
# THE MAGICAL CONTAGION OF GUILT: THE ROLE OF CLEANSING

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**Resumo**

A literatura tem demonstrado que é possível transferir emoções através de contacto direto ou indireto – através de um veículo –. A este respeito, vários estudos têm-se focado na emoção nojo. No entanto, a possível transferência de sentimentos de culpa através de contacto indireto, permanece por explorar. Adicionalmente, há evidências de que comportamentos de limpeza contribuem para o alívio dos sentimentos de culpa associados a uma transgressão moral. O objetivo do presente estudo experimental (n = 94) é compreender se é possível transferir culpa e se, perante a oportunidade de limpeza do veículo de transmissão, os sentimentos de culpa podem ser atenuados. Os resultados mostram que não só é possível transferir culpa através de contacto indireto, como também se confirma o papel da limpeza como mecanismo de atenuação de culpa. Limitações e implicações são discutidas.

**Palavras-chave:** Lei do Contágio; Culpa, Emoção Corporalizada

## Abstract

A solid body of research has demonstrated that it is possible to transfer emotions by both direct and indirect – through a carrier – contact. In the case of emotion transfer, a number of studies has focused on the emotion of disgust. However, the possible transfer of guilt, particularly via indirect contact, has remained unexplored. Additionally, there is evidence that cleansing behaviours contribute to the relief from guilt feelings due to one's moral transgressions. The aim of our experimental study (n = 94) was to investigate whether it is possible transfer guilt and if given the opportunity to clean the medium of guilt transfer would attenuate the transferred guilt. Our results show that not only the emotion of guilt can be indirectly transferred across subjects but also the role of cleansing as a guilt relief mechanism. Limitations and the implications of the study are discussed.



**Key-Words:** Law of Contagion; Guilt; Embodied Emotion

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## 1. Introduction

We all know washing the body with soap and water cleans it. However, what is less known, if at all, is that physical cleansing relieves a person of guilt feelings induced, for instance, some moral transgression (e.g., Zhong & Liljenquist, 2006). Independently, there is research suggesting that people hold a contagion belief (e.g., Rozin, Millman, & Nemeroff, 1986; Rozin & Nemeroff, 2002). This research shows that if one comes into contact with objects that have been contaminated, such as a glass in which there had been a cockroach, then people are reluctant to drink from such a glass, even if it had been sterilized. In the research we report, we cross these two areas by examining whether witnessing somebody else report a moral transgression they committed transfers to a person who comes into contact with an object that the transgressor has held.

In the following, we shall first of all provide an overview of the two areas of research, namely the research showing contagion effects and the research showing that physical cleansing relieves a person of guilt feelings. Subsequently, we shall provide an overview of the present research.

## 2. Contagion effects

In our daily lives, we touch in a variety of things and generally we don't even think about the pros and cons of touching such things. Some examples are doorknobs or diverse objects in public spaces such as ATM machines, money, public telephones, just to name a few. As Nemeroff and Rozin (1994) have noted, contact has an influence by transmitting some properties. If you press a sheet of paper, it will crease. That is, the transmission of a property – force application – causes influence through direct contact – the creased paper.

From a biological point of view, we are all aware that some things we touch are more likely to transmit microbes or parasites, and affect our physical health. Therefore, we avoid having contact with some objects we think may pose a threat to our health that are likely to contain microbes and contaminants (e.g., garbage, toxic products). As suggested by the contagion literature (e.g., Nemeroff & Rozin, 1994), this is the adaptive function of disgust that is biologically rooted to protect us from undesirable substances (Nemeroff & Rozin, 1994). Although not all microbes are harmful to health, such as probiotics – microbes that have beneficial health effects for their host (i.e. improving the intestinal microbial balance) (Shadnoush et al., 2015) – this view does not explain contagion beliefs or for that matter beliefs about conditions in which microbial contagion plays no part (e.g., positive contagion,

rejection of objects that are sterilized between after the undesirable contact has occurred) (Nemeroff & Rozin, 1994).

From a psychological point of view, beliefs about such a transfer process is referred to as magical thinking, specifically, the contagion law. Sir James Frazer (1959), in his book "The Golden Bough", argued that there are two principles of thought on which magical thinking is based: the Law of Similarity where the magician infers that he can produce any effect he desires merely by imitating it; and the Contagion Law, which is the principle on which we will focus. Here, the magician infers that whatever he does to an object will affect and spread to the person with whom the object is next in contact (Frazer, 1959). The Law of Similarity and the Contagion law, which may be called laws of sympathetic magic (Frazer, 1959), constitute a part of what can be called magical thinking and were proposed to be universal principles of thinking (Rozin & Nemeroff, 2002). The common point between these two concepts is that they share the idea that beliefs about the world are generally contrary to current scientific beliefs (Rozin & Nemeroff, 2002). However, in contrast with magical thinking, the laws of sympathetic magic may be more manageable to experimental study for 3 reasons: they are clearly defined; they are present in abundance as modes of thought among contemporary people in developed societies; and they invoke principles (e.g. contact, resemblance) that are easy to manipulate in laboratory settings (Rozin & Nemeroff 2002).

According to the law of contagion, things that were once in contact with each other influence each other by transferring some of their properties (Rozin, Millman, & Nemeroff, 1986). Comparing psychological contagion with the biological one, this is precisely what happens in biological contagion. Consider the transmission of malaria: after female *Anopheles bites,* the effect of the bite remains, and is manifested in malaria (WHO, 2015).

Is it possible that contact transfers emotional residues upon others? This phenomenon can be demonstrated in the case of the Indian cast system. If someone from a lower caste touches an object that belongs to someone from an upper cast, then that object becomes contaminated (O'Neill, 2003). Why? Because the person in the lower caste is considered impure and polluted and when this person touches something, such properties are transferred, which, in turn, can contaminate other people who touch that the same thing (O'Neill, 2003). Thus, it can be seen that a person can contaminate another via touching an object.

The exchanged properties, as we have noted, may be rooted in physical, moral or psychological features and their effects can be beneficial or not, depending on the nature of transmitted property (Rozin & Nemeroff, 2002; Hejmadi et al., 2004). The transmission of those properties occurs through the transfer of assumed essences or residues, which are believed to contain the essential properties of the source (Nemeroff & Rozin, 1994). It is important to note that all properties of the source, good and bad ones, pervade the entire source and are contained in its essence regardless of their valence (Rozin & Nemeroff, 2002). As a result, one can say touching Hitler's fingernails as is as bad as touching his brain (Rozin & Nemeroff, 2002). This characteristic of contagion is called route insensitivity (Nemeroff & Rozin, 1994; Nemeroff & Rozin, 2000).

What is the process underlying contagion? As we referred above, the Contagion law suggests that things that were once in contact influence each other by transferring some of its properties, i.e., the *essence* (Rozin et al., 1986). This influence remains after physical contact terminates and yet the transferred property can be permanently associated with the contacted object ("once in contact, always in contact") (Rozin et al., 1986). The example of malaria illustrates biological contagion. In the following, we shall review some studies illustrating psychological contagion. "Contact" in these cases can be direct – for example, between an offensive (i.e., which transmit negative properties) person or object and a neutral one – or indirect – through an object or a space (e.g., living room) – (Rozin et al., 1986; Hejmadi, Rozin, & Siegal 2004). Generally, the source is usually animate, and a second object, usually human, is the target or recipient (Rozin & Nemeroff, 2002). When the contact is indirect, a third object – *vehicle* – mediates the contact between the source and the target (Rozin & Nemeroff, 2002). Food and clothing are common vehicles (Rozin & Nemeroff, 2002) but there are others, for instance, a cell phone.

The second law of sympathetic magic, the similarity law, suggests that things that are similar to each other share fundamental properties ("the image is equal to the object") (Rozin et al., 1986). That is, resemblance in some properties indicates a fundamental similarity or identity (Rozin & Fallon, 1987). For example, if it *looks like* dog faeces, it *is* dog faeces. Furthermore, if two things are "similar", then action taken against one will influence the other (Rozin & Fallon, 1987). A prototypical example of similarity is the voodoo practice of burning a representation of an enemy to cause the enemy harm; the action on the image is believed to result in effects on the object (Rozin & Nemeroff, 2002). As the contagion law, the similarity law also suggests that an image contains the essence of the

"source" and so the action taken against the image can produce similar effects on the source and vice-versa ("like produces like") (Rozin et al., 1986).

