visible no touch condition than the hidden touch, $p < .001$, $d = 1.00$, or hidden no touch conditions, $p < .001$, $d = 0.91$. The target was also rated as more immoral in the visible no touch condition than the hidden touch, $p < .001$, $d = 1.12$, or hidden no touch conditions, $p < .001$, $d = 0.69$. And perhaps most remarkably, the target was rated as more morally contaminated in the visible no touch condition than the hidden touch, $p < .001$, $d = 0.83$, or hidden no touch conditions, $p < .001$, $d = 0.72$.

Contagion and Affiliation. The essence and substance items measuring how contaminated the target was perceived to be correlated well ($r = .87$) so they were combined into a composite *Contaminated* measure. The sympathy and approval items also correlated well ($r = .88$), so they were combined into a composite *Affiliation* measure. A MANOVA showed that condition (visible vs. hidden touch vs. hidden no touch) had a significant effect on how much the target was perceived to affiliate with the Nazis, $F(2, 307) = 34.79$, $p < .001$, $\eta_p^2 = .19$, how contaminated by an essence or substance the target was perceived to be, $F(2, 307) = 10.22$, $p < .001$, $\eta_p^2 = .06$, and how tainted the target was perceived to be, $F(2, 307) = 14.58$, $p < .001$, $\eta_p^2 = .09$. Post-hoc Sidak tests revealed that there was no significant difference between how much the target was perceived to affiliate with the Nazis in the hidden touch and hidden no touch conditions, $p = .60$, $d = 0.23$, nor how contaminated, $p = .68$, $d = 0.18$, or tainted, $p = .58$, $d = 0.21$ the target was perceived to be.

Table 1. Participants' judgements of the target in Study 3.

	Visible no touch (<i>n</i> = 105)		Hidden touch (<i>n</i> = 107)		Hidden no touch (<i>n</i> = 98)	
	<i>M</i> (<i>SD</i>)	95% CIs	<i>M</i> (<i>SD</i>)	95% CIs	<i>M</i> (<i>SD</i>)	95% CIs
Disgusting	1.76 (1.72)	[1.43,2.09]	0.41 (0.88)	[0.24,0.58]	0.51 (0.86)	[0.34,0.68]
Immoral	1.95 (1.65)	[1.63,2.27]	0.50 (0.84)	[0.33,0.66]	0.91 (1.38)	[0.63,1.18]
Morally Contaminated	1.99 (1.86)	[1.63,2.35]	0.70 (1.19)	[0.47,0.93]	0.83 (1.29)	[0.57,1.08]
Likable	2.55 (1.45)	[2.27,2.83]	4.16 (1.14)	[3.94,4.38]	4.10 (1.26)	[3.85,4.36]
Affiliation with Nazis	1.48 (1.69)	[1.15,1.81]	0.23 (0.69)	[0.10,1.10]	0.41 (0.88)	[0.24,0.59]
Contagion by essence/substance	0.91 (1.47)	[1.63,2.20]	0.27 (0.72)	[0.13,0.40]	0.42 (0.92)	[0.23,0.60]
Tainted	1.14 (1.61)	[0.83,1.45]	0.30 (0.78)	[0.15,0.45]	0.49 (1.02)	[0.29,0.69]

Post-hoc Sidak tests revealed that there was no significant difference between how much the target was perceived to affiliate with the Nazis in the hidden touch and hidden no touch conditions, $p = .60$, $d = 0.23$, nor how contaminated, $p = .68$, $d = 0.18$, or tainted, $p = .58$, $d = 0.21$ the target was perceived to be. However, in the visible no touch condition, the target was perceived to affiliate more with the Nazis than in the hidden touch, $p < .001$, $d = 0.98$, or hidden no touch conditions, $p < .001$, $d = 0.79$. Remarkably, in the visible no touch condition, the target was perceived to be significantly *more* contaminated than in the hidden touch, $p < .001$, $d = 0.56$, or hidden no touch conditions, $p < .001$, $d = 0.40$. This finding is the opposite to that predicted by the “law of contagion”. Instead, to the (limited) extent that participants

regarded the morally disgusting stimulus as contaminating, they may have understood contamination concepts metaphorically to mean that the target's character or reputation was harmed. For example, the target was also perceived to be significantly more *tainted* in the visible no touch condition than in the hidden touch, $p < .001$, $d = 0.67$, or hidden no touch conditions, $p < .001$, $d = 0.48$. And, there were high correlations among measures of perceived taint, contamination and affiliation.

Discussion

Findings were inconsistent with the idea that people intuitively believe that another person who makes contact with an immoral stimulus becomes immoral via the transfer of a physical or spiritual essence. Rather, third parties judge that a person who chooses to visibly display and immoral object is more of an immoral person than a person who chooses to conceal it, even if that leads them to make direct skin contact with the immoral object. Furthermore, third parties did not judge the targets who chose to wear the armband visibly as more contaminated than those who made skin contact with it. This strongly suggests that people do not think that immorality can be transferred by contact, or that people can become immoral by touching something immoral. Rather, third parties think that a person who chose to display an immoral object is more contaminated, suggesting that, to the limited extent that they endorsed this term at all, they understood the concept to mean that the individual's moral character or reputation is questionable due to their behaviour. The finding that targets who displayed the armband were also judged as more "tainted" than those who touched it, is also consistent with this interpretation.

One interesting finding from this study was that ratings were quite low. Even for the targets who wore the armband on display, third parties did not judge them above the midpoint on any of the negative dependent measures, despite the Nazi

armband being rated at close to the scale maximum on ratings of disgust and immorality. In itself, this suggests that little of the disgust and immorality was transferred. Even targets who chose to display the armband seem to have been judged charitably and presumably were not thought to be strongly identifying with Nazis. This may in part have been because third parties knew that the targets were wearing the armband for the purposes of an experiment. This contrasts with findings from the first two studies, especially Study 1 which used participants individuals from a similar sample (MTurk), in which participants rated reputation concerns well above the midpoint (“I would not want to seem like I support Nazis”). This might indicate that people are overcautious when thinking about reputational consequences of their actions, relative to the inferences that observers actually make. This is what one would expect from an error management point of view, in which threat detection mechanisms should be designed to be hypervigilant to avoid the high cost of failing to detect a threat, even at the expense of making (less costly) false alarms (Haselton & Nettle, 2006; Nesse, 2002; Neuberg, Kenrick & Schaller, 2011). In other words, reputation management mechanisms may operate on a ‘better safe than sorry’ principle, because the consequences of losing one’s reputation can be high, including potential exclusion from cooperative activities (Kurzban & Leary, 2001).

2.4 General Discussion

Results were inconsistent with the idea that people intuitively believe that immoral stimuli are contagious, whether by a physical or spiritual essence (e.g., Nemeroff & Rozin, 2000). This was shown by participants’ choices because overall, they preferred to wear the armband hidden, even though this brought it into contact with their skin. In addition, there was very low self-reported importance of contagion

to decisions in all studies. Furthermore, third parties judged that concealed, immoral objects that touched the skin were, if anything, less contaminating, and disgusting than concealed immoral objects that did not touch the skin (Study 3). Behavior and reported motives were much more consistent with our alternative account that people are motivated to avoid immoral stimuli because they are concerned about being *seen* to associate with them.

2.4.1 Implications for moral contagion. If people do not intuit that essences are transferred from immoral objects to other surfaces, then why do people refer to immorality as contagious or contaminating? Despite having disparate motivational origins, reputational concerns are superficially like contamination concerns in some ways. Both motivate avoidance of certain objects and people – immoral stimuli are treated *as if* they are contagious. Like physical contamination, reputation management intuitions are sensitively tuned to manage the risk of seeming immoral – like a clean surface, one’s reputation can be easily ‘tarnished’, ‘tainted’ or ‘contaminated’. Due to these analogies, concrete concepts of pathogen avoidance are well suited to elaborate on intuitions about reputation management.

This account of the folk use of disease concepts like contamination and contagion is consistent with Baumard and Boyer’s (2013) dual process account of religious beliefs. They argue that a variety of evolved domain-specific systems provide stable intuitions, whereas other systems produce explicit, often deliberate, elaborations on those intuitions. For example, they suggest that all people have pathogen-avoidance psychological mechanisms that provide the intuition that people can make you ill by contact, but this mechanism does not provide detailed information about vectors or modes of transmission. This means that reflective representations are developed to elaborate on the transmission of disease, and because

the vectors of disease are invisible, cultures develop a variety of beliefs to elaborate on contagion intuitions, such as bad air, evil spirits, germ theory, or witchcraft (Boyer & Lienard, 2006; Legare & Gelman, 2008).

Even in western populations, children's intuition that people can transfer sickness is reflectively elaborated in various ways prior to learning about germ theory in school. Children intuit that contact with unpleasant objects like insects and dog saliva could cause sickness due to the transfer of something invisible but when they are asked to explain how, they refer to a variety of transfer mechanisms, including poisons, colours, "doggy slime", dirt, and little animals (Legare, Wellman & Gelman, 2009). The widespread children's game of "cooties" may be also an example of a simple reflective elaboration on the intuition that people can make you sick by contact (Morin, 2008; Samuelson, 1980). Explicit reflective elaboration can also lead people to extend their intuitions of contagion from physically disgusting objects to other domains (Boyer, 2001). For example, people in many cultures want to touch sacred items, such as statue of a saint, and avoid contact with evil items (Shweder, et al., 1997). The intuition that sickness can be transferred between people may expand into a variety of beliefs about contact, such as the totemic belief that the characteristics of animals are transferred when they are eaten, or that immorality or evilness can be transferred by contact with immoral people or objects (Boyer, 2001). However, contrary to claims that this is a universal intuition (e.g., Nemeroff & Rozin, 2000) they depend on reflective elaborations which are culturally and individually variable.

The argument presented in this thesis is that intuitions of reputation threat are universal and that they motivate aversion and avoidance behaviour that can appear similar to a pathogen avoidance response. Reflective elaborations on aversion towards immoral stimuli (e.g., a Nazi armband) may or may not come to the conclusion that

feelings are due a concern for reputation. In the current experiments, when participants were asked to reflect on their reasons for deciding to wear the armband in a particular way, they most strongly endorsed items like “I would not want to seem like I support Nazis”, suggesting that they do have insight into their reputation management intuitions. It is possible, however, that in other circumstances, individuals or cultures would elaborate on intuitive feelings of aversion towards immoral people and objects by describing them as contaminating or contagious. But this would not necessarily mean that they would behave exactly as if they are contagious: they might avoid proximity or contact with the immoral stimulus but if they did contact it (or saw someone else contact it, as in Study 3), they might not conclude that they (or a third party) were now contaminated by immorality, in the sense of an immoral substance being on the skin which needs to be removed before the person is infected with immorality. But this is what is claimed by the moral cleansing literature (e.g., Zhong & Liljenquist 2006). Problems with this literature are discussed in the general discussion of Chapter 4.

Furthermore, if people do reflectively elaborate on reputation management intuitions with pathogen avoidance language like contamination, they may be using the term metaphorically, rather than using it to accurately convey their beliefs. This interpretation is supported by Study 3 which found that participants rated targets who displayed the armband as *more* contaminated than targets who made skin contact with the armband. Similar results were found for ratings of how “tainted” targets were, suggesting that any label that denotes a person to have a morally suspect character can be used, even if it has no relevance to disease avoidance.

This account suggests an avenue for future research into forms of obsessive-compulsive disorder characterized by obsessions about being sinful, immoral, or the

target of punishment (Greenberg & Huppert, 2010). Although often described as involving feelings of mental contamination or pollution (Rachman, 1994), these concrete terms might in some cases reflect concerns about moral reputation. Importantly, the costs of potential reputation loss will not be the same for everyone. For example, some people may already be vulnerable to social exclusion due to other stigmatizing features, or may be weaker and more socially dependent than others. An interesting direction for future research would be to measure individual differences in reputation concerns and see how they impact behaviour. Particularly strong concerns about certain threats are often associated with anxiety disorders, for example, people who feel very vulnerable to disease may develop contamination OCD (Stein & Nesse, 2011). People who have particularly strong concerns about reputation loss might develop a disordered level of anxiety, which could manifest as obsessive thoughts about the immorality of their behaviour, or excessive vigilance about the possibility that other people are judging them. Although some forms of scrupulosity disorder (Miller & Hedges, 2010) and OCD with mental contamination (Herba & Rachman, 2007) have been argued to relate to excessive disgust sensitivity and contamination concerns (e.g., Berle & Philps, 2006), the current perspective suggests that these links might instead be explained by the presence of excessive reputational concerns.

2.4.2 Implications for moral disgust. In addition to challenging “law of contagion” ideas about intuitive belief in the transfer of essences, findings challenge the predominant view of moral disgust as originating in the appraisal of a stimulus as contaminating (Chapman & Anderson, 2013; Graham, Haidt, & Nosek, 2009; Horberg, et al., 2009; Rozin et al., 2008). Across three studies participants reported strong disgust towards Nazis, yet there was little or no evidence that they appraised them as contaminating. In previous findings that have been taken to show that

immoral objects are perceived as contaminating (e.g., Rozin et al., 1999), participants may instead have been motivated by reputational concerns.

Other evidence supports this deflationary view of moral disgust. Royzman, et al. (2008) found that participants reported high levels of disgust towards Hitler, yet this was unrelated to prototypical disgust feelings like nausea, gagging or diminished appetite, measured using their *Oral Inhibition* index. Similarly Royzman, et al., (2014) found that people did not report experiencing nausea, gagging or diminished appetite towards moral violation scenarios, if those scenarios did not contain cues to pathogens. Nabi (2002) found that although participants frequently report disgust towards moral violations, they will usually stop short of agreeing that they are “grossed out”, a term they reserve for physically disgusting experiences.

If moral disgust lacks key components of disgust like contamination appraisals and feelings of nausea, then it is questionable whether endorsement of the word “disgust” or even display the facial expression of disgust, towards moral violations can be taken as evidence that people experience the *emotion* disgust. Emotions can be distinguished by the presence or absence of a number of different components, including characteristic physiological responses, action tendencies and subjective feeling states (Roseman, Wiest & Swartz, 1994; Scherer, 2009), so if moral disgust lacks the key components of disgust, it should not be assumed to be the same emotion, even if it bears the same name. Folk emotion terms were not designed to provide emotion scientists with categories that accurately assign experiences to discrete natural kinds, so it should not be surprising if some folk emotion terms conflate distinct affective experiences (Scarantino & Griffiths, 2011).

Instead, we should take seriously more conservative views, like the idea that moral disgust is merely be reported as a metaphor for anger (Nabi, 2002; Royzman &

Kurzban, 2011), or as argued here in the introduction and tested in the next chapter, that it communicates a more impartial, moral form of condemnation. Others argue that evidence showing that the facial expression of disgust is produced in response to moral violations tells us that disgust really is felt and it is not just a synonym for anger (Cannon et al., 2011; Chapman et al., 2009). However, as discussed in the introduction, this argument depends on the assumption that facial expressions are automatically and necessarily tied to emotional experiences (e.g., Ekman, Sorenson & Friesen, 1969). However, facial expressions do not always index emotions: like words, expressions can be deployed for communicative reasons, even when the underlying emotion is not experienced (Fridlund, 1994; Royzman & Kurzban, 2011b). This perspective argues for consideration of impression management and communicative motives behind expressions of emotion, before taking them as reflections of internal feelings states.