The magical law of contagion has two basic dimensions: first, the "magic" can be negative, which in turn can devalue the object (e.g., when we contact with someone who we don't like or despise) or positive, which can enhance the value of the object (e.g., when we contact a loved one); second, the transmitted essence can mediate the positive and negative contagion effects, i.e., the properties which pass from the source to the receptor (Rozin et al., 1986). In an early report, Rozin and colleagues (1986) found that the majority of the participants reported considerable negative responses to the suggestion of contacting with objects, which had a previous history of contact with negative sources, while the mean results of negative responses for objects contacting with positive sources was very small.

It is noteworthy that in the law of magical contagion, the nature of the relation between the source of contamination and the receiver determines if the contact will have an impact on the perception of receiver's well-being and what type of impact it will have (Hejmadi et al., 2004). According to this law, if an agent is hostile, has bad intentions or carries some kind of harm or threat, then these harm or threat related properties can be absorbed by, for instance, the clothes of the recipient, and consequently transferred to another person who comes into contact with this agent (Nemeroff & Rozin, 1989).

These two laws were qualified by Rozin and Nemeroff (2002) as cognitive heuristics, since they are rules of thumb that generally work to make sense of the world and promote adaptive behaviours. As mentioned earlier, appearance is usually a very good indicator of reality (e.g., if it looks like a tiger, it *is* a tiger) and, in fact, some important entities, as germs, do pass some of their properties through physical contact (Rozin & Nemeroff, 2002). Nevertheless, the laws of sympathetic magic differ from most of the classic heuristics, which serve the purpose of reducing the complex tasks of assessing likelihoods and predicting values to simpler judgmental operations (Tversky & Kahneman, 1974). The differences can be found in availability and anchoring: (1) the invocation of sympathetic magical intuitions is typically associated with a substantial affective component and, usually, the affective component it's not so substantial (Tversky & Kahneman, 1973); and (2) usually, people are either aware, or can be easily made aware, of the "irrational" aspects of these laws (Rozin & Nemeroff, 2002), which usually does not happen because the adjustment compared to the original anchor is often not enough (Epley & Gilovich, 2001). This can be seen when educated Americans prefer to eat chocolate in form of a disc or muffin rather than in the

form of dog faeces (Rozin et al., 1986). Such choices are made even though people are aware that it "makes no sense" (Rozin & Nemeroff, 2002), because they irrationally adhere, in this case, to the law of similarity, due to the shape of the chocolate, and to the contagion law, transferring the disgusting feeling associated with dog faeces. However, not all objects carry the same value for people and are affected the same way by these laws. For instance, money has been found to play an important role on decision-making processes since it makes people become more rational (Rozin & Nemeroff, 2002; Rozin, Grant, Weinberg, & Parker, 2007). If participants are given the opportunity to pay in order to avoid an unpleasant situation of negative contagion, they become overtly more rational, that is their beliefs of contagion decrease (Rozin et al., 2007).

The emotional experience of disgust, briefly exemplified above, provides an important and specific framework to the study of the laws of sympathetic magic given that disgusting stimuli have been found to produce strong effects which are congruent with and confirm these laws (Rozin et al., 1986). Disgust has a strong contaminant property which is a frequent (but not essential) feature of the danger category (Fallon, Rozin, & Pliner, 1984). Thus, in order to avoid such undesirable stimulus, participants are lead to transfer these disgusting properties to neutral objects.

Disgusting properties of objects have been found to vary from culture to culture (e.g., Nemeroff & Rozin, 2000). However, some objects seem to induce disgust in a universal way. In most cultures, disgust can also be induced by body parts (e.g., nails, hair), meat of invertebrates, reptiles, almost all amphibians and mammals (e.g., insects, mice/rats, frogs, snakes and parasites), in Western culture: (e.g., dogs, cats, donkeys), and certain excretions (e.g., stool, urine, secretions of various mucous membranes) (Angyal, 1941; Rozin et al., 1986; Rozin & Fallon, 1987). The intensity of disgust is also known to increase with the intimacy of the contact: vicinity, contact with the skin, with the mouth and ingestion (Angyal, 1941). It's important to note that the "history" about contact alone is enough to discourage people to get in contact with a certain object (Rozin et al., 1986).

Literature has shown that, when evaluating an object, its physical traces can either represent a threat to one's health (as with substances in the danger category) and/or a psychological threat (as with disgust substances) (Fallon et al., 1984). Disgust arises as an adaptive response to a certain stimulus for it allows individuals to keep away from what they might reason as a threat to their physical and psychological well-being. Therefore, disgusting properties of objects represent threats and often elicit uncomfortable states, which

consequently activate the need to avoid such objects in order to not be infect with the disgusting properties. As Hejmadi and colleagues (2004) have pointed out, nothing can be more threatening than something, which poses a threat the self and to the body.

At an interpersonal level, the negative contagion effects of seem to overlap the positive ones due to the tendency of human beings responding and learning more quickly to and from negative events (Rozin & Zellner, 1985). It has been demonstrated that this contagious effect and belief it seems to operate transversally between adults of different cultures (Rozin et al., 1986), such as in many "primitive" systems and rituals, like the Hua people from New Guinea and the Kai from Northern New Guinea, but also among American adults, Indians and other Western cultures. For instance evidence was found that American adults hesitated about eating soup, which had been stirred with a brand new comb or with a flyswatter (Rozin, Fallon, & Mandell, 1984; Rozin, Haidt, McCauley, Dunlop, & Ashmore, 1999). Similarly, participants also hesitated in drinking orange juice from a glass that has had brief contact with a sterilized cockroach (Rozin et al., 1986). That is, the fact that the participants knew that the juice was in contact with a sterile cockroach made them want the juice less. However, the contagion effect is not only present among adults, but it's also present in pre-school aged children (see Siegal, 1988; Siegal & Share, 1990), despite the lack of comprehension about how the biological process occurs at this age (Fallon et al., 1984). Moreover, Hejmadi and colleagues (2004) also found an adherence to the laws of magical contagion among 10 year old children, confirming that the contagion effect seems to be present from young ages and throughout adulthood. The common point between these studies is the underlying emotion – disgust – which is associated with the comb, the flyswatter and with the sterile cockroach and is transferred to a second product, which in turn made it much less appealing.

In the present work, the chosen emotion was "guilt", as we will explain next.

## 3. Guilt feelings

Guilt is a common form of emotional distress and a common factor in behavioural decisions (Baumeister, Stillwell, & Heatherton, 1994). The emotion of guilt occurs when an individual evaluates his/her current situation as "bad", observing that he/she has violated an important social norm in a blameworthy manner (Ortony, Clore, & Collins, 1988; Tangney, 1994). Therefore, there are two types of appraisals involved in the process that leads to the formation of guilt: an affective one (e.g., categorizing the behaviour as "good" or "bad") and

a cognitive one (e.g., considering the behaviour as a blameworthy violation of a social norm) (Ketelaar & Au, 2003). It is important to note that feelings of guilt emerge when the individual considers the possibility that he or she might have been incorrect at a particular behaviour or situation or that others may perceive him or her as a wrongdoer (Baumeister et al., 1994). As Ausubel (1955, as cited in Shott, 1979) stated for over sixty years ago, guilt is a "*negative self-evaluation, which occurs when an individual acknowledges that his behaviour is at variance with a given moral value to which he feels obligated to conform"* (p. 379). Hence, one may experience guilt when a misdeed is committed and when that person perceives his/her behaviour as morally inadequate.

Literature so far has suggested that guilt may be seen from two different points of view: (i) a legal one, related with the violation of legislated rules, and (ii) a psychological one, where guilt refers to a specific variety of consciously accessible mental states (e.g., the violation of an important social norm) characterized by a specific feeling state, as we'll show bellow (Baumeister et al., 1994; Ketelaar & Au, 2003). On the present study we will focus on the latest.

One may wonder what is special about guilt. To address that issue, it is noteworthy that some emotions don't require role taking for their evocation (e.g., anger, fear, joy) while others do, given that it's necessary to put oneself in another's position and take that person's perspective (Shott, 1979). There are two types of role-taking emotions: (i) reflexive ones, directed toward oneself (e.g., guilt, shame, embarrassment, pride, and vanity), and (ii) empathic ones, evoked by mental simulation of the other's position and imagining what the generalized other may be feeling or may do in such position (Shott, 1979). These reflexive emotions, specifically guilt, which serves our purposes, "*entail self-reactions to internalised and accepted social standards, which are abstractions acquired in the course of interaction, namely culturally supplied convention, rules and moral values"* (Semin & Papadopoulou, 1990, p. 109). Their two main features which contrast with the primary emotions are: (i) on one hand, "*the elicitation of negative reflexive social emotions consists in how one's self is perceived to appear to significant others as a consequence of particular actions* (…) [in this case,] *real or imagined social transgressions"* (Semin & Papadopoulou, 1990, p. 109); (ii) on the other hand, "*these emotions are self-directed"* (p. 109) and thus are significant motivators of normative and moral conduct which facilitate social control through the check and punish of the deviant behaviour (Semin & Papadopoulou, 1990). That is, this self-monitoring function makes this kind of emotions an important psycho-social mechanism in

the sense that it is through them that a person becomes socialized (Semin & Papadopoulou, 1990). Although guilt is a reflexive emotion, it depends mainly on taking the generalized others' point of view instead of specific others, which is most related to embarrassment (Shott, 1979). This occurs because, otherwise, if one takes the point of view of a specific other who feels guilty, his/her feeling of guilt would in turn increase. To diminish this possibility, people avoid interaction with those who trigger the emotion (Shott, 1979).

Another distinctive feature of guilt is that it tends to be elicited by internal, unstable and controllable attributions (Tangney & Dearing, 2002). Guilt belongs to the group of role-taking emotions and relates to empathy, i.e., people who feel guilty have propensity to be more empathic towards others than free-guilt people (Tangney, 1991). Guilt-prone individuals appear to be better able to empathize with others and to accept responsibility for negative interpersonal events, comparing with shame-prone individuals who evidence shows are relatively more likely to blame others for negative outcomes and are more prone to use anger and hostility and less capable to empathize with others in general (Tangney & Dearing, 2002).

As far as guilt is concerned, this emotion can be understood in interpersonal contexts as a factor that strengthens social bonds by enhancing symbolic affirmation of caring and commitment (Baumeister et al., 1994). It is also an internal mechanism, which as we'll show next, alleviates imbalances or inequities in emotional distress within interpersonal relationships (Baumeister et al., 1994; Estrada-Hollenbeck & Heatherton, 1998). The manifestation of guilt can also exert influence over others because it may lead the guilty person to adapt or even alter his behaviour towards others. That is, feelings of guilt promote a victim-oriented concern in the wrongdoer: usually guilt is followed by an attempt to increase social contact, and as we'll show next the tendency to apologize and confess the misdeed, ultimately promotes reparation and reconciliatory actions (Estrada-Hollenbeck & Heatherton, 1998; Tangney, 1994). In this sense, guilt and also embarrassment encourage altruistic behaviours by those who experience them "in *an attempt to repair one's self-conception or self-presentation and convince others of one's moral worthiness or competence"* (Shott, 1979, p. 1327). However, Baumeister and colleagues (1994) have pointed out that the manifestation of guilt strongly relates to the degree the guilty one is emotionally connected to the ones who suffer the misdeed. Therefore, according to an interpersonal approach, guilt reactions would be stronger and more common and influential in close relationships than in weak or distant ones (Baumeister et al., 1994). And so, as the

commonality (i.e., community, relationship) between two people approaches zero, the possibility for guilt should approach zero as well (Baumeister et al., 1994).

### 3.1. Role of cleansing

A solid body of research so far has showed that certain physical behaviours, such as self-punishment and physical cleansing, relieve the guilty feelings associated with moral transgressions (e.g., Zhong & Liljenquist, 2006; Schnall, Benton, & Harvey, 2008; Schnall, Haidt, Clore & Jordan, 2008; Lee &Schwarz, 2010; Bastian, Jetten, & Fasoli, 2011). Bastian and colleagues (2011) found evidence that when participants wrote about an unethical behaviour, they did not only hold their hands in icy for longer periods but also rated this experience as more painful than did participants who wrote about an everyday interaction. This shows that the experience of pain reduces peoples' feelings of guilt (Bastian et al., 2011) and contributes for feelings of relief. Similarly, Lee and Schwarz (2010) showed that inducing participants to commit a moral or immoral act through the mouth (using the voice mail) or the hands (using an e-mail), causes a differential desire for cleaning products; the authors found that participants' evaluation of the toothpaste and the antiseptic was more positive when the communication of the moral transgression involved, respectively, the mouth and the hands.

When studying the relation between (un)ethical behaviours and relief through cleansing, Zhong and Liljenquist (2006) found that when asked to recall non-ethical actions versus ethical ones, the participants generated more words related with cleanliness compared to neutral words. The accessibility of cleaning concepts increased when the action recalled was an unethical one. Moreover, and in line with other findings reported above, the authors found evidence that participants had a greater desire for cleaning products and a greater desire for an antiseptic as a gift over a pencil, when they were primed with unethical actions compared with ethical actions. Additionally, when participants in the unethical condition were able to clean their hands they were less likely to engage in volunteering, comparing to participants who weren't given the chance to do so (Zhong & Liljenquist, 2006). These findings help us conclude that after a moral transgression, relief can be achieved through cleansing actions – such as washing the hands – but when participants are not given this option, they look for another way to do so and are more likely to engage in activities which also help mitigate their guilt associated with the transgression, such as volunteering and assuming an altruistic behaviour.

Such findings confirm that cleansing behaviours, punishment and an altruistic conduct contributes to mitigate the guilt feelings associated with moral transgressions, but also the link between the body part used to commit a moral transgression and the specific cleansing product desired to relieve the guilt feeling associated with the misbehaviour.

So far we've seen that, relying on different methodologies, the literature shows convergent results regarding the relationship between physical cleansing and relieving negative feelings associated to moral transgressions. However, literature extends these findings to other emotions and has also showed an existent association between cleansing behaviours and disgust. This literature emphasises the importance of using cleansing, a physical action, as a mechanism for diminishing the impact of certain negative emotions. For instance, Schnall, Benton, and Harvey (2008) showed that priming the participants with cleansing intuitions and physically cleansing one's self after the experience of disgust reduces the severity of judgements about moral dilemmas when compared to a control group. In the same line of investigation, Schnall, Haidt, Clore and Jordan (2008) wondered if this judgement severity on moral dilemmas induced by disgust could arise due to individual differences. Confirming that individual differences account for judgement severity, they found that participants who attend more to their visceral reactions, assessed through the Body Consciousness Questionnaire of Miller, Murphy, and Buss (1981), had a tendency to be more severe in their judgments. Furthermore, it was shown that the relation between disgust and morality is stronger than the relation between sadness and morality. Judgments were more severe when disgust is the induced emotion rather than sadness. In fact, the results indicated that sadness leads to moral judgments in the opposite direction (Schnall et al., 2008a). In another study, Inbar, Pizarro, Gilovich, and Ariely (2013) showed that recalling a guilt-inducing event made participants more willing to inflict unpleasant electric shocks on themselves. This effect cannot be attributed to the fact that guilt is a negative emotion given that participants who recalled a sadness-inducing event also gave themselves shocks but these were significantly less intense than those given by participants in the guilt-induction group. The evidence presented above suggests that there is indeed a different relation between some groups of negative emotions, such as disgust and guilt feelings, and physical cleansing.

More recently, guilt began to be studied as if it could be treated as a tangible property, namely that people who bring guilt upon themselves also carry it much like a burden, or as if they are weighted down by it (Day & Bobocel, 2013; Kouchaki, Gino, & Jami, 2014). In

other words, feelings of guilt can be expressed as a "*weight on one's conscience"* (Day & Bobocel, 2013, p.1). This metaphorical language suggests that guilt, an abstract concept, is connected to a more concrete one, weight, which makes the abstract concept easier to grasp (Kouchaki et al., 2014). So far it has been known that the abstract concept of guilt has properties similar to an object with real weight (Lakoff & Johnson, 1980; Day & Bobocel, 2013). As Kouchaki and colleagues (2014) demonstrated, participants who wore a heavy rather than a light backpack while recalling a personal experience of guilt, reported experiencing greater guilt, chose more boring tasks over funnier and engaging ones and chose healthier snacks over unhealthy ones. In another set of studies, it was shown that the recall of an unethical action, compared to an ethical one, led to an increase of the perception of subjective weight, that is, participants who recalled an unethical act perceived themselves as heavier (Day & Bobocel, 2013) as if they carried the guilt of the action themselves. To conclude, these findings clearly demonstrate that the emotional experience of guilt can be grounded in subjective bodily sensations (Day & Bobocel, 2013) making it one of our measures.

## 4. Overview of the present investigation

In this present study, we examine the link between the cleansing concept and guilt feelings, with a specific focus on the transference of guilt by contact.