2.4.3 Limitations. One limitation is that only one immoral stimulus was used (a Nazi armband). Although this was used because Nazis are known to elicit strong moral disgust in Western populations (Rozin et al. 2008), we cannot be certain that findings generalize to other stimuli, or to other populations. The findings would not be expected to replicate exactly with populations who do not recognize the Nazi swastika symbol, or who do not associate the Nazis so strongly with immorality. For instance, "We're Aryans too," and "I like Nazi" are said to be common greetings to German tourists in India and Pakistan (Kazim, 2010). Other stimuli that have been used in moral contagion experiments include a Nazi officer's hat (Rozin, et al. 1999), a murderer's sweater, bed, and car (Rozin et al., 1994), a liar's hand and a thief's chair (Eskine et al., 2013). These stimuli do not all lend themselves to precisely the

same methodology used here, nor is association likely to produce equal reputation threat.

A murderer's sweater, for example, does not present any observable symbol that would identify it as immoral, so any discomfort over wearing it would be less attributable to concerns about been seen to endorse murder, but participants reported almost as much reluctance to wear a sweater previously worn by a murderer as by a person with AIDS or tuberculosis (Rozin et al., 1994). However, this does not necessarily show that *morality* is contagious. Although these participants were filling out an anonymous questionnaire, they knew that they would return the questionnaire to the experimenter, so the presence of cues to an imagined audience (Hoffman, McCabe and Smith, 1996) or implicit audience (Fridlund, 1994) cannot be ruled out. Even if contagion concerns motivated reluctance to wear the jumper, it would not necessarily be *moral* contagion because the design does not rule out physical contagion. Source effects have shown that outgroup members, foreigners or strangers are perceived to be more potent sources of germs, and elicit stronger disgust and avoidance (Peng, Chang & Zhou, 2013; Stevenson & Repacholi, 2005; Reicher, Templeton, Neville, Ferrari & Drury, 2016). To distinguish these effects, participants' contagion and reputation concerns would have to be measured and whether they felt more immoral after wearing the jumper (to see if morality is contagious), or merely dirtier and contaminated by germs.

Another limitation is that the decision not to visibly associate with an immoral object like the Nazi armband could be motivated by concern about supporting or normalizing it. This could be the case, for example, if a person was worried that other people could see the Nazi symbol on display and then think that Nazism is acceptable.

Thus, the desire to maintain moral norms among others could be an alternative, or additional, motive to reputation concerns.

Many researchers argue that morality and punishment function to maintain group-beneficial cooperative norms within large-scale groups (e.g., Graham et al., 2009; Haidt, 2012) and these researchers might be more likely to argue that participants' reluctance to wear the Nazi armband was motivated by a desire to avoid normalizing Nazism which might be perceived as harmful to society, especially to certain members of society. This interpretation is not ruled out by the evidence, due to the items used to measure reputation concern, "I would not want to seem like I support Nazis" and "I would not want to seem like I approve of what the Nazis did". Although "seem like" implies an impression management concern, appearing to condone or support Nazis would also be objectionable to a participant who is motivated by concern about normalizing Nazism. One way to distinguish between these motives would be to include additional items, such as "I did not want to make other people to think that what the Nazis did was ok", or "I did not want to lead other people to approve of Nazism" or "Wearing the armband visibly could affect other people's attitudes towards the Nazis" versus "Other people might think I was a bad person if I wore the armband visibly" and "other people might think I was immoral person if I wore the armband visibly". These items would distinguish more clearly between normalization and reputation concerns, respectively.

Another way to distinguish between these accounts would be to vary the composition of the audience. If participants are led to believe that audience members are already somewhat sympathetic to Nazis, then the reputation explanation would predict lower aversion to being seen associating with the armband and a greater tendency to display the armband. But the moral norm endorsement explanation would

predict that if the audience members are somewhat sympathetic to Nazis, participants would have more concern about display because there is more risk that Nazism could become normalized. The audience could also be identified as different groups of people. If participants were told that the people who were likely to see them were children, then participants might have more concern about normalizing Nazism, assuming that people believe that children are more impressionable than adults, but also have less power to harm reputation. If, on the other hand, the audience was a group of Jews, then participants would be unlikely to be concerned about normalizing Nazism, which is unlikely to occur among Jews, but more concerned about the audience's impression of them. The reputation management account predicts that participants in the Jew condition, participants would be less likely to visibly display the armband and would report more discomfort about doing so, whereas the normalization account predicts that participants in the child condition would be more reluctant to visibly display the armband.

Although the normalization and reputation explanations are both plausible, findings from Study 3 are arguably less consistent with the normalization account than the reputation management account. Third parties judged people who visibly displayed the Nazi armband to be only slightly immoral and disgusting, despite first parties (in Studies 1 and 2) reporting strong concern about visibly displaying the armband. If display of the Nazi armband was perceived to be wrong because it risks promoting an immoral norm, then third-party observers might have been expected to more strongly condemn those who displayed the armband for promoting Nazism. But if the person who visibly displayed the Nazi armband was only seen as harming themselves by damaging their reputation, and not negatively influencing those around them, then their action would not have been judged as immoral. Again, this

interpretation could be confirmed empirically by asking third-parties additional questions to probe for reasons behind condemnation of people who chose to wear the armband, such as, “Wearing the armband visibly could have made observers think that Nazis are ok”, or “people who saw him wearing the armband are more likely to think that Nazism is not evil”, versus “people who saw him might think that he is an immoral person”, or “people who saw him might think that he condones Nazism”.

Although additional evidence would be required to settle the issue with certainty, there are theoretical reasons to favour the reputation explanation over the norm-support explanation. As explained in detail in the introduction, during human evolution maintaining a good reputation is thought to have been extremely important because of its influence on securing future cooperative partners and avoiding ostracism (Fehr & Fischbacher, 2004; Kurzban & Leary, 2001). For this reason, the desire to maintain a good reputation is a strong motive, and reputational consequences of actions are often highly salient to people (Hoffman, McCabe & Smith, 1996; Kurzban, DeScioli & O’Brian, 2007).

In contrast, it is less clear, from an evolutionary perspective, why people would be motivated to adjust their self-presentation behaviour based on concerns about the effects of their actions on the moral beliefs of third-parties. Some perspectives argue that people are motivated to uphold social norms because people are concerned about the functioning of their social group and do not want to support norm-violations that could damage the group (e.g., Feldman, 1984). Other perspectives argue that moral psychology is based on a form of intuitive deontology, whereby people have moral principles (e.g. “harming others is wrong”; “Nazism is harmful and wrong”) and object when people violate these principles (e.g., Cushman, Greene & Young, 2009). Others argue that psychological mechanisms for benefitting

the group could have evolved by group-level selection. For example, intuitive aversion to harm or unfairness within a group may have been selected because groups with individuals who didn't cheat or harm each other would have outcompeted groups who did, and these groups would have left more descendants (Haidt, 2012; Boyd & Richerson, 2002). However, group selection is a weak force and it is not capable of constructing complex adaptations (Williams, 1966). Therefore, the psychological mechanisms upon which morality is based are unlikely to be designed to benefit the group. Evolution builds mechanisms that benefit individual fitness, not group fitness (Pinker, 2012).

However, motives for supporting norms do not have to be a product of group-level selection, because some norms can enhance individual fitness. Even when a violation does not affect an individual directly, the individual's fitness could be adversely affected if the cooperative or moral norm were to become acceptable and widespread, so there can be selection for motives to punish, gossip and generally uphold preferred rules of conduct (DeScioli & Kurzban, 2013; Tooby & Cosmides, 2010; Tybur et al., 2013). However, this would lead to the evolution of mechanisms that identify norms that benefit the individual (which would vary between individuals), rather than blind support for norms that benefit everybody. For example, for a weak, isolated, or minority group member, it might be especially beneficial to support norms against physical violence, not for the group's welfare, but because one's self or kin could later be the target of violence if aggressive behaviour was normalized. This individual would be particularly motivated to condemn harm violations and might be particularly supportive of norms favouring redistribution or supporting the weak and vulnerable. In contrast, a person who perceives themselves as strong and dominant might favour norms supporting free competition. The functional flexibility of norm-

endorsement has been supported by recent studies. For example, participants who fasted were subsequently more likely to support redistribution norms than those who were satiated, possibly because they perceived themselves as needy (Petersen et al., 2011). As another example, individuals who have mating opportunities (because they are attractive or single) are less likely to support norms that favour monogamy (Price et al., 2014). This leads to the question: who would benefit from norms supporting versus proscribing Nazism? Even if the Nazi ideology could be perceived as beneficial to some individuals, such as white heterosexual men, it seems unlikely that anyone in a University of Kent psychology lab would think that normalizing Nazism was possible or desirable, given the widespread moral condemnation of Nazis (as shown by the mean score of over 5 on the 6-point scale of Nazi immorality in Studies 1, 2 and 3). This could be tested empirically by asking participants, not just about their own moral views on Nazism, but their perception of others' views of Nazism, and how susceptible others' views were to being changed, or influenced by seeing a participant condoning the wearing of Nazi insignia. If no-one thinks that Nazism should be normalized, or can be normalized, then concern about normalization seems unlikely to be a salient motive.

2.4.4 Conclusion. At a minimum, these findings cast doubt on the claim that moral disgust arises from appraisals of contamination. If disgust reported towards immoral stimuli is not accompanied by perceptions of contamination, then this raises the possibility that moral disgust may not be the same emotion as disgust elicited by towards physical, pathogenic, stimuli, especially if, as many have argued, the perception of the potential to contaminate is required for the elicitation of disgust (e.g., Horberg et al., 2009). If moral disgust is not really the same mental state as prototypical disgust, then it is necessary to explain why people frequently use disgust-

related terminology, and facial expressions of disgust, when responding to moral violations that have no pathogenic content (e.g., Chapman et al., 2009). The next Chapter contains five studies investigating the social signaling account of moral disgust.

Chapter 3. Disgust communicates moral motives

One way to enhance moral reputation is to publicly condemn the immoral actions of other people, thereby signalling one's own virtue. Although both anger and disgust are emotions of condemnation, anger is typically deployed in defence of self-interest, so observers are likely to infer from anger that the expresser is motivated by self-interest. Disgust may also communicate strong offense but without prompting inferences of self-interested motivation. Disgust may be expressed towards immorality not because a wrongdoing is appraised as contaminating, or because the expresser feels nausea, but because the expresser seeks to communicate morally motivated condemnation.

This chapter contains five studies testing these hypotheses. Studies 4 and 5 presented a scenario in which a target expressed anger or disgust toward a wrongdoing and participants' inferences about the target's moral versus self-interested motivation were measured. Study 6 gave participants a scenario in which their aim was to communicate either self-interest or moral concern and measured which emotion they chose to express. For a more stringent test, Studies 7 and 8 used a concrete scenario involving harm to the self, to see whether the aim of communicating moral motivation would increase disgust expression under conditions that would normally predict anger (Hutcherson & Gross, 2011). All measures, all manipulations, data exclusions, and a priori sample size rationale are reported. Studies

5, 6, and 7 were preregistered, including all of the hypotheses. Preregistrations and data can be found on the Open Science Framework website, <https://osf.io/4ac5p/>.

3.1 Study 4

Participants were presented with a scenario in which they imagined two people having a conversation in which one of the people is describing a wrongdoing and condemns the wrongdoing by expressing either disgust or anger. The details of the wrongdoing were deliberately kept vague, so that participants had to make inferences based on the expression and not on other contextual clues. Ambiguous social situations have also been used in other research to investigate inferences based only on expressed emotion, while excluding situational clues (Van Doorn, Van Kleef & Van der Pligt, 2015). Participants were then asked to infer the likely motives of the person who condemned the wrongdoing. Predictions were that the disgust expresser would be perceived as motivated more by moral concerns, or concerns for what had happened to someone other than themselves, whereas the anger expresser would be perceived as being motivated more by self-interest. Participants were also asked to infer who was likely to be the victim of the wrongdoing. Given the hypothesis that anger communicates self-interest and disgust communicates more moral and impartial motives, the victim in the anger condition should be inferred to be expresser herself, whereas in the disgust condition, the victim would be inferred to be the target's friend or a stranger.

Method

Participants. Based on an effect size ($d = .91$) in similar research on emotion communication (Hareli & Hess, 2010), a power analysis using GPower 3.1.9.2., recommended a sample size of 66 at 95% power. This was increased by 25% to allow for incomplete responses and exclusions based on an attention check question. Amazon MTurk was used to recruit 84 (34 female) participants from the United States ($M_{age} = 36.18$, $SD = 11.11$). Allocation to anger and disgust conditions was unevenly balanced, resulting in 34 participants in the anger condition and 50 in the disgust condition.

Materials and procedure.

Scenario. The participant imagined seeing a colleague expressing either disgust or anger in response to a violation. Minimal information about the violation was given, to ensure that participants made inferences based on the emotion expressed and not on other clues about the situation. The scenario consisted of the following text (word changes for the disgust condition in brackets):

“You are at work in a job that you have only just started and you are sitting in the breakroom during your break. Two of your colleagues come into the room and sit at the table at the other end of the room. After a few minutes you overhear one of your colleagues talking and, although you do not know her well, you recognize the voice as belonging to your colleague Mary.

You can't hear all of the conversation from where you are but from what you hear, you can tell that they are talking about someone else who has done something wrong. You can tell from Mary's voice that she sounds angry (disgusted). A minute later, you over-hear the words "I am angry (disgusted)". You decide to glance up at her and

when you see her face, you can tell from her expression of anger (disgust) that her feelings are strong.”

Participants were then asked to complete several dependent measures.

Perceived victim. Participants were asked to infer who was likely to be the victim of the wrongdoing from the following options: ‘Mary’, ‘Mary’s friend’, or ‘someone else Mary doesn’t know very well’.

Perceived Motives. Participants were asked “Based on what you saw and heard, why do you think Mary feels this way about whatever has happened? How likely are the following to be true?” Nine items were rated on a scale from 0, ‘not at all likely’, to 6, ‘very likely’, assessing how selfish, other-caring and moral the target’s motives were perceived to be. The selfish items were: ‘she is mainly concerned about herself’, ‘she is concerned about how something has affected herself’ and ‘she feels that she has been wronged’ ($\alpha = .83$). The other-caring items were: ‘she is concerned about something bad happening to someone else’, ‘she is worried someone else’s feelings might be hurt’ and ‘she feels this way on behalf of someone else’ ($\alpha = .85$). The moral concern items were: ‘she mainly feels this way out of principle’, ‘she feels that something immoral has happened’ and ‘she feels this way because it is always wrong to cheat’. However, these items had inadequate reliability ($\alpha = .25$). Since the second item was the only one that was unambiguously about the target’s moral concern, the other two items were dropped.

Results

Four participants were excluded based on the attention check question. Where data violated sphericity, adjusted values are reported.