The current research relies on a 2 (emotional transfer: guilt vs. neutral) x 2 (cleanness: cleansing the phone vs. non-cleansing) between subjects' experimental design. Half of the participants were expected to experience transferred guilty-induced by listening to a phone call where the participant heard the confederate talking about an event where the confederate could have helped, but didn't, and because of that, felt very bad, i.e., guilty (Ortony et al., 1988; Tangney, 1994; Tangney & Dearing, 2002). The other half of the participants didn't receive this manipulation. They heard the confederate talking on the phone but now about a neutral event that had happened to her. This manipulation to induce the transfer of guilt, between the confederate and the participant was introduced by having the participant use the cell phone (the vehicle) that the 'guilty' confederate had used (see method).

Previous studies had already shown that it is possible to transfer emotions such as disgust (Rozin et al., 1986; Rozin & Fallon, 1987; Hejmadi et al., 2004). The novelty of our study is we were examining the transfer of guilt. To assess whether there was indeed transfer

of guilt feelings we used a measure of perceived weight (Day & Bobocel, 2013; Kouchaki et al., 2014).

After the participants received the instructions to proceed with their task, half of them were asked to clean the cell phone left by the confederate before they received a call giving the okay to start the computer tasks. This was the second manipulation we introduced which was designed to understand if cleaning behaviours can indeed reduce transferred guilt feelings. The literature has shown that this kind of behaviours and the desire for cleaning products, rather than neutral products, can relieve feelings of guilt (Schnall et al., 2008a; Schnall et al., 2008b; Lee & Schwarz, 2010). If guilt is actually transferred, then participants in non-clean/ guilt condition were expected to perceive themselves as physically heavier than participants in the clean/ guilt condition and the participants in the neutral-condition (first hypothesis).

Additionally, we developed another task to bring some clarity on the relation between guilt and cleansing behaviours. In line with previous findings showing that the desire for cleaning products is higher when a transgression or immoral act was committed (e.g. Lee and Schwarz, 2010), we used a computer mouse-tracking approach. This method gave us two kinds of measures: an explicit one – in a sense that the participant has to choose one between two options of response – and an implicit one – in a sense that we can assess the time needed to select the response (Hehman, Stolier, & Freeman, 2014). The participant's task was to categorize a number of products (neutral and cleansing products of bathroom and kitchen) as cleaners or non-cleaners. Accordingly, we predict that participants in the non-cleaning/guilt condition, would be faster categorizing cleaning products than participants in the other conditions (second hypothesis). Considering the morality involved with guilt feelings (Shott, 1979; Baumeister et al., 1994) and that *a clean self feels like a moral self* (Zhong, Strejcek, & Sivanathan, 2010), the speed and accuracy of the categorization of cleansing products would show an indirect attempt to *clean the self* which in turn could relieve guilt feelings.

To better understand our reasoning we considered other variables. As previously mentioned, feelings of guilt are positively related to empathy, given that people who experience guilt have a greater propensity to be more empathic (Tangney, 1991) and guilt prone individuals appear to be more capable of empathizing with others (Tangney & Dearing, 2002). In order to comprehend the association between the transfer of guilt and cleaning behaviours, we wanted to explore if the obtained results could be moderated by

empathy. In order to do so, one of the tasks was to fill an empathy measure (*Empathy Quotient* – Lawrence, Shaw, Baker, Baron-Cohen, & David, 2004). Thus, we want to explore to which extent empathy influences participants' subjective weight perception in the guilt and neutral conditions.

Finally, it is known that when people are openly asked if they believe in the transfer of emotions, they usually tend to state they do not believe in such concept, which confirms that the laws of sympathetic magic are seen by most people as irrational and unlikely (Rozin & Nemeroff, 2002). However, when this information is obtained in an implicit way, it's possible to see that some people do believe in the transfer of emotions (Savani, Kumar, Naidu, & Dweck, 2011). In order to verify if this is present rather than just American and Indian cultures (Savani et al., 2011), we constructed some items referring to the transfer of emotions (E.g., *If my partner uses a tissue, I have no problem using it later.*). Here, we hypothesize that participants who show implicit beliefs in transfer emotions, are more likely to be susceptible to transfer emotions.

Therefore, the overall aim of this study is to understand if it's possible transferring guilt and if so, whether cleansing behaviours can relieve the feeling of such emotion.

## 5. Method

### 5.1. Participants and design

Ninety-four participants aged between 18 and 40 (60 females, $M_{age}$=25 $SD$=4.96) participated as paid volunteers (5€). All procedures were executed in compliance with relevant laws and institutional guidelines and were approved by the ethics committee of the University Institute - ISPA. All participants signed an online informed consent for their participation.

Participants were recruited from the external pool of ISPA and they were randomly assigned to one of the conditions: 2 (emotional transfer: guilt vs. neutral) x 2 (cleanness: clean vs. non-clean).

### 5.2. Stimulus Materials and Procedure

Upon arrival participants provided some personal data. Then they had to wait while the experimenter went to the control room. During this period, the confederate, who was in the experiment room, played a pre-recorded conversation, which appeared as a phone conversation that the confederate was having with a friend. The conversation that the

confederate was having implied unambiguously that the confederate had acted in a way that she was and felt guilty of an interpersonal misdemeanour (or not) [see Appendix 1 for detail]. After ending the conversation, the confederate left the room without saying anything to the participant, who was sitting next to the door. Afterwards, the experimenter came and led the participant to the experiment room where the participant received the following instructions: *'In this experiment you will be doing some computer driven tasks. Each task is preceded with instructions of what you'll have to do. While performing these tasks, sometimes you will have to use the mouse and other times the keyboard. After receiving your instructions you will have the opportunity to do some practice trials to familiarize yourself with the task at hand. I shall now leave you and call you on this cell phone here to tell you the key you have to press to start the experiment. Do you have any questions?* Additionally, in the cleanness condition, the participant was asked to wipe the mobile phone (with regular cleaning wipes provided by the experimenter) because 'the mobile phone had been used by several people'. This manipulation was not used in the non-cleaning condition. The experimenter then left the experiment room, waited a few moments (so that the participant could have time to wipe the phone in the cleaning condition) and called the participant on the cell phone that was intentionally placed in the experiment room, informing him about the key that should be pressed in order to initiate the experiment.

In the first task, the participant was asked to move the cursor in a slider bar to the position which better indicated how she/he was feeling both physically and psychologically, on that particular moment. The slider represented a continuum which varied from a score of 0 (left side of the slider) to 100 (right side), with a middle point of 50. Thus, for each dependent variable, the participant's score on that particular category could range from 0 to 100. However, this quantification was not shown to the participants, given that the slider was only presented with 3 reference points. For instance, for our first measure – weight - the reference points were *Much lighter* (left), *Neither lighter nor heavier* (middle), *Much heavier* (right).The remaining measures appearing on the screen were the following: *cleaner/dirtier, tensed/relaxed, lighter/darker, brighter/darker, taller/shorter, worst/better, stronger/weaker, passive/active.*

The second task was carried out by means of the mouse, whereby the mouse movements were tracked with special software. This software allows us to record and analyse the movements participants did with the mouse while they were responding to the current task, providing us implicit information about the motor processes behind their

answers. In this task an image appeared in the centre of the screen and participants had to categorize it as belonging to one of two groups: cleaning products or non-cleaning products. These two response options presented on the screen were counterbalanced between subjects: half of the participants had the word "cleaning" on the left and the word "non-cleaning" on the right, and the other half of the participants had the inverse pattern. Four categories of products were shown at the centre of the screen: kitchen cleaners, assorted kitchen paraphernalia, bathroom cleaners and assorted bathroom paraphernalia. Each category contained images of ten products. All images were previously piloted for neutrality; the three products in each category which obtained the closest evaluation to the neutral point (on a scale from 1 to 7) were presented twice, the remaining seven in each category were shown only once [see Appendix 2 for detail]; this means that, in total, each participant saw a display of 52 pictures.

As each image was presented on the centre of the screen, the participants were required to move the mouse cursor towards the response answer (cleaning vs. non-cleaning products) they thought better described the category of the portrayed product; participants were instructed to move the cursor as fast as possible even if at that point they had not yet decided which was the category the displayed product belonged to. However, if the participant took more than 400ms to start moving the mouse from the onset of the task, the following message popped on the screen "*Start moving the mouse faster*!".

The third task consisted on an empathy measure. We used the Empathy Quotient (reduced version) from Baron-Cohen, Richler, Bisarya, Gurunathan, and Wheelwright (2003), which was translated and adapted to Portuguese by Rodrigues, Lopes, Giger, Gomes, Santos, and Gonçalves (2011). This scale was chosen because it was adapted to different countries and due to its excellent psychometric qualities ($\alpha$= .85). The 22 items were responded to on 4-point scales, from 1- Totally agree to 4- Totally disagree. The scoring varied from 0 points (a non-empathic response), 1 point (a slightly empathic response) or 2 points (a strongly empathic response). The scores could range between 0 and 44.