Perceived victim. Figure 5 shows the perceived victim when the target expressed anger versus disgust. There was a significant association between the

target's emotion expression and the perceived victim, $\chi^2(2, N = 80) = 14.39, p < .001$, Cramér's $V = .42$. The target herself was perceived to be the victim more frequently when expressing anger than disgust, $\chi^2(1, n = 50) = 5.33, p = .02$, Cohen's $w = .33$. The target's friend was perceived to be the target more frequently when the target expressed disgust compared to anger, $\chi^2(1, n = 19) = 6.88, p < .001$, Cohen's $w = .60$. A stranger was perceived to be the target more frequently when the target expressed disgust compared to anger but this difference was not significant, $\chi^2(1, n = 12) = 2.18, p = .14$, Cohen's $w = .45$.

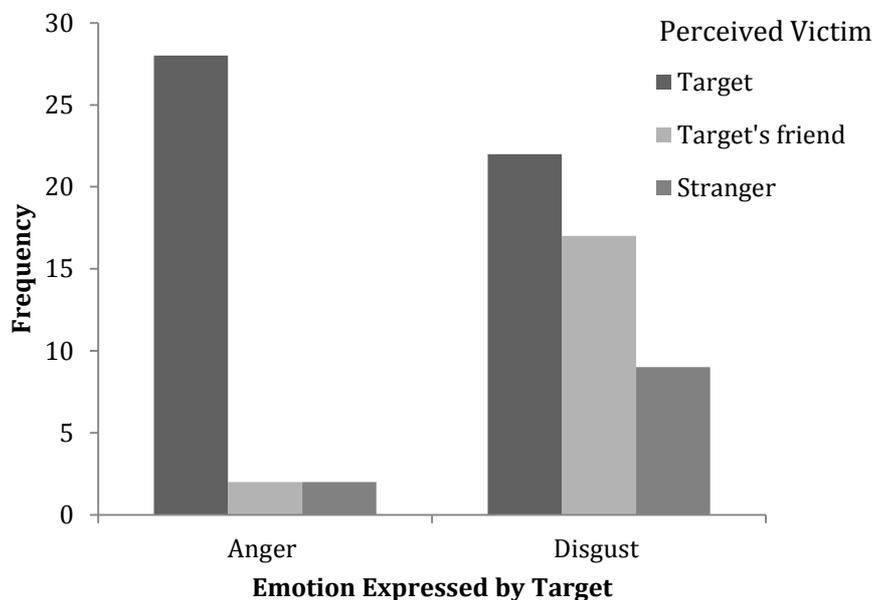


Figure 5. Frequency of inferences made by participants about whether the victim of the violation was the target herself, the target's friend, or a stranger, when the target expressed anger versus disgust, Study 4.

Perceived Motives. A repeated measures analysis of variance (ANOVA) with emotion as a between subjects factor and perceived motive as a within subjects factor revealed a main effect of motive, $F(1.33, 103.80) = 17.21, p < .001, \eta_p^2 = .18$, but no main effect of emotion, $F(1, 78) = .30, p = .59, \eta_p^2 = .004$. A significant

interaction was revealed, $F(1.33, 103.80) = 12.90, p < .001, \eta_p^2 = .14$. As can be seen in Figure 6, an expression of anger led participants to infer more self-interested motivation than disgust, $F(1, 78) = 13.77, p < .001, \eta_p^2 = .15$. The target's motives were rated as more other-caring when disgust was expressed, $F(1, 78) = 8.65, p = .004, \eta_p^2 = .10$, and as marginally more moral with disgust, $F(1,78) = 3.56, p = .063, \eta_p^2 = .044$.

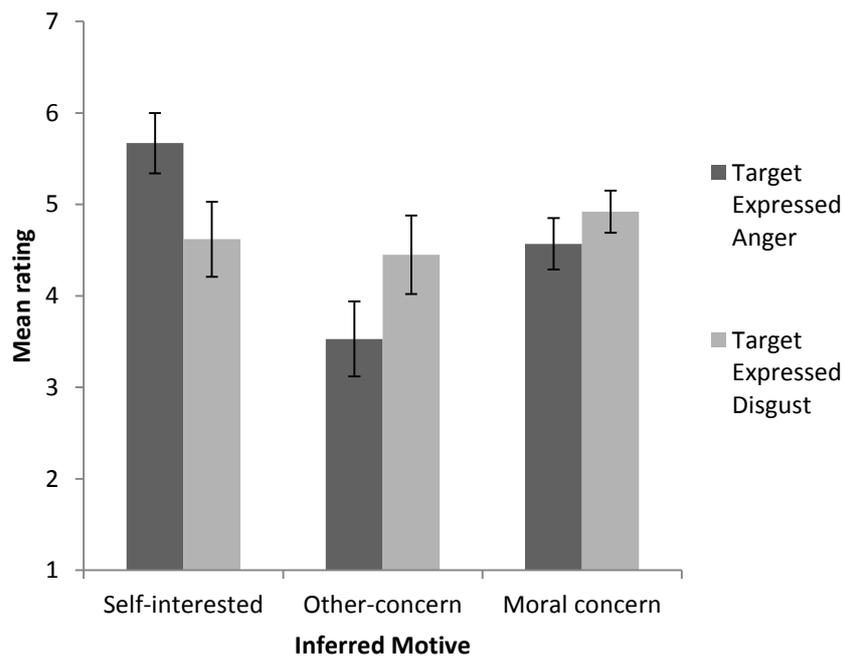


Figure 6. Motives inferred by participants when the target expressed anger versus disgust, Study 4. Error bars represent 95% confidence intervals.

3.1.3 Discussion

Findings supported the prediction that more moral concern and other concern would be inferred from an expression of disgust compared to anger and more self-concern would be inferred from an expression of anger. In addition, many more participants thought the victim of the wrongdoing was likely to be the expresser herself in the anger condition compared to the disgust condition. This supports the hypothesis that disgust is less likely to be inferred as self-serving. One limitation was

that the difference between inferences of moral concern was only marginal and this may have been related to the sample size being fairly small. The aim of Study 5 was to replicate these findings with a larger sample size and including additional measures.

3.2 Study 5

Additional items were included for the measurement of moral concern, and the gender of the target was varied because some research has shown that women can be more harshly viewed for expressing anger (Brescoll and Uhlmann, 2008). We also investigated whether inferences about the target's motives were extended to judgements about their character, given findings that expressed emotions are sometimes seen as diagnostic of personality characteristics (e.g. Hareli & Hess, 2010).

Method

Participants. Amazon MTurk was used to recruit 200 (72 female) participants ($M_{\text{age}} = 32.49$, $SD = 11.01$). Expecting similar effect sizes to Study 4 ($\sim d = .70$), a power analysis (with desired power at .90) recommended a sample size of 176. We aimed to collect 200 participants to allow for exclusions based on an attention check question.

Materials and Procedure.

Scenario. The scenario was the same as in Study 4, except that the gender of the target was varied. The names Robert and Mary were used because in research by Cotton, O'Neill & Griffin (2008), they were rated equally American, Caucasian and likeable. Participants then completed the following dependent measures.

Perceived victim. Participants were asked to infer who was likely to be the victim of the wrongdoing from the following options: ‘Mary’, ‘Mary’s friend’, or ‘someone else Mary doesn’t know very well’.

Perceived Motives. Participants are asked “Based on what you saw and heard, why do you think Mary (Robert) feels this way about whatever has happened? How likely are the following to be true?” and rated items from 0, ‘not at all likely’, to 6, ‘very likely’. Items measuring self-concern ($\alpha = .74$) and other concern ($\alpha = .78$) were the same as in Study 4. Items assessing moral motivation were divided into 3 moral concern items and 3 principled items. The moral concern items were: ‘she(he) thinks someone has behaved unethically’, ‘she (he) feels this way because someone’s behaviour violated a moral principle’ and ‘she (he) feels this way because she (he) thinks important moral rules have been broken’ ($\alpha = .79$). The principled items were: ‘she (he) would feel this way about what happened no matter who was involved’, ‘she (he) thinks that people shouldn’t ever behave like that’ and ‘she (he) would feel this way about what happened whoever the victim was’. The reliability of the principled items was unacceptable ($\alpha = .56$), so the second item was dropped and the remaining two items correlated well ($r = .59$).

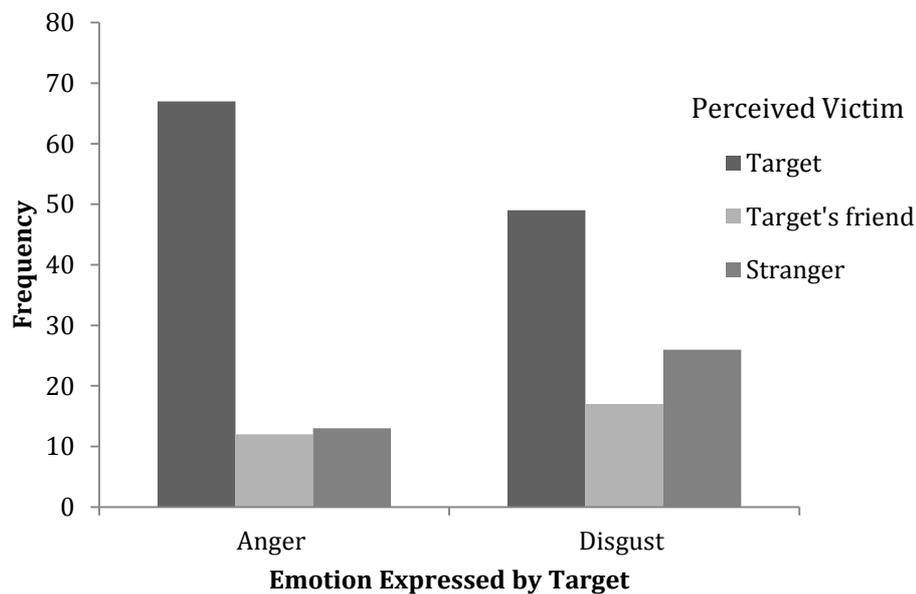
Trait inferences. Participants were asked “Based on what you saw and heard, to what extent do you think that Mary (Robert) is likely to have the following characteristics?” Items for three of the traits were from Leach, Ellemers & Barreto (2007). Perceived competence was assessed with 3 items: Competent, intelligent and skilled ($\alpha = .82$). Warmth was assessed with 3 items: Likeable, warm and friendly ($\alpha = .90$). Morality was assessed with 3 items: Honest, sincere and trustworthy ($\alpha = .83$). The dominance items: Dominant, assertive and forceful ($\alpha = .83$) were from Anderson & Kilduff (2009). Participants also rated how masculine and feminine they perceive

the target to be. To measure ‘negative aggression’, 3 items were used: hostile, aggressive and out of control ($\alpha = .81$). All items were rated from 0, ‘not at all’, to 6, ‘a lot like this’.

Results

Sixteen participants were excluded for failing the attention check question.

Perceived victim. Figure 7 shows the perceived victim when the target expressed anger versus disgust. There was a significant association between the type of expression and the perceived victim of the wrongdoing, $\chi^2(2, N=184) = 7.99, p = .02$, Cramér’s $V = .21$. A stranger was perceived to be the victim more frequently when disgust was expressed compared to anger, $\chi^2(1, n = 39) = 4.33, p = .04$, Cohen’s $w = .33$. The target’s friend was more frequently perceived to be the victim when the target expressed disgust compared to anger but this difference was not significant,



$\chi^2(1, n = 29) = 0.86, p = .35$, Cohen’s $w = .17$. The target’s self was perceived to be the victim more frequently when expressing anger compared to disgust, but this difference did not reach significance, $\chi^2(1, n = 116) = 2.79, p = .09$, Cohen’s $w = .16$.

Figure 7. Frequency of inferences made by participants about victim of the violation when the target expressed anger versus disgust, Study 5.

The pattern of results was similar irrespective of the gender of the target but effects were stronger for the male target, despite clear results for the female target in Study 5. Separate analyses for male and female target are described below.

Separate analyses for male and female targets. When the male target is considered separately, there was a significant association between the type of expression and the perceived victim of the wrongdoing, $\chi^2(2, n = 93) = 16.96, p < .001$, Cramér's $V = .43$. The target himself was perceived to be the victim more frequently when he expressed anger (36 observed vs. 26.3 expected) compared to disgust (16 observed vs. 25.7 expected), $\chi^2(1, n = 52) = 7.24, p = .007$, Cohen's $w = .37$. But the target's friend was perceived to be the victim more frequently when the target expressed disgust (15 observed vs. 9.4 expected) compared to anger (4 observed vs. 9.6 expected), $\chi^2(1, n = 19) = 6.60, p = .01$, Cohen's $w = .59$, and a stranger was perceived to be the victim more frequently when the target expressed disgust (15 observed vs. 10.9 expected) compared to anger (7 observed vs. 11.1 expected), though this difference did not reach significance, $\chi^2(1, n = 22) = 3.06, p = .08$, Cohen's $w = .37$.

When the female target is considered separately, the perceived victim only marginally differed between anger and disgust expressions, $\chi^2(2, n = 91) = 5.12, p = .077$, Cramér's $V = .24$. The number of times the target herself was inferred to be the victim did not differ significantly between anger (31 observed vs. 31.6 expected) and disgust expressions (33 observed vs. 32.4 expected), $\chi^2(1, n = 64) = 0.02, p = .88$, Cohen's $w = .02$. The number of times the target's friend was inferred to be the victim

was greater when anger was expressed (8 observed vs. 4.9 expected) compared to disgust (2 observed vs. 5.1 expected), $\chi^2(1, n = 10) = 3.85, p = .05$, Cohen's $w = .62$. The number of times a stranger was inferred to be the victim did not differ significantly between anger (6 observed vs. 8.4 expected) and disgust (11 observed vs. 8.6 expected) expressions, $\chi^2(1, n = 17) = 1.36, p = .24$, Cohen's $w = .28$.

Perceived motives. An ANOVA with emotion expressed and gender of target as between subjects factors and perceived motives as a within subjects factor revealed a main effect of motive, $F(2.55, 458.67) = 120.64, p < .001, \eta_p^2 = .40$, but no main effect of emotion expressed, $F(1, 180) = 1.83, p = .18, \eta_p^2 = .01$, or gender of target, $F(1, 180) = 0.12, p = .73, \eta_p^2 = .00$. There was a significant 3 way interaction, $F(2.55, 458.67) = 3.89, p = .009, \eta_p^2 = .021$. Figure 8 shows mean ratings for each motive. Participants inferred more selfish motivation from anger, $F(1, 180) = 32.26, p < .001, \eta_p^2 = .15$, but more other-caring motivation from disgust, $F(1, 180) = 3.97, p = .048, \eta_p^2 = .02$, as well as more moral, $F(1, 180) = 7.49, p = .007, \eta_p^2 = .04$, and more principled, $F(1, 180) = 22.89, p < .001, \eta_p^2 = .11$, motivation from disgust than from anger.

The direction of results was similar for male and female target but effects were stronger for the male target. For the male target is considered separately, participants inferred significantly more self-interest when the expression was anger compared to disgust, $F(1, 180) = 28.91, p < .001, \eta_p^2 = .14$. His motives were rated as more other-caring when the expression was disgust compared to anger, $F(1, 180) = 7.812, p = .006, \eta_p^2 = .042$, as well as more moral when the expression was disgust in comparison to anger, $F(1, 180) = 4.78, p = .030, \eta_p^2 = .026$, and also more disinterested when the expression was disgust in comparison to anger, $F(1, 180) = 11.67, p < .001, \eta_p^2 = .061$.

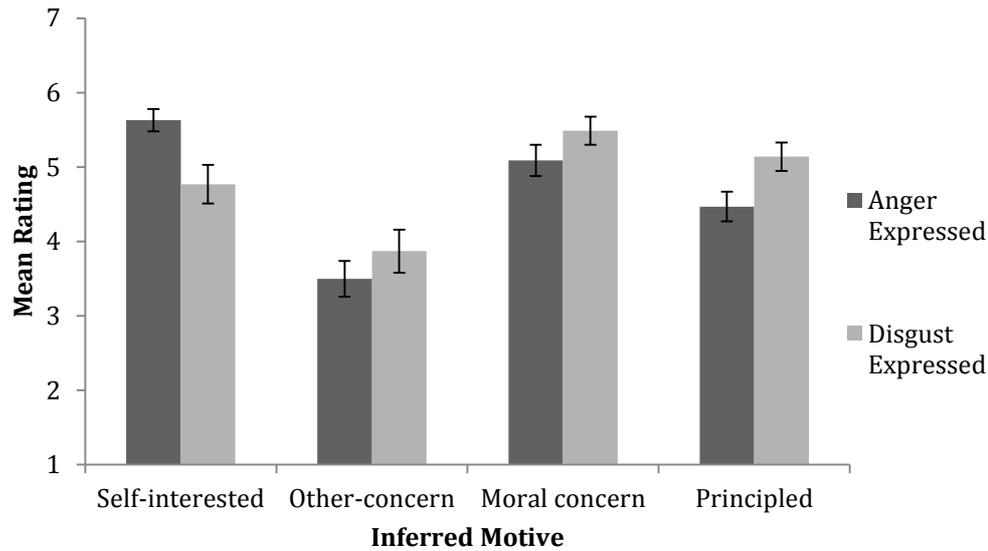


Figure 8. Motives inferred by participants when the target expressed anger versus disgust, Study 5. Error bars represent 95% confidence intervals.

The female target's anger emotional expression led participants to infer significantly more self-interested motivation compared to disgust, $F(1, 180) = 7.13, p = .008, \eta_p^2 = .038$. Participants inferred more disinterested motives when she expressed disgust, compared to anger, $F(1, 180) = 11.22, p < .001, \eta_p^2 = .059$. However, the other-caring motive, $F(1, 180) = .001, p = .97, \eta_p^2 = .00$ and the moral concern motive, $F(1, 180) = 2.85, p = .093, \eta_p^2 = .016$, did not significantly differ between disgust and anger expressions. In general, the female target showed the same overall pattern as the male but less strongly and consistently.

Trait inferences

An ANOVA with emotion and gender of target as between subjects factors and trait inferences as a within subjects factor revealed a main effect of trait, $F(1.76, 317.03) = 14.28, p < .001, \eta_p^2 = .073$, but main effects of emotion expressed, $F(1, 180) = .79, p = .38, \eta_p^2 = .004$, and gender of expresser $F(1, 180) = .82, p = .37, \eta_p^2 = .005$, were not significant, nor were there any significant interactions. Only trait negative aggression

significantly differed between emotion conditions, and only for the male target: It was higher when anger was expressed ($M = 4.35$, 95% CIs [3.99, 4.71]) compared to disgust ($M = 3.81$, 95% CIs [3.45, 4.18]), $F(1, 180) = 4.26$, $p = .04$. Mean ratings for all inferred traits and correlations between inferred traits and inferred motives are shown in Tables 2 and 3.

Table 2. Mean trait inferences made by participants when the target expressed anger versus disgust.

Target	Trait	Emotion expressed		Mean difference	<i>p</i>
		Anger	Disgust		
Mary	Morality	4.52	4.35	0.17	.45
	Warmth	3.93	3.85	0.08	.72
	Competence	4.41	4.49	-0.08	.66
	Dominance	4.25	4.30	-0.05	.86
	Negative aggression	3.86	3.56	0.30	.25
Robert	Morality	4.33	4.33	0.00	.98
	Warmth	3.70	3.97	-0.27	.24
	Competence	4.26	4.42	-0.16	.42
	Dominance	4.75	4.44	0.31	.22
	Negative aggression	4.35	3.81	0.54	.04

Table 3. Correlations between inferred traits and inferred motives

Motive/trait	1	2	3	4	5	6	7	8
1. Self-interested motive	-							
2. Other caring motive	-.02	-						
3. Moral concern motive	.19*	.31**	-					
4. Disinterested motive	-.08	.50**	.46**	-				
5. Trait morality	.17*	.15*	.18*	.20**	-			
6. Trait Warmth	.24**	.26**	.26**	.26**	.71**	-		
7. Trait competence	.13	.10	.21**	.20**	.71**	.68**	-	
8. Trait negative aggression	.14	-.11	-.20**	-.28**	-.34**	-.40**	-.21**	-
9. Dominance	.10	-.10	-.09	-.23**	-.07	-.14	.13	.63**

Note. * indicates significance at .05 level and ** indicates significance at .01 level.

Discussion

Study 5 replicated the findings from Study 4: when the target expressed anger, he or she was more likely to be perceived as motivated by self-interest and the victim was thought to most likely be the expresser herself. When the target expressed disgust, though, she was perceived as more motivated by moral concerns, other

concerns, and principled concerns and the likelihood of the victim being the expresser herself decreased.

The findings did not extend to character inferences, despite previous research showing that emotion expressions can be taken as cues to a person's disposition (Hareli & Hess, 2010; Knutson, 1996). One reason for this might be that participants did not feel that there was enough evidence in the abstract scenario to make judgments about the target's character; perhaps if they had known why Robert was expressing anger, then they would have been more willing and able to make trait inferences. Expressing anger in itself might not be perceived as making a person less moral, even if it is less likely to be morally motivated, unless the anger is seen as unreasonable or unjustified. If he had been expressing anger towards a minor insult or goal blockage, for example, then he may have been seen as less moral and warm. Future research could investigate trait inferences further by including more information about the scenario, such as the nature of the transgression and the target of the expression.

3.3 Study 6

Study 6 investigated whether people strategically deploy anger and disgust depending on the motives they aim to communicate. The prediction was that participants would choose to express more disgust than anger to show moral concern, but more anger than disgust to show self-concern. Whether the emotion was expressed towards a second party (the moral violator), or towards a third party (someone hearing about the violation) was also varied. This was included to explore the possibility that, in communicating with a second party, the value of anger in moral

communication might increase, because of the possibility of changing behaviour directly.

Method

Participants. Amazon MTurk was used to recruit 204 participants (82 female) ($M_{age} = 35.75$, $SD = 12.36$). Although Study 6 investigated participants' own expression choices rather than inferences about others' expressions, similar effect sizes were expected ($\sim d = .70$). A power analysis with desired power at .90 recommended a sample size of 176. We aimed to collect 220 participants to allow for incomplete responses and exclusions based on an attention check question.

Materials & Procedure.

Scenario. Minimal information about the violation was given to ensure that participants chose an expression based on their communicative aim and not on other situational information. The scenario consisted of the following text (word changes for the harm-to-self condition in brackets):

“You are at work and you are sitting in the break room during your lunch break talking to your colleague, Mary. You are talking about another colleague you know called Robert, who has done something bad which you feel strongly about because it was immoral (harmed you).

You are trying to get Mary to understand that you feel strongly about what Robert did because he broke an important moral principle (it harmed you personally).”

In the second party condition, participants imagined talking directly with the person who committed the violation:

You are at work in the break room during your lunch break and you are talking to your colleague, Robert. Robert has done something bad which you feel strongly about because it was immoral (harmed you personally).

You want to make sure that Robert understands that you feel strongly about what he did because he broke an important moral principle (it harmed you personally).

Participants then completed several dependent measures:

Emotion label. Participants were asked: ‘Which emotion would you be most likely to express?’ and chose from ‘angry’, ‘disgusted’, ‘afraid’ and ‘joyful’.

Emotion facial expression. Participants were asked ‘Which of the facial expressions shown below would you be most likely to show?’ and chose from anger, fear, disgust and joy facial expressions. Images were obtained from the Radboud faces database (Langner et al., 2010). The expressions were portrait views from the first model in the database, a Caucasian adult female.

Emotion label scale. Participants were asked ‘How much of each emotion do you think you would express in this situation?’ and rated the four emotion labels from 0, ‘none’ to 6, ‘a lot’.

Results

Sixteen participants were excluded due to incomplete responses and seven because they failed the attention check question. Analyses are conducted only for the emotions of interest, anger and disgust.

Emotion label. There was a significant association between communicative aim and emotion expression chosen, $\chi^2(1, N = 190) = 43.44, p < .001$, Cramér’s $V = .48$. As shown in Figure 9, when participants’ aim was to show moral concern, they chose to express disgust more frequently than anger, $\chi^2(1, n = 96) = 21.58, p < .001$,

Cohen's $w = .47$, but when participants' aim was to show concern about harm to themselves, anger was chosen more frequently, $\chi^2(1, n = 94) = 22.03, p < .001$, Cohen's $w = .48$. This pattern of results held across audience conditions: There was no significant difference between how often anger and disgust were chosen when communicating with a third party or a second party, $\chi^2(1, N = 190) = 2.87, p = .09$, Cramér's $V = .12$.

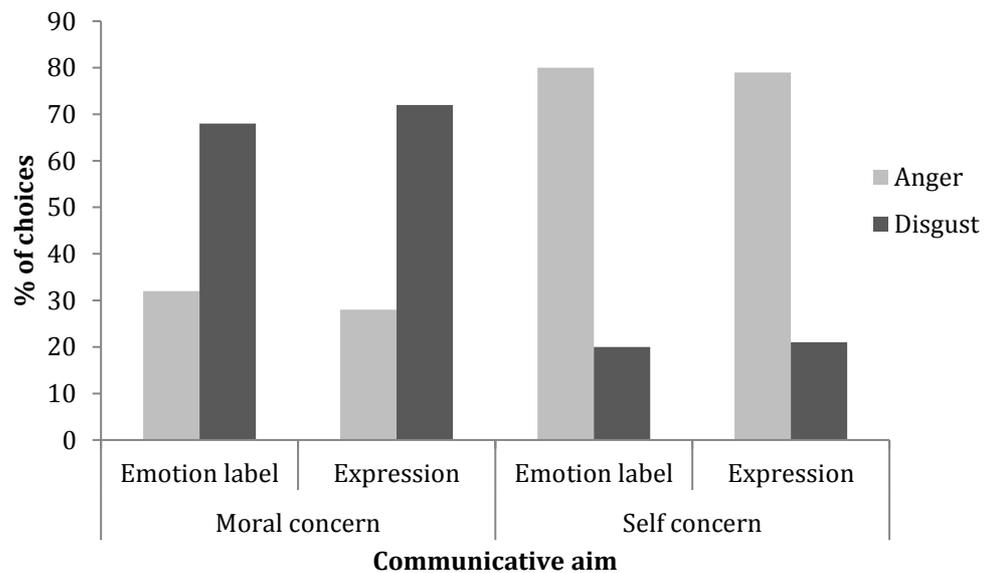


Figure 9. Categorical anger/disgust expression choices by communicative goal, Study 6.

Emotion facial expression. There was a significant association between communicative aim and choice of facial expression, $\chi^2(1, N = 186) = 47.99, p < .001$, Cramér's $V = .51$. If participants' aim was to show moral concern, they chose disgust more frequently than anger, $\chi^2(1, n = 95) = 23.55, p < .001$, Cohen's $w = .50$, but if their aim was to show concern about harm to themselves, they chose anger more frequently, $\chi^2(1, n = 91) = 24.58, p < .001$, Cohen's $w = .52$. There was no significant difference between how often anger and disgust facial expressions were chosen in the second and third party conditions, $\chi^2(1, N = 186) = 1.50, p = .22$, Cramér's $V = .09$.

Emotion scale. An ANOVA with communication aim and audience as between-subjects factors and emotion as a within-subjects variable revealed no main effects of emotion, $F(1, 186) = 1.07, p = .30, \eta_p^2 = .00$, audience, $F(1, 186) = 0.97, p = .33, \eta_p^2 = .00$, or communicative aim, $F(1, 186) = 0.52, p = .47, \eta_p^2 = .00$. The two-way interaction between emotion and audience was not significant, $F(1, 186) = 0.66, p = .42, \eta_p^2 = .00$, nor was the three-way interaction, $F(1, 186) = 0.39, p = .53, \eta_p^2 = .00$. However, there was a significant interaction between the emotion chosen and the participants' communicative aim, $F(1, 186) = 45.78, p < .001, \eta_p^2 = .20$. As can be seen in Figure 10, when participants' aim was to communicate moral concern, significantly more disgust than anger was chosen, $F(1, 186) = 16.64, p < .001, \eta_p^2 = .08$, but when their aim was to communicate self-concern, more anger was chosen, $F(1, 186) = 30.06, p < .001, \eta_p^2 = .14$.

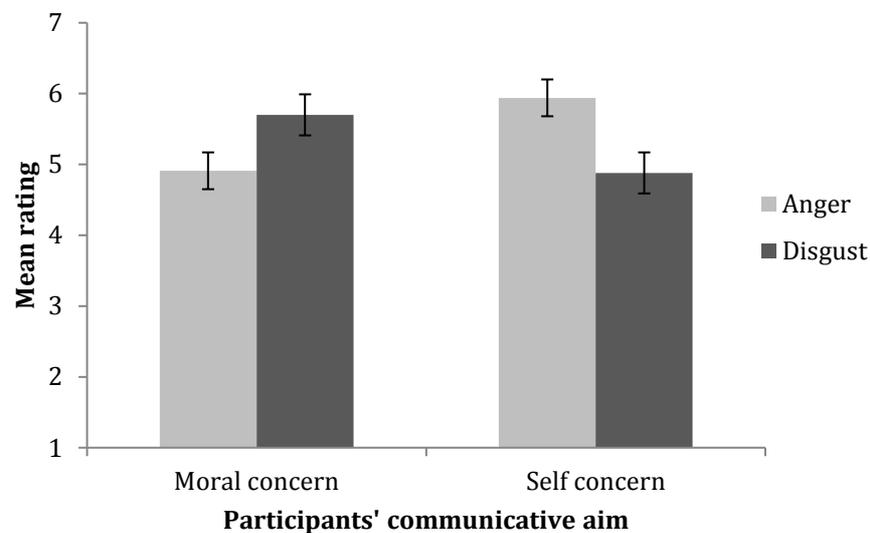


Figure 10. Scaled anger/disgust expression choices by communicative goal, Study 6. Error bars represent 95% confidence intervals.

Discussion

Findings gave clear support to predictions: participants deliberately chose to express anger when their aim was to protest about harm to their own interests, and

disgust when their aim was to communicate moral concern about a wrongdoing. This is consistent with the hypothesis that disgust is expressed towards moral violations because it is more effective than anger at communicating morally motivated condemnation and not necessarily because participants subjectively feel disgusted.