The fifth task was an emotional transfer implicit measure, where the participants had to express their opinion regarding some statements. As other authors did (see Savani et al., 2011), we constructed some sentences involving the transfer of emotions [see Appendix 3 for detail]. The response scale was a 7-point one, ranging from 1 (totally disagree) to 7 (totally agree) (e.g., *If someone drinks from a glass, I have no problem in drinking from the same cup.*). The scale comprised a total of 11 sentences which were randomly presented on

the computer screen to the participants. The scores could range between 0 and 77. Higher scores indicate weak beliefs about emotion transmission, lower scores indicate strong beliefs.

The last task was a manipulation check. In a 7-point scale, ranging from 1 (totally disagree) to 7 (totally agree), the participants had to choose the point that better indicate how they felt. In order to do so, participants were asked to report to which extent during the experiment they felt: annoyed, tired, guilty, happy, ashamed, sad, serene, neutral, optimistic, angry, and indifferent. Adjectives were randomly presented on the screen.

Finally, we questioned participants what they thought the experiment was about as well as which was, in their opinion, the experiment's main goal.

## 6. Results

### 6.1. Dependent variables development

a) Developing the guilt transmission measure

The first question we addressed was centered on the notion of perceived weight, which had been shown to be associated with the feeling of guilt perceived as a burden (Day & Bobocel, 2013; Kouchaki et al., 2014). We assumed that this construct would be an indicator of perceived guilt via contagion. We performed an exploratory principle components analysis with varimax rotation on the bipolar items we had used to find if we could identify a distinctive heavy-light Factor. The first factor we identified had an Eigenvalue of 2.51 (31.31% of explained variance). The items with a factor loading above .5 were light/heavy, light/dark, clean/dirty and tense/relaxed (reverse coded). The second factor had an Eigenvalue of 1.35 (16.84% of explained variance) with the following items loading above .5: strong/weak (reverse coded), passive/active and feeling worst/better (see Table 1). The remaining items were fillers so they are not considered further.

Table 1: Factor Loadings of Items on Factor 1 and 2

| | Component | |
|---|---|---|
| | 1 | 2 |
| Light/heavy | .763 | |
| Tense/relaxed (R) | .761 | |
| Light/dark | .580 | |
| Clean/dirty | .546 | |

| | | |
|---|---|---|
| Strong/weak (R) | | .829 |
| Passive/active | | .765 |
| Feeling worst/better | | .606 |

(R) – reversed coded

In a second step, a reliability analysis was performed on the items of the first and second Factors to see their scalability. An analysis of the items loading on the first Factor yielded a Cronbach alpha of .59. Further examination of the items suggested that the items light/dark and clean/dirty had low item-whole correlations (see Table 2). Discarding these resulted in a Cronbach alpha of .61. Examining the reliability of the items loading on the second factor yielded a low alpha (.650). We thus discarded passive-active, because the item had a low whole correlation (see Table 3). The remaining two items, strong-weak and feeling worst-better formed a reliable scale (Cronbach alpha of .753).

Table 2: Cronbach alpha of Factor 1 if item deleted

| | Scale Mean if Item Deleted | Scale Variance if Item Deleted | Corrected Item-Total Correlation | Cronbach's Alpha if Item Deleted |
|---|---|---|---|---|
| Tense/relaxed (R) | 126.87 | 1422.03 | .460 | .446 |
| Light/heavy | 125.63 | 1754.77 | .513 | .433 |
| Light/dark | 135.51 | 1982.88 | .335 | .551 |
| Clean/dirty | 140.40 | 1837.66 | .240 | .632 |

(R) – reverse coded

Table 3: Cronbach alpha of Factor 2 if item deleted

| | Scale Mean if Item Deleted | Scale Variance if Item Deleted | Corrected Item-Total Correlation | Cronbach's Alpha if Item Deleted |
|---|---|---|---|---|
| Passive/active | 110.31 | 766.41 | .361 | .753 |
| Feeling worst/better | 107.78 | 1031.85 | .455 | .579 |
| Strong/weak (R) | 108.34 | 797.5 | .631 | .328 |

(R) – reverse coded

Subsequently, we calculated a composite measure for the first Factor by adding the scores for the two items and dividing them by 2. From now on, we will refer to this factor as

the Weight Scale. The same procedure was employed for Factor 2 and to which refer to as the Valence-Strength Scale.

b) Developing the belief in contagion measure

The next question we addressed concerned the role of contagion beliefs. We conducted a reliability analysis on the 11 items. Considering that the best reliability value came from the items altogether, and in order to improve the reliability of the scale, item 11 was discarded, thus obtaining a Cronbach alpha of .608 (see Table 4), which is a low Cronbach value.

Table 4: Cronbach alpha of all Contagion Beliefs items if item deleted

| Contagion beliefs items | Scale Mean if Item Deleted | Scale Variance if Item Deleted | Corrected Item-Total Correlation | Cronbach's Alpha if Item Deleted |
|---|---|---|---|---|
| 1 (R) | 44.29 | 70.85 | .306 | .502 |
| 2 | 43.91 | 65.78 | .343 | .487 |
| 3 (R) | 46.00 | 72.13 | .245 | .518 |
| 4 | 42.93 | 73.38 | .259 | .515 |
| 5 (R) | 45.85 | 72.62 | .265 | .513 |
| 6 (R) | 42.68 | 74.8 | .268 | .515 |
| 7 (R) | 43.57 | 74.98 | .161 | .541 |
| 8 | 43.65 | 72.06 | .355 | .495 |
| 9 | 45.03 | 70.78 | .270 | .511 |
| 10 (R) | 45.67 | 71.11 | .235 | .521 |
| 11 | 42.59 | 89.41 | -.234 | .608 |

(R) – reverse coded

Subsequently, we calculated a composite measure with the remaining items by adding the scores for the ten items and diving them by 10. Henceforth, this measure will be referred to as the belief in contagion measure.

In the data analyses reported below this measure was recoded as 1 (low contagion beliefs - scores from 0 to the median value; Md = 4.45) versus 2 (high contagion beliefs - scores from the median value to 7) and used as a constructed variable to distinguish between high and low contagion believers in the analyses.

c) Developing proportion of correct categorization responses

Participants were asked to categorize each product as a cleaner or non-cleaner. These products were then divided into four groups and each group comprised a total of 13 images, namely: bathroom cleaners, bathroom non-cleaners, kitchen cleaners, and kitchen non-cleaners. We calculated the proportion of correct answers when categorizing each of the presented products. The proportion of correct answers per kind of product was then obtained by dividing the total number of correct answers for the total number of products in each group. Thus, composite scales concerning proportion of correct answers were computed for each of the four groups. An outlier examination led us to exclude two participants from the sample considering that their response accuracy was lower than three quartiles below the median.

Our next step was to create a new variable including the four above-mentioned scales, which gave us the overall proportion of correct answers and served as our dependent variable in further analysis.

d) Developing the empathy measure

One of the participants task was the fulfillment of the *Empathy Quotient* adapted to Portuguese by Rodrigues and colleagues (2011), as we referred above. Considering the participants responses, we created a new variable comprising the 22 items. To do it, we added the scores obtained in all items and we divided that score by 22. Thus, we obtained an overall variable to the empathy measure.

6.2. Analyzing guilt transfer

As our first hypothesis suggests, our goal was to understand if guilt can indeed be transferred, and if that is the case, then participants in the non-clean/ guilt condition were expected to have higher scores on the Weight Scale compared to all the other conditions. To test this hypothesis, we performed a 2 (emotional transfer: guilt vs neutral) x 2 (cleanness: clean vs non-clean) between participants analysis of variance (ANOVA).

The first ANOVA, using the Weight Scale as a dependent variable, didn't show a main effect for the emotional transfer variable, $F(1,90) = .421$, $p = .518$, $\eta^2p = .005$, nor for cleanness variable, $F(1,90) = 1.362$, $p = .246$, $\eta^2p = .015$. Moreover, no significant interaction effect was found, $F(1,90) = 1.797$, $p = .183$, $\eta^2p = .020$.