One limitation is that because we did not give any specific information about the content of the wrongdoing in the scenario, it is possible that participants inferred that a purity, or bodily moral, violation had occurred and that is why they chose disgust. In the harm-to-self condition, participants could have inferred that the wrongdoing contained no impure content, so they chose anger, as would be predicted by theories that posit specific links between moral content and emotions (e.g., Graham et al., 2009; Rozin et al., 1999). In addition, Hutcherson & Gross (Study 2, 2011) found that feelings of disgust are higher when the victim of a transgression is a stranger, whereas feelings of anger are higher when the victim is the self, and intermediate for a friend. Our scenario did not specify whether the victim was the self or a stranger but only varied participants' communicative aim, so it is possible that participants inferred that they themselves were the victim in the harm condition, but someone else was the victim in the moral concern condition, leading participants to feel the corresponding emotions. Study 7 aimed to eliminate these alternative explanations for the decision to express disgust versus anger.

3.4 Study 7

As a more stringent test of whether the goal of communicating moral motives increases the likelihood of expressing disgust, Study 7 explicitly identified the self as the victim of a harm transgression, favouring feelings of anger (Hutcherson & Gross, 2011; Rozin et al., 1999). However, we predicted that despite *feeling* anger, the

number of participants choosing to *express* disgust would increase if their communicative aim was to show morally motivated condemnation. When their communicative aim was to protest harm-to-self, they would express anger.

Method

Participants: Although Study7 was similar in design to Study 6, we conservatively expected small to medium effect sizes (\sim Cramér's $V = .20$) due to differences in design. A power analysis with desired power at .90 recommended a sample size of 263. We aimed to collect 20% extra participants to allow for incomplete responses and exclusions based on an attention check question. From Amazon MTurk, 296 participants (156 female; $M_{\text{age}} = 37.48$, $SD = 11.51$) completed the study.

Materials and Procedure

Scenario

The first part of the scenario was the same for the two communicative aim conditions and the felt emotion comparison condition:

“At your place of work you and your colleague, Robert, have recently completed a project that you have both been working on for the past few weeks. You were equal partners on the project. If anything, you feel that you worked a bit harder than Robert but you are pleased that the project was a success and you are happy to give him equal credit.

However, you have just been told by another colleague that Robert presented the results of the project to the managers of the company. He made it sound as if he had done the majority of the work himself. Since he was given almost all of the credit for the work, he was awarded a significant amount of money as a bonus.

If your colleague had not told you about this, you might not even have found out. When you saw Robert recently, he did not mention anything about it.”

In the comparison condition, to show that anger was the predominant *felt* emotion, the scenario ended here and participants reported how they would feel. In the other conditions, the following text manipulated communicative aim (word changes for the harm-to-self condition in brackets):

“A short while after you find out about what had happened, you are in the break room during your lunch break with your colleague Mary.

You still feel strongly about what happened and you are trying to make it clear to Mary that you feel this way about what Robert did because he broke an important moral principle (harmed you personally).

Which emotion would you be most likely to express to show that you feel strongly about what Robert did because it was immoral (harmed you personally)?”

Participants completed the following dependent measures:

Emotion label. Participants were asked: ‘Which emotion would you be most likely to express to show that you feel strongly about what Robert did because it was immoral (harmed you personally)?’ Or in the felt emotion condition, ‘Which emotion would best describe how you would feel when you found out about what Robert did?’ They chose from ‘angry’, ‘disgusted’, ‘afraid’ and ‘joyful’.

Emotion label scale. Participants were asked ‘How likely would you be to express each emotion in this situation?’, or ‘How likely would you be to feel each emotion in this situation?’, and rated the four emotion labels from 0, ‘not at all’ to 6, ‘definitely’.

Emotion facial expression. In the expressed emotion conditions, participants were asked ‘Which of the facial expressions shown below would you be most likely to show?’ and choose from anger, fear, disgust and joy expressions.

Results

Ten participants were excluded for failing the attention check question. Only the emotions of interest, anger and disgust, were analysed.

Felt emotion. As expected, participants chose the label angry more frequently than disgusted to describe how they would feel, $\chi^2(1, n = 94) = 24.51, p < .001$, Cohen’s $w = .51$. Using the scaled responses, participants also reported that they would feel anger more than disgust, $t(94) = 4.59, p < .001, d = 0.95$. Figures 11 and 12 display these results in comparison to the communicative goal conditions.

Expressed emotion label. There was a significant association between communicative aim and emotion expression, $\chi^2(1, N = 191) = 8.37, p = .004$, Cramér’s $V = .21$. When participants were given the aim to communicate concern about harm-to self, they chose angry more frequently than disgusted, $\chi^2(1, n = 93) = 20.82, p < .001$, Cohen’s $w = .47$. When they aimed to communicate moral concern, there was no significant difference in how often they chose disgusted and angry, $\chi^2(1, n = 98) = 0.5, p = .48$, Cohen’s $w = .07$.

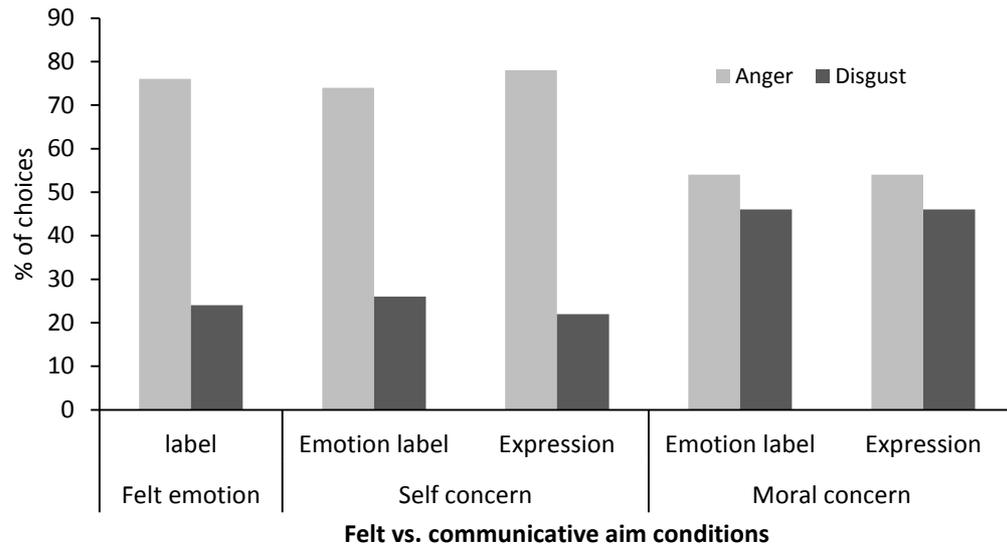


Figure 11. Categorical anger/disgust expression choices by communicative goal or felt emotion condition, Study 7.

Expressed emotion face. Similarly, there was a significant association between communicative aim and facial expression chosen, $\chi^2(1, N = 188) = 12.15, p < .001$, Cramér's $V = .25$. When participants had the aim to communicate concern about harm-to self, they chose anger more frequently than disgust, $\chi^2(1, n = 92) = 28.28, p < .001$, Cohen's $w = .55$. When they aimed to communicate moral concern, there was no significant difference between anger and disgust, $\chi^2(1, n = 96) = 0.52, p = .47$, Cohen's $w = .07$. **Expressed emotion scale.** There was no interaction between gender of participant, communicative aim and emotion expressed, $F(1, 189) = 0.22, p = .64, \eta_p^2 = .00$.

Expressed emotion scale. An ANOVA with communicative aim as a between-subjects factor and emotion as within-subjects revealed a main effect of emotion expressed, $F(1, 189) = 18.24, p < .001, \eta_p^2 = .09$, but the main effect of communicative aim was not significant, $F(1, 189) = 0.00, p = .97, \eta_p^2 = .00$. The two-

way interaction between emotion expressed and communicative aim was significant, $F(1, 189) = 18.24, p < .001, \eta_p^2 = .09$.

As can be seen from Figure 12, when the participants' aim was to communicate self-concern, more anger than disgust was chosen, $F(1, 197) = 35.55, p < .001, \eta_p^2 = .16$, but when the aim was to communicate moral concern, disgust was equal to the anger expressed, $F(1, 197) = .000, p = 1.00, \eta_p^2 = .00$.

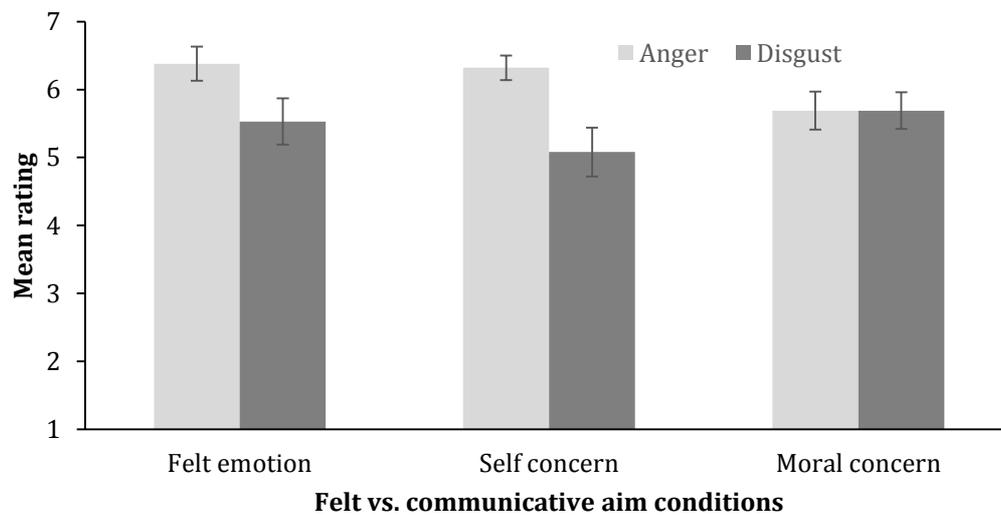


Figure 12. Scaled anger/disgust expression choices by communicative goal or felt emotion condition, Study7. Error bars represent 95% confidence intervals.

Analysis by gender of participant

Felt emotion. Male participants chose the label angry ($n = 31$) more frequently than disgusted (10) to describe how they would feel and female participants also chose the label angry ($n = 40$) more frequently than disgusted ($n = 13$) to describe how they would feel. These proportions were not significantly different, $\chi^2(1, n = 94) = 0.00, p = .99$. Using the scaled responses, there was no interaction between gender and emotion felt, $F(1, 92) = 2.02, p = .27, \eta_p^2 = .01$.

Expressed emotion label. When male participants were given the aim to communicate concern about harm-to self, they chose angry ($n = 35$) more frequently than disgusted ($n = 11$) and when female participants were given the aim to communicate concern about harm-to self, they also chose angry ($n = 34$) more frequently than disgusted ($n = 13$). These proportions were not significantly different, $\chi^2(1, n = 93) = 0.17, p = .68$. When male participants aimed to communicate moral concern, they chose disgusted ($n = 24$) and angry ($n = 23$) with similar frequency but female participants chose disgusted ($n = 30$) more frequently than angry ($n = 21$). However, these proportions did not significantly differ, $\chi^2(1, n = 98) = 0.6, p = .44$.

Expressed emotion face. When male participants had the aim to communicate concern about harm-to self, they chose anger (35) more frequently than disgust (11) and females also chose anger (37) more frequently than disgust (9). These proportions did not significantly differ, $\chi^2(1, n = 92) = 0.26, p = .61$. When males aimed to communicate moral concern, they chose anger (23) and disgust (22) about as often, but females chose anger (29) more frequently than disgust (22). However, the proportions did not significantly differ between genders, $\chi^2(1, n = 96) = 0.32, p = .57$.

In summary, gender of participant did not alter the findings, suggesting that males and females make use of anger and disgust for similar communicative purposes.

Discussion

In confirmation of previous findings, when participants aimed to communicate that their condemnation was morally motivated, the relative likelihood of expressing disgust increased to the extent that they were just as likely to express disgust as anger.

This was found despite the scenario strongly favouring anger because the violation had clear direct effects on the participant themselves and had unambiguously harmful content. The comparison condition confirmed that the wrongdoing elicited feelings of anger much more than disgust. Intentions to express disgust do not just depend on what one feels, but also on what one aims to communicate, even if the violation has no impure content.

3.5 Study 8

Study 8 had a similar aim to Study 7² but had a different design. Participants were given a similar scenario but were asked how they would feel after the first part of the scenario and were then also asked which emotion they would express if they had a particular communicative aim. The prediction was again that participants should predominately report *feeling* anger because in the scenario they are the victim of the violation (Hutcheson & Gross, 2011). However, despite reporting *feeling* anger, participants would predominantly choose to *express* disgust when their communicative aim was to show morally motivated condemnation. When their communicative aim was to protest harm-to-self, then they were expected to express, as well as feel, anger. It was not expected that all (or even most) participants would switch to disgust, since many would presumably answer with a mind to being consistent with the feeling they had reported. Nevertheless, if a significant number of participants switch to disgust in the communicating moral motives condition, then the social signalling hypothesis would pass a stringent test.

Method

² Study 8 was conducted prior to Study 7 but is included afterwards here, because it did not appear in the main text of Kupfer and Giner-Sorolla (2016) but only in the supplemental online materials due to the findings being less clear-cut than those of Study 7.

Participants: Expecting small to medium effect sizes (\sim Cramér's $V = .25$), a power analysis using GPower 3.1.9.2., with the alpha level at .05 and desired power at .90 was conducted. It recommended a sample size of 264. We aimed to collect 317 participants to allow for incomplete responses and exclusions based on an attention check question. Of the 305 participants (133 female; $M_{\text{age}} = 37.22$, $SD = 11.33$) who completed the study on Amazon MTurk, 12 were excluded for failing the attention check question, leaving 290 participants for analysis.

Materials and Procedure

Scenario part 1. The first part of the scenario was common to both conditions. It described the violation with the following text and then the participant was asked how they would feel and the second part described an audience to whom the participant was trying to express. The scenario consisted of the following text (word changes for the harm-to-self condition are given in brackets):

“At your place of work you and your colleague, Robert, have recently completed a project that you have both been working on for the past few weeks. You were equal partners on the project. If anything, you feel that you worked a bit harder than Robert but you are pleased that the project was a success and you are happy to give him equal credit.

However, you have just been told by another colleague that Robert presented the results of the project to the managers of the company. He made is sound as if he had done the majority of the work himself. Since he was given almost all of the credit for the work, he has been awarded a significant amount of money as a bonus. If your colleague had not told you about this, you might not even have found out. When you saw Robert recently, he did not mention anything about it.”

Next, participants completed the following dependent measures:

Felt emotion. Participants were asked: ‘Which emotion would best describe how you would feel when you found out about what Robert did?’ and chose from ‘angry’, ‘disgusted’, ‘afraid’ and ‘joyful’. They were also asked ‘How much of each emotion do you think you would express in this situation?’ and rated the four emotion labels from 0, none to 6, a lot.

Scenario part 2. The second part of the scenario varied participants’ communicative aim using the following text (word changes for the harm-to-self condition are given in brackets):

“A short while after you find out about what had happened, you are in the break room during your lunch break with a few of your colleagues. You decide that you want to talk to them about what Robert did. You still feel strongly about what happened but you want to make it clear to your colleagues that you feel this way about what Robert did because he broke an important moral principle (it harmed you personally).

Which emotion would you express to show that you feel strongly about what Robert did because it was immoral (harmed you personally)?”

Next, participants completed the following dependent measures:

Emotion label. Participants chose from ‘angry’, ‘disgusted’, ‘afraid’ and ‘joyful’.

Emotion facial expression. Participants were asked ‘Which of the facial expressions shown below would you be most likely to show?’ and chose from anger, fear, disgust and joy facial expressions.

Emotion label scale. Participants were asked ‘How much of each emotion do you think you would express in this situation?’ and rated the four emotion labels from 0, none to 6, a lot.

Results

Felt emotion. Participants who chose afraid ($n = 0$) or joyful ($n = 3$) were excluded, so that the emotions of interest, angry ($n = 222$) and disgusted ($n = 65$), could be compared directly. As expected participants chose the label angry (222) more frequently than the label disgusted (65) to describe how they would feel, $\chi^2(1, N = 287) = 84.89, p < .001$, Cohen’s $w = .54$. Using the scaled responses, participants also reported that they would feel more anger ($M = 6.27, SD = 1.05$) than disgust ($M = 5.62, SD = 1.45$), $t(289) = 7.12, p < .001, d = 0.84$.

Expressed emotion label. Participants who chose afraid ($n = 2$) or joyful ($n = 0$) were excluded, so that the emotions of interest, angry and disgusted, could be compared directly. There was a significant association between communicative aim and emotion expression chosen, $\chi^2(1, N = 288) = 3.98, p = .046$, Cramér’s $V = .12$. When participants were given the aim to communicate concern about harm-to self, they chose angry ($n = 77$) more frequently than disgusted ($n = 64$), although this difference did not reach significance, $\chi^2(1, n = 141) = 1.20, p = .27$, Cohen’s $w = .09$. When they aimed to communicate moral concern, they chose disgusted ($n = 84$) more frequently than angry ($n = 63$). This difference approached significance, $\chi^2(1, n = 147) = 3.00, p = .083$, Cohen’s $w = .14$.

Expressed emotion facial expression. Participants who chose afraid ($n = 2$) or joyful ($n = 0$) were excluded, so that the emotions of interest, angry and disgusted, could be compared directly. There was a significant association between communicative aim and emotion expression chosen, $\chi^2(1, N = 279) = 5.27, p = .022$,

Cramér's $V = .14$. When participants were given the aim to communicate concern about harm-to self, they chose the anger facial expression ($n = 92$) significantly more frequently than disgust ($n = 46$), $\chi^2(1, n = 138) = 15.33, p < .001$, Cohen's $w = .33$. When they aimed to communicate moral concern, there was no significant difference between anger ($n = 75$) and disgust ($n = 66$), $\chi^2(1, n = 141) = 0.57, p = .45$, Cohen's $w = .06$.

Thus with both emotion word labels and facial expression choices, having the aim of communicating moral motivation for condemnation increased the proportion of disgust choices relative to anger choices. These findings are consistent with those of Study 7.

Expressed emotion scale. An ANOVA with communication aim as a between-subjects factor and amount of emotion expressed as a within-subjects variable revealed no main effect of emotion expressed, $F(1, 288) = 2.62, p = .11, \eta_p^2 = .01$, but there was a significant main effect of communicative aim, $F(1, 189) = 7.02, p = .008, \eta_p^2 = .02$. The two-way interaction between emotion expressed and communicative aim was not significant, $F(1, 288) = 0.77, p = .38, \eta_p^2 = .00$. When the participants' aim was to communicate self-concern, more anger ($M = 5.59, SD = 1.40$) and disgust ($M = 5.67, SD = 1.45$) was chosen, than anger ($M = 5.11, SD = 1.49$) and disgust ($M = 5.38, SD = 1.71$) when participants' aim was to communicate moral concern.

Results by gender of participant.

Felt emotion. Male participants chose the label angry (118) more frequently than the label disgusted (39) to describe how they would feel and female participants also chose the label angry (104) more frequently than the label disgusted (26). These proportions did not significantly differ, $\chi^2(1, N = 287) = 0.95, p = .33$.

Expressed emotion label. When male participants were given the aim to communicate concern about harm-to self, they chose angry ($n = 45$) more frequently than disgusted ($n = 40$) and females also chose angry ($n = 32$) more frequently than disgusted ($n = 24$). These proportions did not differ, $\chi^2(1, n = 141) = 0.24, p = .62$. When males aimed to communicate moral concern, they chose disgusted ($n = 41$) more frequently than angry ($n = 32$) and females also chose disgusted ($n = 43$) more frequently than angry ($n = 31$). These proportions did not differ, $\chi^2(1, n = 147) = 0.06, p = .81$.

Expressed emotion facial expression. When male participants were given the aim to communicate concern about harm-to self, they chose the anger facial expression ($n = 56$) significantly more frequently than disgust ($n = 27$) and females also chose the anger facial expression ($n = 36$) significantly more frequently than disgust ($n = 19$). These proportions did not significantly differ, $\chi^2(1, n = 138) = 0.06, p = .81$. When males aimed to communicate moral concern, they chose anger ($n = 36$) and disgust ($n = 33$) about equally and women also chose anger ($n = 39$) and disgust ($n = 33$) about equally. These proportions did not significantly differ, $\chi^2(1, n = 141) = 0.56, p = .81$.

Expressed emotion scale. Looking at the scaled responses, gender of participant did not interact with the emotion expressed, $F(1, 288) = 0.87, p = .35, \eta_p^2 = .00$.

In summary, consistent with Study 7, findings did not differ depending on the gender of participants, suggesting that males and females make use of anger and disgust for similar communicative purposes.

Discussion

The results from emotion label choices and facial expression choices were consistent with predictions, in that despite the scenario predominantly eliciting feelings of anger, a goal of communicating morally motivated condemnation pushed the expression decision in the direction of disgust. However, this did not occur for the emotion scale ratings. One possible reason is that since the scale rating came after the word and face ratings, it may be that the relatively subtle effect of the communicative aim manipulation had attenuated. This may have been exacerbated because participants were not reminded of the communicative aim, so they may simply have reported their felt emotion. The design for Study 7 (described previously but conducted after Study 8) was adjusted to take into account these possible weaknesses; this was mainly achieved by making the felt condition a third, comparison, condition, rather than asking felt emotion prior to asking the same participant their expressed emotion. In addition, participants were reminded of their communicative aim in the scenario before completing the scaled emotion responses. These changes may have reduced any consistency or attenuation effects, enabling the effect of interest to be revealed more clearly.

One limitation is that Study 8 (as well as Study 7, above) did not investigate whether having a particular communicative goal influenced the emotion felt. In both studies, the felt emotion was measured before the communicative goal was given and then participants were asked which emotion they would express. However, it could have been that having a goal of communicating moral motives increased the likelihood of expressing disgust but also increased the likelihood of feeling disgust, or, more strongly, that the increased likelihood of feeling disgust led to increased likelihood of expressing disgust. There are reasons to doubt the latter stronger claim,

however, because there is no obvious reason why a desire to express moral concern should directly make a person feel the emotion disgust. However, a more plausible indirect account could be that a person expresses disgust because they have implicit knowledge that disgust effectively communicates moral motives for condemning a wrongdoer (as argued in this thesis), but then the act of expressing disgust leads to feelings of disgust.

This possibility is supported by some evidence relating to the effect of expressions on feelings. According to the facial feedback hypothesis, people's affective experience can be influenced by their emotion expression, even if that expression did not arise from a corresponding emotion (Strack, Martin, and Stepper, 1988). However, if it exists, the facial feedback effect may be weak: a recent registered replication involving 17 independent studies in which the funniness of a cartoon was rated with a pen held between the teeth or lips (to produce a smile or pout), found an effect size of zero (Wagenmakers, et al., 2016). Another possibility is that feelings of disgust follow expressions of disgust due to cognitive, rather than physiological mechanisms. Evidence has shown that the act of publically communicating attitudes can have an influence on a person's actual attitudes, even if they did not hold these attitudes previously (Higgins & Rholes, 1978); and when people deliberately present themselves to an audience in a particular way, they can come to believe that what they have presented reflects how they really are (Kelly & Rodriguez, 2006; Schlenker & Trudeau, 1990). Perhaps an analogous process could lead self-presentations of moral concern via disgust to lead to actual feelings of disgust.

Regardless, the possibility that expressing disgust leads to feelings of disgust (or any other feeling), does not contradict the central claims of this thesis, which are

that the *initial* motive for expressing disgust is to communicate particular social-motives (Studies 4-8), and that moral disgust is not initiated by contamination appraisals (Studies 1-3). By themselves, these findings suggest that moral disgust is unlike prototypical disgust, and if it were true that expressing moral disgust subsequently led to some degree of prototypical disgust feeling, this would not be contradictory.

To test the possibility that reporting disgust, or having a communicative aim, leads to feelings of disgust, additional conditions could be added in which participants are given a communicative aim and are then asked which emotion they would feel, after (or instead of) asking which emotion they would express. A caveat to any findings deriving from an experiment like this would be that participants will often report feeling disgust, even when the emotional experience is in fact unlike prototypical disgust (Kupfer, 2018; Kupfer & Fessler, 2018). To find out whether participants truly feel disgust, rather than report feeling it because they use the term imprecisely, the emotion should be measured at a more granular level by asking participants whether they feel the key components of disgust, including nausea, the urge to vomit, the urge to withdraw, and feelings of contamination. Indeed, Studies 1-3 of the present thesis showed that participants do not appraise or feel contamination, even when they report being strongly disgusted by an immoral stimulus (a Nazi armband), suggesting that people may report moral disgust without experiencing the emotion (assuming that emotions are defined by their physiological and subjective properties, rather than simply by use of a word). Future studies could also investigate whether people who report moral disgust feel nausea, the urge to vomit, or suppressed appetite; the lack of which is already indicated by some evidence (Royzman et al., 2014). If people do not experience these components either, then it would be difficult

to argue that moral disgust is the same emotion that is experienced in response to physical elicitors such as faeces or rotten meat, given that the responses would have little left in common beyond a vague feeling of dislike or displeasure and a similar facial display.

Importantly, this would not mean that reporting or expressing disgust towards immorality is dishonest or deceptive. Moral disgust would only be deceptive if observers were led to mistakenly infer that the expresser was experiencing sensations of nausea and contamination. This, too, is an empirical question: a study could ask participants to rate how disgusted an expresser is towards a moral violation, and then to rate how much nausea and contamination they think the target feels. Participants could also be asked how much indignation or moral outrage the target feels.

According to the account outlined here, ratings of nausea and contamination would be much lower than indignation and outrage. Moreover, perceived indignation and outrage would predict the level of disgust inferred more strongly than perceived nausea and contamination. It might still be argued that expressing disgust towards immorality is an attempt to deceive observers, even if the outcome of this proposed study showed that the attempt to deceive is unsuccessful. Again, this could be tested: a participant could be asked which expression they would show towards a moral violation and, for those who chose disgust, asked to predict what an observer (who is aware that the expression was shown towards a moral violation) would infer regarding the participant's feelings. The prediction would be that the participant would not expect an observer to infer nausea or contamination, but would infer moral motives, which might be labelled indignation or outrage. Notably, a person may genuinely feel outrage and indignation while expressing disgust, but their sincerity is likely judged by many factors, such as the strength of their display, their history of

sincerity (if known), and whether they are perceived to have selfish interests at stake. Together these two studies would show that expressing moral disgust in the absence of prototypical disgust feelings is not deceptive, and nor is it an attempt to deceive. Rather, as highly sophisticated social communicators and perceivers, humans have flexibly redeployed an existing facial display to serve the uniquely human need advertise and perceive socio-moral standards.

3.6 General Discussion

Overall, results show that an expression of disgust conveys more moral concern than an expression of anger (Studies 4 and 5), and that people deliberately choose to express disgust to communicate that they are motivated by moral concern, and anger to communicate that they are motivated by self-concern (Studies 6, 7 and 8). These findings support the social signalling hypothesis of disgust.

This perspective may explain why people often report feeling disgust towards wrongdoings such as cheating or stealing, which have no cues of contamination: disgust is being used to communicate morally motivated condemnation. Even with wrongdoings that do involve any purity content, a question for future research is whether people respond with disgust predominantly because of an appraisal of contamination or impurity, as previous researchers have argued (e.g., Graham et al., 2009; Horberg et al., 2009; Inbar & Pizarro, 2014), or because they aim to communicate morally motivated condemnation. It could also be that the disgust expression is motivated by a combination of concerns; one might have an automatic disgust reaction towards a sexually deviant act but exaggerate the expression of disgust to make clear one's moral basis for objection. Previous findings have shown that even distaste or disgust expressions towards unpleasant chemicals are produced

in private but exaggerated when in front of an audience (Brightman, Segal, Werther & Steiner, 1977; Gilbert, Fridlund & Sabini, 1987; Jancke & Kaufmann, 1994). As noted by Hinde (1985), the motives behind an emotion expression may lie somewhere on a continuum from purely expression of internal feeling, to purely strategic signalling.

Findings from the current chapter reinforce the argument made in Chapter 2 that if people report disgust or even produce an expression of disgust, it may not mean that they experience the subjective feeling of disgust or its associated nausea, contamination and withdrawal components. Rather, they may express disgust to convey information about their motives. This is consistent with Fridlund's (1994) view of the function of emotion expressions: they have adaptive value because they convey information about the behavioural intentions and social motives of the expresser, not information about the expresser's internal feeling state. In the case of disgust towards wrongdoings, it seems clear that communicating information about one's basis for disapproval of the behaviour has greater adaptive value than communicating one's feeling of literal or figurative contamination. Having an alternative expression to anger, with its selfish connotations, affords opportunities to condemn behaviour without appearing to be motivated by self-interest. This might be especially useful in ambiguous situations in which one could plausibly be motivated either by concern for one's self, or by concern for the importance of a moral norm. Anger may prompt observers' to consider why the expresser herself has been harmed, whereas disgust could prompt observers' to consider the immoral nature of the wrongdoing, drawing attention away from the expresser's personal interests.

By framing condemnation as moral, rather than selfish, disgust may be a more effective tool for recruiting agreement and co-condemnation from observers; people

are more likely to agree with the expresser's condemnation if doing otherwise implies failure to care about a moral norm. In this way, disgust could be used not only to show one's moral credentials, but to reinforce moral norms that benefit the expresser. This argument accords with other accounts also suggesting disgust's involvement in morality is due to its signalling value, but that its main function is to recruit condemnation from third party observers to support norms that serve the fitness interests of the expresser (Tybur et al., 2013). In contrast to anger which threatens direct aggression, they argue that disgust functions like gossip as an indirect form of punishment (Molho, Tybur, Güler, Balliet, & Hofmann, 2017).