To the extent that we predicted a specific pattern of effects, namely that the guilt/non clean condition should differ from the three other conditions, we performed a planned contrasts analysis with the Weight Scale as the dependent variable. Results showed that participants in the guilt/non clean condition had marginally significant higher scores than participants in any of the other conditions, $t(90) = 1.810$, $p = .073$, $d = .382$. This result shows a weak trend in the direction suggested by our hypothesis. Participants in the guilt/ non clean condition reported higher scores on the Weight Scale than participants in the other conditions. This result seems to suggest that there is a possible transfer of guilt and that guilt feelings can in fact be relieved through physical cleansing, given that participants in the guilt/ clean condition obtained similar scores to the participants in the neutral condition. This conclusion is supported by a further planned contrast analysis showing no significant differences between the subjects in the guilt/clean condition comparing to the participants in the other two no-guilt conditions, $t(90) = 1.065$, $p = .289$, $d = .225$.

Considering the marginally significant two-way interaction between contagion beliefs and emotional transfer, and considering our proposed hypothesis, we ran planned mean contrasts between the obtained means on the Weight Scale of the participants in the guilt/non clean/high contagion belief condition, compared to all the other conditions. We expected that participants in the guilt/non clean/ high contagion belief condition would feel heavier than participants in any other conditions. Specifically, we hypothesized that participants who didn't clean the phone and had higher contagion beliefs would be more prone to the guilt contagion, which in turn would increase their ratings on the Weight Scale. Planned mean contrasts showed that participants in above mentioned condition had significantly higher scores than participants in any other conditions, $t(55) = 2.176$, $p = .034$, $d = .587$. This result suggests that the participants who heard the guilty scenario, who didn't clean the phone and who showed high contagion beliefs, felt significantly heavier and tenser than participants in any other conditions. Thus, this effect partially supports our hypothesis, and suggests that not all participants, but only those who have high contagion beliefs, are more susceptible to guilt contagion, considering that they felt significantly heavier and tenser than the other participants.

As Rozin and colleagues previously mentioned (1986), the Contagion law states that things which have been in contact influence each other by transferring some of their properties. In order to understand the obtained results, we speculated that if the participants who implicitly believe in contagion beliefs could have different responses from the

participants who do not. Our rationale was that, if participants do have contagion beliefs, they may be more prone to emotion transfer, which in turn would made them feel guiltier. In order to relieve their feelings of transferred guilt, participants with higher contagion beliefs compared to the ones with lower contagion beliefs were expected to be more accurate and faster when categorizing products. Thus, to further explore the accuracy of responses given by participants, we conducted a second analysis of variance with a 2 (emotional transfer: guilt vs. neutral) x 2 (cleanness: clean vs. non-clean) x 2 (belief in contagion measure: high vs. low) design. A significant main effect of the belief in contagion measure emerged, $F(1,84) = 4.121$, $p = .046$, $\eta^2p = .519$, but for cleanness, $F(1,84) = 1.496$, $p = .225$, $\eta^2p = .227$, or emotional transfer, $F(1,84) = .137$, $p = .712$, $\eta^2p = .065$. Contrary to what was expected, the main effect of belief in contagion measure suggests that participants with low contagion beliefs were more accurate ($M = 0.92$; $SD = 0.05$) than participants with high contagion beliefs ($M = 0.89$; $SD = 0.06$). There was no significant effect between cleanness and emotional transfer, $F(1,84) = .007$, $p = .935$, $\eta^2p = .051$, nor between cleanness and belief in contagion measure, $F(1,84) = 2.824$, $p = .097$, $\eta^2p = .383$, or between emotional transfer and belief in contagion measure, $F(1,84) = .007$, $p = .932$, $\eta^2p = .051$. Similarly, the three-way interaction between factors was not significant, $F(1,84) = .041$, $p = .840$, $\eta^2p = .055$.

As our third hypothesis states, and in order to shed some light on the results from our first hypothesis, we questioned if the subjects with high contagion beliefs could be more susceptible to the transfer of emotions than subjects with low contagion beliefs. With a 2 (emotional transfer: guilt vs. neutral) x 2 (cleanness: clean vs. non-clean) x 2 (belief in contagion measure: high vs. low) design and with the Weight Scale as dependent variable, we ran an analysis of variance (ANOVA). We didn't find a main effect for the emotional transfer, $F(1,86) = .317$, $p = .575$, $\eta^2p = .004$, nor for the cleanness, $F(1,86) = 1.683$, $p = .198$, $\eta^2p = .019$, or for the belief in contagion measure, $F(1,86) = 1.572$, $p = .213$, $\eta^2p = .018$. We found a marginally significant two-way interaction between the belief in contagion measure and the emotional transfer, $F(1,86) = 3.297$, $p = .073$, $\eta^2p = .037$. However, we did not find a two-way interaction between the emotional transfer and cleanness, $F(1,86) = .920$, $p = .340$, $\eta^2p = 011$, or between the cleanness and the contagion belief measure, $F(1,86) = .745$, $p = .390$, $\eta^2p = .009$. The three-way interaction was also not significant, $F(1,86) = .424$, $p = .517$, $\eta^2p = .005$.

Given that guilt prone people have a better tendency of empathize with others (Tangney & Dearing, 2002) and to be more empathic (Tangney, 1991), we sought to

understand the role of empathy. In order to do so, we ran an analysis of variance with a 2 (emotional transfer: guilt vs. neutral) x 2 (cleanness: clean vs. non-clean) x 2 (belief in contagion measure: high vs. low) design, with the empathy measure as a covariate, and with the Weight Scale as dependent variable. We didn't find a significant main effect for cleanness, $F(1,85) = 1.201$, $p = .276$, $\eta^2p = .014$, emotional transfer, $F(1,85) = .149$, $p = .701$, $\eta^2p = .002$, nor for the contagion belief measure, $F(1,85) = 2.057$, $p = .155$, $\eta^2p = .024$. However, we did find a main effect of the empathy measure, $F(1,85) = 4.219$, $p = .043$, $\eta^2p = .047$. We did not find any interaction between cleanness and emotional transfer, $F(1,85) = 1.139$, $p = .289$, $\eta^2p = .013$, nor between cleanness and belief in contagion measure, , $F(1,85) = .303$, $p = .583$, $\eta^2p = .004$, neither between emotional transfer and belief in contagion measure, $F(1,85) = 2.670$, $p = .106$, $\eta^2p = .030$. When analysing the third-way interaction we found no significant main effect, $F(1,85) = .308$, $p = .581$, $\eta^2p = .004$.

The second question we addressed concerned to the proportion of correct categorization responses. Accordingly, we hypothesized that participants in the non-cleaning/guilt condition would be faster in categorizing products than participants in the remaining conditions.

In order to examine our hypothesis, we ran an analysis of variance (ANOVA) with a 2 (emotional transfer: guilt vs. neutral) x 2 (cleanness: clean vs. non-clean) design and with the scale of overall proportions of correct answers when categorizing the products as a dependent variable. There was no significant main effect for emotional transfer, $F(1,88) = .100$, $p = .752$, $\eta^2p = .061$, or the cleanness, $F(1,88) = 2.428$, $p = .123$, $\eta^2p = .338$. Additionally, the interaction between emotional transfer and cleanness did not yield a significant effect, $F(1,88) = .004$, $p = .950$, $\eta^2p = .050$. These results allow us to conclude that none of the manipulations concerning emotional transfer and cleanness significantly influenced the proportion of correct answers when categorizing products.

In a further ANOVA, with Valence-Strength Scale as the dependent variable, there was no main effect for emotional transfer, $F(1,90) = .179$, $p = .673$, $\eta^2p = .002$, for cleanness, $F(1,90) = .002$, $p = .965$, $\eta^2p = .000$, or for the interaction between the two, $F(1,90) = 1.552$, $p = .216$, $\eta^2p = .017$.

## 7. Discussion

It is well known in the literature that cleansing behaviors and self-punishment can relieve guilt feelings associated with moral transgressions (see, Schnall, Benton, & Harvey,

2008; Lee & Schwarz, 2010; Bastian, Jetten, & Fasoli, 2011). The possibility of transferring emotions is also well established in the literature. For instance, disgust has been found to transfer from one person or object to another. For instance, in a study by Rozin and colleagues (1999), the authors showed that 77% of participants were reluctant, i.e., disgusted, about drinking a juice which was stirred with a brand new comb. This contagion process, namely the transfer of properties assumed to be *associated* with an object (disgust in this case) is perceived to occur through a direct or indirect – through a *vehicle* – contact between them (Rozin et al., 1986) even if the object (new hair comb) has never had any contact with anybody. Here, we aimed to understand whether it's possible to transfer guilt feelings via a third object – a cell phone – and if so, if the phone cleansing can relieve such feelings.