Although largely compatible, the present account differs in two main respects from that of Tybur and colleagues. First, they argue that disgust was exapted during evolution to serve the specific new function of norm endorsement and condemnation coordination (Tybur et al., 2009; Tybur et al., 2013). Many other researchers also argue that moral disgust arose through exaptation, an evolutionary process in which a pre-existing trait adopts a new function (Gould & Vrba, 1982), sometimes referred to as co-option, or preadaptation (Borg et al., 2008; Chapman & Anderson, 2013; Chapman et al., 2009; Kelly, 2014; Rozin & Haidt, 2013; Rozin, Haidt & McCauley, 2008). In contrast, the current perspective argues that there is no discrete emotion of moral disgust, as a few other researchers have also suggested (Nabi, 2002; Royzman et al., 2014). When the emotion of disgust is elicited by a moral violation, it is in response to pathogen or bodily content of the violation and the emotion is, therefore, pathogen disgust, not moral disgust (Royzman et al., 2014). Or if disgust is reported towards pathogen-free violations, it merely involves the expressive components of disgust, not the physiological, action tendency, or subjective feeling components that define emotion episodes (Studies 1-3; Nabi, 2002; Royzman et al., 2014). In

accordance with the behavioural ecology view of animal signals and human facial expressions (Dawkins & Krebs, 1984; Hinde, 1985; Fridlund, 1994), the expressive components of disgust can be used flexibly and strategically to communicate intentions and motives, irrespective of the internal state of the expresser. This account is more parsimonious than the exaptation account of moral disgust because it does not require a discrete adaptive event to explain the available evidence (Williams, 1966), only moralized pathogen disgust and flexible use of expressive components.

A second related difference is that Tybur and colleagues assume that reports and expressions of moral disgust reflect feelings and internal states of disgust (Molho et al., 2017), citing evidence that facial expressions of disgust are produced in response to pathogen free violations like cheating (Chapman et al., 2009) and that anterior insula activity increases in response morally disgusting stimuli. As detailed in Chapter 1, studies like these do not provide strong evidence that disgust is experienced. If reports and expressions of moral disgust do not include components of disgust like subjective feelings, physiology and action tendencies, then this renders exaptationist accounts even less parsimonious because it would need to make a post-hoc account of how these components were lost following its evolutionary origin as a novel assignment of the pathogen disgust system.

One counterpoint to the argument that disgust towards pathogen-free violations only involves expressive components is that facial actions should evolve to be honest signals; otherwise signal receivers will stop attending to them because they provide misleading information (Gintis, Smith & Bowles, 2001; Frank, 1988; Zahavi, 1977). Honesty in this context means that the expression is reliable and accurate in representing the internal emotion experience of the signal emitter. This argument may well be true for some expressions such as anger (Reed, DeScioli & Pinker, 2014), or

smiling (Brown & Moore, 2002; Mehu, Little & Dunbar, 2007), which could be misused by an expresser to send false signals of cooperative intent and then to cheat or free-ride on the gullible receiver. This may be why people are able to distinguish between ‘honest’, or Duchenne, smiles that are hard to fake because they are automatically linked to particular emotional experiences (Ekman, Davidson & Friesen, 1990), and ‘false’ smiles (Ekman & Friesen, 1982), which do not involve contraction of the muscle surrounding the eye. However, if receivers are able to distinguish between honest and false smiles, then false smiles are not really false in the sense of being misleading, rather they contain different information. For example, Reed, Zeglen and Schmidt (2012) found that both Duchenne and non-Duchenne smiles expressed by the sender during an acquaintance period were predictive of sender cooperation in a one-shot Prisoner's Dilemma game. Smiles that are not automatically linked to a particular internal state still communicate cooperative intent, just not as strongly as automatic smiles; receivers who are sophisticated enough to tell the difference between these signals can glean useful information from both signals and need not ignore the ‘dishonest’ signal. A similar argument can be made for disgust: receivers are not misled by expressions of disgust towards immorality; they just receive different information from an expression of disgust automatically tied to a particular internal state: they learn about the moral position of the expresser, not about her internal feelings of nausea or contamination.

Arguably, it is more useful for an observer to acquire information about whether the expresser's motives are moral versus self-interested than it is to learn about their internal feelings of contamination. It is, after all, information about the social motives, disposition and behavioural intentions of the expresser that will enable the observer to adjust their own social behaviour accordingly: Through trust and

cooperation given the disinterested, moral inclination of the disgust expresser, or through appeasement or retaliation given the personal stakes suggested by anger. Future research may investigate whether observers do behave differently (more cooperatively) towards a person who has expressed disgust versus anger towards the same wrong-doing. Research could also investigate whether receivers can tell the difference between expressions of disgust linked to internal feelings of nausea from a disgust expression made to advertise a moral position in the absence of these internal feelings.

Chapter 4. General Discussion

Chapter 2 demonstrated that the apparent contagiousness of immoral objects may in fact be due to concerns about being seen to associate with immorality. This finding provides further reason to doubt that disgust reported towards pathogen-free immorality really reflects activation of the emotion disgust (Royzman et al., 2014). Chapter 3 showed that disgust may be expressed towards moral violations because it is more effective than anger at communicating unselfish and morally motivated condemnation. This explanation removes the need for exotic explanations for disgust's elicitation by pathogen-free immorality, such as the perception and embodiment of "social contaminants", discussed below (Chapman et al., 2009; Zhong & Liljenquist, 2006), or the exaptation of pathogen disgust to motivate avoidance of poor cooperative partners (Tybur et al., 2009). Together, these findings provide an alternative account for why pathogen-free moral violations are reported to be disgusting and contaminating. The chapters are linked in that they both explain phenomena in terms of the fundamentally important social goal of maintaining a good moral reputation: apparent contagion concern functions to avoid immorality by association and the expression of disgust functions to communicate morally motivated condemnation. Maintaining a good moral reputation was probably vital during human evolutionary history, to secure the benefits of cooperation (Barclay & Willer, 2007) and to avoid the costs social exclusion (Kurzban & Leary, 2001), so it should not be surprising if reactions to immorality are shaped by reputation management motives, rather than by metaphorical pathogen avoidance motives.

Previous chapters discussed limitations, future research directions and links to existing literature. This chapter will discuss implications relating to moral cleansing effects and will use current and existing findings to consider metaphorical nature of

disgust and contamination. In addition, some broader suggestions for future research will be considered.

4.1. Metaphors and moral cleansing

The claim made in this thesis is that the language of disgust and contamination is used for communicative reasons but is underpinned by psychology unrelated to disease avoidance. However, the literature on moral cleansing claims to show that physical cleaning reduces people's feelings of moral disgust and contamination (e.g., Zhong and Liljenquist, 2006). If physical cleaning does indeed have this effect, it would count as evidence against the claim that people do intuit that moral disgust is physically contaminating.

In one of the most prominent set of studies, Zhong and Liljenquist (2006) had participants recall either moral or immoral past behaviour. Participants who had recalled an immoral act were more likely to complete word fragments (e.g., S _ _ P) with cleansing-related words (SOAP). In another study, Zhong and Liljenquist found that participants who recalled an immoral behaviour were more likely to choose an antiseptic wipe over a pencil as a free gift, apparently showing that immoral thoughts not only activated cleaning concepts but also *motivated* the desire to cleanse. Schnall, Haidt, Clore, and Jordan (2008) found that participants exposed to an untidy room, a bad smell, or a video showing a dirty toilet, expressed stronger moral condemnation than participants who sat in a clean room. Zhong et al. (2010) found that if participants' perceptions of their physical cleanliness were increased using a writing task, then subsequent ratings of their own moral character also increased. Lobel et al. (2014) found that participants donated less money to charity after they had bathed for religious purification and participants cheated more if they had taken a shower after visiting the gym. Based on the idea that clean is often represented by white and dirty

by black, Sherman and Clore (2009) used a moral Stroop task and found that participants judged the colour of a word more quickly when moral words were shown in white and immoral words in black. The more strongly people showed this effect, the more they rated soap and toothpaste as desirable.

Inspired by every-day sayings such as “dirty mouth” and “dirty hands”, Lee and Schwarz (2010) suggested that the above cleaning effects should be specific to corresponding body parts, in the same way that a person wants to clean their foot, not their mouth, when they step in dog faeces. Participants took part in a role-playing task in which they lied by voice mail (mouth) or by e-mail (hands). Participants who had lied with their mouth subsequently preferred mouthwash over hand sanitizer, whereas those who had used their hands preferred hand sanitizer over mouthwash. Participants were also willing to pay more for the product that cleansed their respective body part. The evaluation of mouth-cleaning versus hand-washing products was later shown to be associated with higher activities in the respective sensorimotor neural regions (Denke, Rotte, Heinze, & Schaefer, 2014; Schaefer, Rotte, Heinze, & Denke, 2015). In a successful replication of the Macbeth effect (Zhong & Liljenquist, 2006), Kaspar, Krapp and König (2015) found that cleansing reduced moral condemnation and this was linked to reduced pupil dilation. These findings have been taken to support the claim that understanding of abstract moral ideas is enabled by grounding in concrete sensorimotor experiences of cleanliness and contamination (Lee & Schwarz, 2016; Zhong & House, 2014).

Cleaning has also been shown to reduce the motive to make amends for one’s past immoral behaviour. Zhong and Liljenquist (2006) found that if participants did not wipe their hands they felt guilty about their past transgressions and were more likely to volunteer for another project. In contrast, those who wiped their hands felt

less guilty and were less likely to volunteer, suggesting that physical cleansing alleviates the need to make amends. Similarly, Schnall, Benton, and Harvey (2008) found that participants who had watched a disgusting movie judged transgressions more harshly but not if they had washed their hands after watching the film. This study was interpreted as showing that by reducing disgust, cleaning attenuated the motive to condemn. Gollwitzer and Melzer (2012) demonstrated that participants who played violent video games reported preferring hygiene related products over non-hygiene-related products in a product selection task.

From a functional perspective it is not obvious why immoral behaviour would lead to the desire to physically cleanse. Physical contaminants would be removed by cleaning, thus reducing the chance of infection, but past immoral behaviour cannot be removed in this way. Nor can these effects be explained as performative attempts to signal regret, since many were conducted without an audience. Lee and Schwarz (2011, p 308) suggest that “the regulation of moral behaviour is built upon earlier mechanisms that evolved to handle physical contamination”. This argument is an extension of the idea that moral disgust was co-opted from its original pathogen avoidance function to regulate avoidance of immorality (Rozin et al., 2008; Tybur et al., 2009). Here they suggest that an important action tendency associated with physical disgust – cleaning and hygienic behaviour – was also co-opted to deal with moral contamination. However, given that cleaning does not actually rectify immoral deeds or improve relations with the transgressed person, it is not clear how cleaning would enhance fitness or why it would have been co-opted by an evolutionary process.

These effects are part of a wider literature on embodied cognition that has been demonstrated in domains other than physical cleanliness. For example,

participants who held a cup of hot coffee made more favourable judgements about a target than those who held a cup of iced coffee (Williams & Bargh 2008). The authors claimed that this showed that concrete experiences facilitate abstract social cognition like interpersonal judgement – an idea known as conceptual metaphor theory, or embodied cognition. They claimed that the effect was not just driven by misattribution of positive affect (due to having hot coffee) because only attributes related to warmth (prosocial, generous, helpful) were rated higher. Experiences of physical warmth have also been found to increase the likelihood of warm behaviour towards a target (IJzerman & Semin 2009). Other demonstrations of conceptual metaphor theory include the finding that abstract ideas of importance are influenced by concrete perceptions of weight, as in “a weighty idea”. Participants who held a heavy clipboard compared to a light clipboard judged a variety of issues to be more important (Ackerman, Nocera, & Bargh, 2010; Jostmann, Lakens, & Schubert, 2009). Inspired by sayings like “the heavy burden of guilt”, Kouchaki, Gino, and Jami (2014) found that carrying a heavy backpack induced feelings of guilt and made individuals less willing to cheat.

The inspiration behind these effects derives largely from the conceptual metaphor theory of Lakoff and Johnson (1980), which argues that cognition is grounded in concrete metaphors, and from embodied cognition theories (e.g., Barsalou, 2008) which also argue that cognition is grounded, but that it is primarily grounded in action simulations (e.g., a simulation of weight or of cleaning), rather than in concrete metaphors. Many scholars have noted the remarkably frequent use of metaphors in languages (Asch, 1958) but Asch made the more specific observation that many metaphors used to describe social relations derive from our understanding of the physical world: a person can be warm or cold hearted, bright or dull, high or

low in status, and social interactions are often described in terms of physical force: “she forced him to go with her” or “they were pushed to the limit” (Pinker, 2010).

Lakoff and Johnson suggested that the significance of these metaphors had been underappreciated by previous scholars and argued that people represent abstract concepts in terms of concepts that are more concrete and easier to understand. Conceptual metaphors consist of systems of “entailments”, or mental associations, between elements of the concrete and abstract concepts. This enables people to use knowledge of a concrete concept to understand and think about the abstract concept. For example, people’s concrete, early developing conceptions of physical cleanliness, disgust and contamination form the cognitive basis for conceptions of the otherwise abstract concept of moral purity. In this view, disgust and contamination are not merely linguistic expressions, but concrete concepts necessary for thinking about morality, which would be too abstract to understand, were it not for activation of these concrete concepts (Landau, Meier & Keefer, 2010; Schnal et al., 2008).

Barge and associates (Bargh & Morsella 2008; Williams, Huang & Bargh, 2009) describe a similar view of metaphor, referred to as *scaffolding* : later forming and more abstract concepts are grounded on earlier forming and more concrete experiences, like a child’s experiences with heat, physical space, or unpleasant foods. As the abstract concepts develop from concrete concepts, associative connections are made which enable priming effects because activating the concrete sensation now also activates the associated abstract concept. Others have suggested that these effects could have come about not only during development but over evolutionary time (e.g., Barsalou, 2016). Lee & Schwarz (2011) argue that Anderson’s (2010) principle of neural reuse - that existing neural mechanisms acquire new functions over evolutionary time - can in part explain why moral disgust shares the concrete

properties of physical disgust like contamination and cleansing motives. In summary, in contradiction to the argument presented in this thesis, a considerable literature based on conceptual metaphor theory (Lakoff & Johnson, 1980) suggests that people *do* intuit that immorality is physically contaminating, and that they can even remove this contamination by physically washing. However there are empirical and theoretical reasons to doubt the credibility of this literature.

Perhaps the most important limitation of conceptual metaphor effects is that they are unreliable. For example, Rabelo, Keller, Pilati and Wicherts (2015) failed to replicate the highly cited effect linking ideas of importance to the perception of physical weight (Jostmann, Lakens, & Schubert, 2009). The authors found that carrying a heavy clipboard compared to a light one did not have any effect on the perceived importance of helping, prosocial responses, or the severity of moral judgments. Furthermore, like many of the conceptual metaphor studies, the original weight studies were methodologically weak. For example, the paper by Ackerman et al. (2010) had 54 participants in their first study and, although not reported, this gave an effect size of $d = 0.54$, with confidence intervals close to zero, 95% CI [0.002, 1.09]. Their second study had a similar effect size $d = 0.54$ and had confidence intervals overlapping zero, 95% CI [-0.04, 1.17] (Lakens, 2014).