Our first hypothesis stated that if guilt was actually transferred, participants in non-clean/ guilt condition were expected to obtain higher scores on the Weight Scale than participants in the other conditions. This would indicate that the participants who heard the guilty scenario (opposed to neutral one) and who didn't clean the cell phone (opposed to the ones who cleaned) would perceive themselves as physically heavier and tenser than the participants in the other conditions. Our results showed a marginally significant effect showing a trend on the expected direction. That is, participants who heard the guilty scenario and handled a cell phone that was not wiped clean – the vehicle of emotion transfer – had the tendency to feel heavier than participants in the other conditions. These results suggest that the transfer of guilt is a possibility and that the lack of cleanliness can, in turn, make participants feel heavier.

In order to better understand the referred tendency, we ran an analysis of variance with emotional transfer (guilt vs. neutral), cleanness (clean vs. non-clean) and belief in contagion measure (high vs. low) as factors, and the Weight Scale as a dependent measure. As proposed by Rozin and colleagues (1986), according to the second basic dimension of the magical law of contagion, the transmitted essence, in our case guilt, can be mediated by the presence of contagion beliefs. Accordingly, we sought to understand the role that contagion beliefs play in mediating the relationship between emotional transfer, cleanness and the Weight Scale. We expected that participants in the guilt/ non clean/ high contagion belief condition would have higher scores on the Weight Scale. In an analysis of variance, we found a marginally significant two-way interaction between belief in contagion measure and emotional transfer. This result suggests that those participants who heard the guilt

scenario and held high contagion beliefs, obtained higher scores on the Weight Scale. That is, these participants perceived themselves as heavier and as tenser than the ones who held low beliefs in contagion, which marginally supports our hypothesis.

Additionally, a further analysis was performed to understand whether participants who didn't clean the phone and who had higher belief in contagion scores would be more disposed to guilt contagion compared to all the other conditions. If this was the case, then it would be reflected on the Weight Scale in such a way that this group of participants would feel heavier and tenser. This hypothesis was indeed confirmed by our data. The evidence suggests not only does guilt transference occur but beyond that the feeling of guilt can actually be embodied (Day & Bobocel, 2013; Kouchaki et al., 2014). This means that an abstract concept such as the emotion of guilt, which ultimately has no direct link to the physical world, can in fact be embodied, otherwise participants wouldn't report feeling heavier than participants in other conditions. This is in line with the proposal that social-cognitive functioning cannot be separated from interactions with our social and physical world (Semin & Smith, 2008).

Subsequently, we reasoned that participants who held high implicit beliefs in contagion could be more susceptible to guilt transfer which, in turn, would be reflected on the proportion of correct answers when categorizing products. Through an analysis of variance, with cleanness, emotional transfer and belief in contagion measure as factors, we found a main effect of the belief in contagion measure although not in the expected direction. That is, the obtained results revealed that participants who held low contagion beliefs were more accurate categorizing products compared to participants with high contagion beliefs. We speculate that these differences may occur due to the presence of a top-down bias on participants with high contagion beliefs. As Soto, Heinke, Humphreys and Blanco (2005) stated, "*top-down control signals from object representations in WM* [i.e., working memory] *can bias selection in favor of the object whose features were preactivated, thus resolving the competition for selection between the objects in the visual scene*" (p. 248). With this reasoning in mind, we suggest that participants with high contagion beliefs may have had contagion beliefs more salient, for they were not given the opportunity to clean *the burden* of guilt thus, cleansing-related concepts were still activated while performing the categorization task. We think that, because their working memory was somewhat overloaded with the activation of cleansing concepts and the consequent need for cleanness, it is possible that participants with high contagion beliefs committed more errors in the categorization of

products than participants with low contagion beliefs. As the latter group has low contagion beliefs, this could have made them less prone to emotional transfer and, consequently, the desire for cleansing was not present, therefore making them more accurate in their responses.

We also found a main effect of the empathy measure as a covariate, when analysing its role with cleanness, emotional transfer and beliefs in contagion as factors, and the Weight Scale as a dependent variable. This result does not significantly affect the pattern of results, however it was expected that people who experience guilt tend to be more empathic than the ones who don't experience it (Tangney, 1991).

Overall, our findings support our hypotheses and are consistent with the evidence reported in the literature. As stated earlier, literature has previously shown that emotions such as disgust are in fact transferable (Rozin et al., 1986; Rozin & Nemeroff, 2002). The data we present here extends these findings by giving evidence that guilt is also a transferable embodied emotion. To our knowledge, it is the first time the transferable properties of guilt are demonstrated. As stated by Day and Bobocel (2013), guilt can be experienced and perceived as a weight on one's conscience and this was in fact what we found, given that this symbolic weight translated into the perception of physical weight, and thus guilt became embodied. Through a dependent measure of weight perception, we show a tendency of guilt being perceived as a *burden*, that is, participants who heard a story inducing guilty feelings felt heavier comparing to those who heard the neutral emotional story. Moreover, the role of cleansing behaviours on relieving of transferred guilt was confirmed, which is a contribution to the existing literature in this domain. It has already been reported that physical cleansing behaviours tend to relieve the feelings of guilt associated to a personal moral transgression (Lee & Schwarz, 2010). The novelty of our study is the extension of this findings by suggesting that not only cleansing can relieve feelings of guilt when they are associated with a moral transgression committed by the self, but also that the simple fact that hearing others who experience this emotion is transferred to the self by a jointly sharing physical object by touch. These results should be interpreted and framed within the Contagion Law framework, which initially proposed the transfer of properties between objects (Rozin et al., 1986, 1994, 2002).

Despite the need for more studies to substantiate our findings, we have successfully showed that implicit beliefs in contagion have a mediating role in the transfer of guilt feelings, given that the discussed effects didn't emerge in both the low contagion beliefs condition nor in the presence of a neutral condition.

To better understand the meaning of our results, we will interpret them according to the association model which provides explanation for the contagion process among American adults (Hejmadi et al., 2004). The association model refers to a "*mere association between the contaminant and the source"* (Hejmadi et al., 2004, p. 2). Specifically, this model refers to the "*notion of things being "paired" in one's mind (i.e., the "the reminding value" of the sweater)"* (Nemeroff & Rozin, 2000, p. 16). Accordingly, we believe our results are congruent with a mere association effect between the guilty scenario, responsible for the guilt transfer, and the lack of cleansing. It's seems that the guilt scenario, by its content and/or by the tone of voice, was associated with negative components, which in this case represented a moral misdeed. An effective way of relieving such feelings would be a cleaning behavior (Nemeroff & Rozin, 2000). This effect refers to the Macbeth effect, that is, the "*exposure to one's own and even to others' moral indiscretions poses a moral threat and stimulates a need for physical cleansing"* (Zhong & Liljenquist, 2006, p. 2). In this regard, not all the participants who heard the guilt scenario had the opportunity of cleaning the transmission vehicle, which in turn, made them feel heavier than the participants who did. That is why we believe we are in the presence of a mere association effect.

It's important to note that this model is commonly applied to the transfer of physical properties, rather than emotional ones, and that our participants were not American adults but mostly young Portuguese adults. Keeping these two points in mind, the association model implicitly refers to the importance of the source's history, which cannot always be seen but it is the essential part of the contagion (Nemeroff & Rozin, 2000). A corollary of this premise is that the physical properties of the source, such as germs and residues, are the ones, which can be efficiently moderated by washing (Nemeroff & Rozin, 2000). This does not always mean that the washing can transform something unclean into something totally clean. On one hand, when one knows that a glass which had a brief contact with a cockroach and was then washed, the reluctance about drinking from that glass remains, although it is much lower. This happens because the cleansing of the glass relieves the physical contamination, but the psychological properties, disgust in this case, may remain with it. On the other hand, if we knew that a stranger had used our toothbrush, we would not use it again. So, apparently, the main difference between these two examples seems to be the perception of proximity between the situation and the self as well as the degree of the perceived threat to the self. From a biological point of view, we already know that nothing is more threating than the ingestion of something which can poison the body (Hejmadi et al., 2004). From a

psychological point of view, its equivalent remains unknown and consequently the boundary conditions which define the critical threat at a psychological level. So, further studies should manipulate the interpersonal proximity to the self, either through a loved one, a friend, or stranger, in order to understand if this social proximity can increase or decrease the emotional transfer, to which extent it occurs, and to understand if cleaning behaviours hold the same effect. Since guilt is a reflexive emotion, which depends on taking the generalized others' point of view (Shott, 1979), the interpersonal proximity manipulation should be relevant to study.

Another important point related with the emotion under study here is that, besides the novelty of studying the transference of guilt, this emotion, by its own characteristics, does not trigger as strong physical reactions as disgust, which makes it more difficult to understand the full scope of the guilt transfer process. A considerable number of the reviewed studies focuses on the emotion of disgust and its relation to contamination. Disgust is an emotion that triggers biological body alterations when one faces the smell, taste, shape, texture (Rozin & Fallon, 1987) of disgusting stimuli. These multiple triggering disgust stimuli alert the self to a potential and sometimes real physical threat. Also, the ingestion of something disgusting can indeed contaminate the body, causing gastrointestinal distress or complaints. This is not the case for the emotion of guilt. So, the associational contamination, which is observed when washing procedures are not able to *ameliorate the contaminating effects of certain substances* (Fallon et al., 1984, p. 574), fits well with disgust but not with guilt. For example, we may be reluctant about eating a fruit that has fallen to the ground, but if we washed it, then we are less reluctant about eating it. When we talk about guilt, this relation is not so straightforward probably because on the first case we are facing a physical contamination, and on the later, we are in presence of an emotional one. Consider the case of saliva: we kiss our loved one, but we stay very reluctant about drinking from someone's bottle. Objectively speaking, the vehicle of transmission is the same, i.e., saliva, the main difference is related to the emotional content. This argument is supported by Nemeroff and Rozin (1994, 2000) who referred that the majority of people can indeed differentiate moral/emotional contagious from physical contagious, nonetheless, there is an overlap of these two types of contagion when around 15 to 30% of the people refer to physical residues as negative moral ones (Nemeroff & Rozin, 1994, 2000). Nevertheless, and as demonstrate by our study, although not posing physical harm to the subject, emotion of guilt still triggered the need for cleansing.

If one considers that we are talking about an experimental study, there are necessarily some limitations. An experimental design is very helpful considering that it allows the study of specific variables in a controlled environment. However, this controlled situation is artificial and thus its ecological validity is compromised. Another limitation, concerns the contagion belief measure that was used. In one hand, the scale was not previously validated, and on the other hand, we created two groups (i.e., high vs. low contagion beliefs) through a split half of the median value, which may not reflect the participants' true contagion beliefs.

From a broader point of view, this study provides evidence that cleaning behaviors have more practical implications than those who one could initially imagined. Literature has shown so far the role played by washing procedures when it comes to relieve the negative feelings associated to moral transgressions (Zhong & Liljenquist, 2006; Lee & Schwarz, 2010); Schnall and colleagues (2008) demonstrated that cleaning behaviours make participants less severe when judging moral dilemmas; Xu, Zwick and Schwarz (2011) showed that incidental cleaning behaviours can remove desirable (like good luck) and undesirable (like bad luck) traces from the past; and our research has furnished additional evidence, namely that transferred guilt may also be relieved through physical cleaning. Altogether, these findings confirm the distinctive role physical cleansing plays in attenuating wrongdoings we all face in a daily life environment, which only emphasizes the importance of further studying this matter.

8. Appendices

Appendix 1 – Pilot of the emotional transfer scenarios

At first, we asked some students to come up with examples of stories where the main emotion was either guilt or a neutral emotion. With that information in mind, we made 8 scenarios inducing guilt, 9 scenarios with a neutral emotion, 2 scenarios inducing sadness and 2 scenarios inducing happiness (these last 4 served only as fillers). All the scenarios were 50-100 word long. Afterwards, we recorded the scenarios with 3 different female voices and selected those which sounded the most realistic and spontaneous,

Our next step was to develop a questionnaire which assessed the emotions elicited by the 21 stories heard by the participants. Following each of the selected scenarios two questions were asked to the participants: "*If you were the protagonist of the story, what emotion would you feel? and "If you felt more than one emotion, list them from the most important to the least important. NOTE: you should list the emotions this story made you feel, however, it is not necessary to fill all spaces.*" Furthermore, we asked the participants to classify each story in terms of valence (positive/negative), strength (strong/weak) and reality (real/fictitious), on a scale from 1 (positive) to 7 (negative).

Twenty eight participants (17 females, $M_{age}$=24, *SD*=3.71) were recruited from a social network and participated as volunteers.

After collecting the data, we performed a content analysis of the responses. The criteria considered as the most important were: the first emotion mentioned on the first question and how real the participants evaluated the story. Given that this study is also being conducted in Turkey, and considering the critical aspects mentioned before, were selected two scenarios inducing guilt and two neutral scenarios.

Selected emotional transfer scenarios inducing guilt:

(i) *You will not believe it! Last night, I was at home and I started to hear someone shouting on the street. When I was peeking through the window, I saw a group of guys arguing but frankly, I didn't even care. I just thought "Every day the same thing". This morning I heard that one of them ended up in hospital. I felt so bad for having done nothing. If only I had called the police, I could have prevented it.*

(ii) *Things at home aren't going well, to the point that I lost control and because of that I broke all the glasses which were in the kitchen counter. When my mother saw it, she snapped and blamed my brother! She was completely furious and*

*thought he did it. When I saw her like that, I couldn't say anything. Because of that, my brother was grounded and missed such an important football game. All because of me...*

Neutral selected emotional transfer scenarios:

*(i)* *The other day I was with a friend studying in the library. However, it closed and we didn't know where to go. We ended up going to her house. Her housemates were also studying, so the house was quiet. They are all taking engineering, and as we were studying statistics, it was great because they helped us a lot with some formulas.*

*(ii)* *Yesterday I was on the subway and there were some people in front of me speaking so loud! I had my headphones almost in maximum volume and I still heard their conversation more than my music! Fortunately, they left a few stops later and I could already hear my music.*

Appendix 2 - Pre-test of the images

A questionnaire was built with 4 categories of products: 13 kitchen cleaners (e.g., broom, dishwasher, washing machine), 10 assorted kitchen paraphernalia (e.g., pan, cup, wooden spoon), 12 bathroom cleaners (e.g., sponge, toothpaste, tooth brush), and 10 assorted bathroom paraphernalia (e.g., brush, dryer, towel hanger). The brands of products were concealed and the images were processed: black and white with the same dimensions. Each image appeared on the screen followed by five dichotomous characteristics – attractive/unattractive, passive/active, weak/strong, ugly/pretty, negative/positive. The participants' task was to classify each product in a scale from 1 (weak) to 7 (strong), in each of the characteristics mentioned above.

Forty seven participants (23 females, $M_{age}$=32.87, *SD*=12.77) were recruited from a social network and participated as volunteers.

After we collected the data, we did a frequencies' analysis for each of the characteristics above. The images whose results were closer to the neutral point, were the ones selected to be included in the experiment. When selecting the images, we took into account the results obtained in the Turkish version of the same questionnaire. Thus, for the experiment, ten products were selected per category and the three products whose evaluation was closer to the neutral point in each category were shown twice. The selected products were:

(i) kitchen cleaners: small broom[1], sonasol, kitchen sponge with scourer, kitchen cloth, scourer, dishwasher, kitchen brush[1], ajax, dustpan[1], kitchen gloves;

(ii) assorted kitchen paraphernalia: soup ladle, lunch box, cutlery, soup pot, frying pan, glass, wooden spoon[1], mug, kettle[1], nut-cracker[1];

(iii) bathroom cleaners: wipes[1], soap dispenser, toilet brush, toilet cleaner[1], soap, toothpaste, bath sponge, brush to wash the back[1,] toothpaste, swabs;

(iv) assorted bathroom paraphernalia: toilet lid[1], hair dryer, comb[1], towel rail, hairbrush, small shower hanger, bathroom basket, crate bathroom trash, door hanger, toilet roll holder[1];

Appendix 3 – Sentences about belief in emotional transfer

The following statements were used:

(i) If someone drinks from a glass, I have no problem in drinking from the same cup.

(ii) If a glass had been in contact with a cockroach, even if it had been sterilized, I would not drink water from it.

(iii) If my partner uses a tissue, I have no problem using it later.

(iv) If found a bunch of spiders in my closet, I would not wear my clothes even if they had been cleaned.

(v) If all my underwear were dirty, I would have no problem in using the same underwear the next day.

(vi) If I went to a bar and somehow found out that somebody with HIV had been sitting on a chair then I would not have any problem in sitting on the same chair.

(vii) If I had forgot my hair brush at home, I would use my friend's brush.

(viii) I wouldn't live in a house where somebody had been murdered.

(ix) If I was spending the weekend in my boyfriend's/ girlfriend's house and had not packed my toothbrush, I would use his/hers.

(x) I couldn't be in a room which had been occupied by two people with Ebola even if the room had been sterilized.

(xi) If I did not have a shaving razor, I would borrow one.

[1] Products that appeared twice on the screen.

9. References


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