Francis, Tanzman, and Matthews (2014) applied the Test for Excess Significance (TES) to a set of articles published in *Science* and found that Ackerman et al. (2010) was among the five articles with the most excessive successful results based on the sampling and analysis they used. Rabelo et al. (2015) ran the p-uniform method (van Assen, van Aert & Wicherts, 2015) on 25 previously published studies purporting to show that perception of weight influences judgements. A meta-analysis showed an effect size of $d = 0.57$, but the p-uniform test revealed strong evidence of

publication bias. Correcting for this bias yielded a negative effect size. Such bias typically results from dubious practices such as choosing which dependent measures to report or using sequential testing with selective reporting of studies (Bakker, van Dijk & Wicherts, 2012). The authors of one of the most widely cited weight-importance articles (Jostmann et al., 2009), confirmed that they had indeed chosen to include measures from exploratory and not just confirmatory variables and had also withheld one study from the paper. Admirably, however, the authors updated their claims: “We have had to conclude that there is actually no reliable evidence for the effect” (Jostmann et al., 2016, p1).

These problems are not restricted to social embodiment findings on the weight-importance link but have also been shown to apply to other effects, as illustrated by numerous, often highly powered, failed replication attempts (e.g., Brandt, IJzerman & Blanken, 2014; LeBel & Wilbur, 2014; Lynott, Corker, Wortman, Connell, Donnellan, Lucas & O’Brien, 2014; Pashler, Coburn & Harris, 2012; Pecher, van Mierlo, Cañal-Bruland & Zeelenberg, 2015; Wortman, Donnellan & Lucas, 2014). The majority of original demonstrations in the field have been underpowered, and according to a p-curve analyses by Lakens (2014), show evidence of selective reporting and publication bias. Although it could still be true that concrete environmental cues influence social cognition and judgement, the evidence does not currently provide strong support for this idea (Lakens, 2014). Importantly, this also applies to evidence purporting to show that concrete experiences of physical disgust, contamination and cleansing influence moral cognition. Several studies have failed to replicate Zhong and Liljenquist’s (2006) prominent findings that priming unethical versus ethical behaviours led participants to prefer cleaning products over non-cleaning products (Earp, Everett, Madva & Hamlin, 2014) and that participants who

physically washed their hands after recalling an unethical deed, were subsequently less likely to volunteer to help (Fayard, Bassi, Bernstein & Roberts, 2009; Gámez, Diaz & Marrero, 2011). Johnson, Cheung and Donnellan (2014) sought to replicate Schnall, Benton, and Harvey's (2008) findings that participants made less severe judgments when they were primed with the concept of cleanliness and when they washed their hands after experiencing disgust. Neither effect was found, despite the direct replication attempts using much larger sample sizes.

In summary, the evidence supporting conceptual metaphor theory in general, and moral cleansing effects more specifically, is weak and cannot be taken to show that people intuitively believe that immorality is physically contaminating. In addition, conceptual metaphor theory has been criticised on theoretical grounds for the claim that people are unable to think abstractly without grounding abstract concepts in concrete physical experiences (Mahon & Caramazza, 2008; McGlone, 2011). Others contest that people can think about social relations using by mentally manipulating symbolic concepts (Dove, 2009; Goldinger, Papesh, Barnhart, Hansen & Hout, 2016; Lakens, 2012). Another theoretical weakness is that it is unclear why links between abstract concepts and physical concepts would also activate motives (Chatterjee, 2010; Molden, 2014). For example, even if immorality is linked by associations to physical concepts of disgust and contamination, this does necessarily mean that the entire emotion, including motives like the urge to clean, would also be activated.

Furthermore, despite the major influence of Lakoff & Johnson's (1980) conceptual metaphor theory on social psychology, there are credible alternative theories of metaphor that do not share the embodiment assumption (e.g., Hofstadter, 2001; Pinker, 2010). For example, Searle (1979) argues that people first derive the

meaning of a metaphor by mentally converting it into a comparison statement, so a statement like “the feeling I have about touching the Nazi armband is contamination” becomes “the feeling I have about touching the Nazi armband is *like* contamination”. From a “weak embodiment” perspective abstract concepts may initially be understood through simulation and embodiment but once conventionalises they gain independent representation and do not need to be represented in terms of concrete domains; “knowledge drawn from concrete bases is used to build up the representation of an abstract concept that can then be used without drawing on the concrete domains that informed it” (Jamrozik, McQuire, Cardillo & Chatterjee, 2016, p. 4). Similarly, the career-of-metaphor account, a metaphor may initially be understood by its concrete sensorimotor associations but when repeated frequently enough, a person no longer needs these associations to comprehend the salient features of the metaphor (Bowdle & Gentner, 2005). These familiar metaphors become polysemous – capable of being understood to have both its original literal meaning and its new abstract meaning (Lehrer, 1990). This is why the abstract meanings arise later both in history and in an individual’s development (Zharikov & Gentner, 2002), as is the case for moral disgust’s development (Danovich & Bloom, 2009). According to these accounts, disgust reported or expressed towards immorality would not require sensorimotor simulation unless a person had not encountered the metaphor before. If disgust is not simulated but only processed abstractly, then it is unlikely that its physiological components like nausea and contamination would be activated.

Others argue that people directly understand that metaphors are used to make assertions about attributes. For example if a boy is said to fly home on a bike, flight prototypically denotes fast travel, so people directly perceive the metaphor attributes speed to the boy (Glucksberg, 1998; Ortony, 1979). Similarly if disgust is the

prototypical experience of offense and rejection, then it is easy to see why it would come to be used in a variety of contexts to denote the attribute of causing offense. Metaphors are often used when ideas would otherwise be difficult to express using literal language, at least in a concise way (Fainsliber & Ortony, 1987). Furthermore, Ortony (1975) suggested that metaphors are often used because they help to communicate the vividness of an experience by prompting the receiver to conjure perceptual and sensory images, which is why people often use metaphors for emotional experiences, like “I was burning inside”.

These features seem to apply well to disgust when it reported towards immorality: it expresses disapproval in a way that is vivid and evocative of strong feelings of rejection and offense that might be difficult to communicate using literal language. One interpretation of the finding that if a crime was described as “a virus infecting” a town, people were more likely to support investigating and tackling the criminals (Thibodeau and Boroditsky, 2011) is that the metaphor effectively evoked attributes of spreading harm but without necessarily being embodied. In addition, the disgust expression is concise and rapidly recognised and decoded by people (Ekman & Friesen, 1971; Sauter & Eimer, 2010; Sauter et al., 2010). Although anger might also be vivid and concise, as the current thesis shows, it does not communicate impartial, moral offense as effectively as disgust. These points might also apply to the language of contamination and contagion: it might be vivid and concise way to bring to mind the idea of strong discomfort with contact or proximity. When accompanied by facial expressions, metaphors of disgust and contamination might even more vividly and concisely communicate offense and rejection.

4.2 Other signalling functions of disgust.

If it is true, as suggested here, that the expressive components of disgust can be flexibly used irrespective of the internal state of the expresser, then there is nothing that ties it exclusively to the function of signalling *moral* condemnation. The disgust expression likely communicates a more general meaning of offense, dislike and the intention to avoid. It also invites agreement because disgusting objects, like faeces, mould, or unpleasant tastes and odours, tend to be disgusting to everyone, not just to one particular individual. The disgust expression, then, could be used as a more general social tool. It might be used, for example, to show dislike of certain outgroups, or even ingroup rivals, in the absence of any specific harmful act that would warrant anger. Females, especially, might use disgust as a tool of relational aggression to signal to peers that a rival is undesirable and to encourage them to exclude her (Underwood, 2004). This signal might communicate morally motivated tones if the target was a mating rival being denigrated as promiscuous, for example, or it might be a more general purpose tool. There are other tools of relational aggression, such as looks of contempt and back turning (Bjorkqvist, Osternan & Lagerspetz, 1994; Hines & Fry, 1994) but it would be interesting to know whether disgust is used in particular circumstances and whether it is more effective at recruiting condemnation and promoting social exclusion than other signals.

Similarly, treating an object as if it is contaminating is unlikely to apply only to immoral stimuli if the function of this behaviour is to avoid reputation harm by association. Stigma-by-association effects are widespread and have been documented to occur for many devalued individuals. Proximity or association with disabled people, homosexuals, or obese people lead to negative inferences about a target, leading to reputation damage (Neuberg et al., 1994; Pryor et al., 2012). If a person

perceives that visible association with these groups, or objects associated with them, would lead to reputation harm, then they will also appear to be treated as if they are contaminating. This reputation damage need not be moral reputation, since people seek to manage their reputations in other domains too, such as competence, formidability or popularity (Macfarlan & Lyle, 2015). Jones (1990), for example, distinguished five common self-presentational domains relating to being likeable, competent and powerful, as well as virtuous or moral.

Equally, reputation could be harmed by visibly associating with outgroups because apparent affiliation might be taken to show disloyalty – a concern which might have motivated Liverpool FC player Jamie Carragher’s reluctance to wear a Manchester United Shirt after losing a bet, despite a Liverpool fans’ advice often being framed in terms of disease avoidance, “Don't even dare put that sh** stained rag on Carra... you'll catch all manner of diseases!” (Gadd, 2015). Similarly, findings that people are more reluctant to wear shirts belonging to outgroup members (Reicher, et al., 2016) could partly be motivated by reputational concerns about loyalty, rather than disease avoidance. One prediction is that these effects should be stronger in audience conditions, especially if the audience consists of ingroup members. However, even without an audience, reputational concerns might not be eliminated because there could be an imagined or implicit audience (Fridlund, 1994), or reputational concerns might be activated by association. For example, if a certain behaviour (e.g. wearing a rival’s shirt) is associated with disloyalty, then even contemplating the action in private might be enough to bring implicit reputation concerns to mind.

4.3 Reputation. This thesis has focused on the importance of reputation management to individual fitness but some psychologists might argue that people’s

behaviour can be motivated by genuinely unselfish moral sentiments that transcend considerations of fitness. However, as several authors have noted being motivated by apparently selfish reputational concerns does not exclude the possibility that people can also be motivated by genuinely moral or prosocial concerns (e.g., Boyer & Baumard, 2012; Tomasello & Vaish, 2013). Indeed, the best way to appear moral may be to be genuinely morally motivated, so evolution may have favoured genuine moral sentiment precisely because it is the best way to make people seem moral and therefore good co-operators (Dennett, 2004; Trivers, 1971). In other words, one function of genuine moral motivation is reputation management. Nevertheless, even people who feel genuinely moral proximate motives might behave more scrupulously when they perceive that there could be reputational consequences. People should not necessarily be aware that their moral motives derive from reputational concerns, since reputation management itself would favour belief that one acts out of genuine moral concern, so as to more easily convince others that this is true (Trivers, 1991). Evolution would favour self-deception in this regard because it is easier to hold one inaccurate but functional belief that one has genuinely moral motives, than to simultaneously hold an accurate belief about one's selfishness and overt beliefs that one has genuinely moral motives with which to convince others (Kurzban & Aktipis, 2007; Smith, Trivers, & von Hippel, 2017).

Costs and benefits of reputation. Enhancing reputation is beneficial for one's status as a good and moral co-operator, but it is also be costly in terms of time and resources devoted to monitoring one's behaviour, including cognitive resources like attention and memory. In addition, monitoring the reputational effects of actions requires vigilance of other people and their attitudes and inferences. This state of vigilance can lead to stress and anxiety, to the extent that excessive reputational

concern may be associated with some anxiety disorders (Miller & Hedges, 2008).

Reputational management also involves opportunity costs because a person might refrain from taking certain actions that might risk reputational damage.

Due to these costs, investment in reputation management should vary depending on an individual's situational and dispositional need for a good cooperative (moral) reputation. There may be predictable consistencies in investment based on these considerations. For example, people with more power, status or competence may be less dependent on having a cooperative reputation (e.g., for not cheating, or not being seen to contribute equally to a group endeavour) than a person who cannot confer such benefits. A person in this situation does not have to pay the costs of reputation management.

A person who has high prestige or perceived abilities (e.g., a prestigious professor) may not even be judged as non-cooperative for the same behaviour that would stigmatise or ostracise a person with lower perceived ability. A person who communicates warmth through non-verbal behaviour might counteract reputation history or negative reported reputation by signalling cooperative disposition through warmth of character. People should be slower to punish highly valuable collaborators and when choosing a partner, they may trade off cooperative and moral reputation for other assets, like competence or status. A racist and sexist politician or a celebrity sex offender might get away with behaviour that would otherwise stigmatise because they afford people other benefits. People who are not under the patronage of these figures may not be in a position to benefit from the celebrity or politician and will be incredulous as to how he is allowed to get away with it. In summary, these affordance trade-offs should predict how much a person's reputation will be harmed for immoral acts, as well as how much an individual worries about their own reputation. Future

research could examine how these variables influence decisions to express emotions including disgust and anger.

4.4 Conclusion

Evolutionary adaptation is a special and onerous concept that should not be used unnecessarily... adaptation should be attributed to no higher a level of organization than is demanded by the evidence. (Williams, 1966, p v)

In no case is an animal activity to be interpreted in terms of higher psychological processes if it can be fairly interpreted in terms of processes which stand lower in the scale of psychological evolution and development. (Morgan, 1984, p 53)

The evidence reviewed in chapter 1 of this thesis gave only weak evidence in support the claim that the emotion disgust is elicited by pathogen-free moral violations. By showing that morally disgusting objects are not perceived or treated as contaminating, the evidence described in chapter 2 raises further doubts about whether reports and expressions disgust towards pathogen-free immorality reflect an internal state of disgust. The evidence described in chapter 3 supports an alternative account of why disgust is reported towards immorality: it is more effective than anger at communicating unselfish and morally motivated condemnation.

Given the constraints on evolution and the improbability of complex adaptation (Blomberg & Garland, 2002; Brakefield, 2006) and the improbability of complex adaptation, alluded to in Morgan's Canon and Williams' "ground rule" of evolutionary thinking, the hypothesis that an emotion called moral disgust evolved as a discrete adaptation should be treated with scepticism, especially in the absence of

convincing arguments that it conferred a significant individual-level fitness benefit on ancestral humans. Furthermore, if existing psychological mechanisms can account for the evidence that moral disgust is sometimes preferentially reported and expressed towards moral violations, then according to the principle of parsimony (Epstein, 1984, Morgan, 1894), the hypothesis that moral disgust is a discrete adaptation should be rejected. Here it is argued that reports and expressions of disgust (and contamination) towards immorality can be explained by existing signalling and reputation management psychological mechanisms.

Disgust reported or expressed towards bodily or impurity violations can be “full disgust” but the disgust is elicited by the pathogen content of the violation, so the emotion is pathogen disgust, not a separate emotion of moral disgust. Disgust toward pathogen-free moral violations is metaphorical: a vivid, concise and unique metaphor expressed with words and facial behaviour, but not necessarily an embodied or evolutionarily co-opted full emotion. From this perspective understanding the role of disgust in morality reduces to two research directions: why disgust is an effective metaphor and how cues to pathogens are sometimes moralised.

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