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**MORAL EMOTIONS AND PHYSIOLOGICAL MARKERS IN PROSOCIAL  
DECISION-MAKING**

ANA PAULA SOUZA SANTANA

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Ana Paula Souza Santana

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Dissertation presented as a partial requirement to obtain  
the degree of Master in Psychology. Advisor: Prof. Dr.  
Gustavo Gauer.

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Prof. Dr. Gustavo Gauer – Orientador

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Thiago Gomes de Castro – UFRGS

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Joaquim Carlos Rossini – UFU

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Karina Rabello Casali - UNIFESP

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## **ABSTRACT**

The present study aimed to investigate the effects of prototypical moral emotions on prosocial behavior in an economic task, in interaction with physiological markers of arousal, measured through Electrodermal Response and Heart Rate, and of parasympathetic response, measured through Heart Rate Variability. 40 undergraduate and postgraduate students performed an experimental version of the Ultimatum Game with moral vignettes describing the responders. We found that participants' mean offer in the elevation block was higher than in the outrage block. The physiological measures did not differ significantly between both emotional blocks. The results suggested that information people receive about third-parties influence their behavior towards them, through moral judgment. Therefore, the results are in line with the assumption that emotions elicited by a disinterested elicitor can influence one's decision to help or not a third-party.

**Keywords:** prosocial behavior, moral emotions, moral judgment

## INTRODUCTION

Decision-making is an interdisciplinary subject explored by researchers from different fields such as Economics, Psychology, Medicine, and Sports Science (Sanvicente-Vieira, Marques, & Grassi-Oliveira, 2018). In terms of adaptive relevance, the class of social decision-making stands out. They occur in complex social environments that comprise a myriad of interactions (Rilling & Sanfey, 2011). Besides, decisions made by individuals such as politicians, policy-makers and health care professionals may affect, directly or not, many people's lives. Thus, a moral decision is the one that has consequences that go beyond the agent; they affect third parties (Vásquez, 1998). Regarding the consequences involved, this kind of decision is described as prosocial if it benefits others.

In the scope of contemporary moral development research, studies point out crucial cognitive processes underlying it. For instance, the ability to represent and integrate information usually results from one's actions and beliefs (Young, Cushman, Hauser, & Saxe, 2007). The reasoning about mental states is also relevant as it motivates the comprehension of other people's actions. According to Young and Waytz (2013), this also allows individuals to make predictions about decision-makers' acts, as well as evaluate them as future enemies or allies. Therefore, the moral salience of social contexts engages mind attribution in understanding and foreseeing others' actions. Likewise, mental disorders with an impairment of the theory of mind (e.g., the autism spectrum disorder) can lead to atypical moral development (Young & Waytz, 2013).

### **Moral Emotions**

Regarding aspects that influence decision-making and behavior in real contexts Tangney, Stuewig and Mashek (2007) mention individual differences in the way people anticipate and experience emotions. In that sense, emotions are broadly considered as responses to changes, opportunities, and threats of the environment. They are usually associated with events that affect the *self* directly and have helped humans to adapt and live in society.

Models that consider emotional states can be useful to understand people's adherence to moral patterns. In addition, moral emotions relate to a concern for the welfare of the society or of people other than the person that is judging (Haidt, 2003). Beyond its importance from the evolutionary perspective, human beings also devote a great portion of their emotional lives to think and react to social events that do not affect them directly. That is where, according to Haidt, moral emotions arise.



Many studies show that different emotional states can be linked to specific behavior tendencies and concerns (Haidt & Graham, 2007; Tangney et al., 2007). According to the Somatic Marker hypothesis, physiological responses signal a positive or negative valence of an event (Bechara & Damásio, 2005). In decision-making scenarios, a somatic element is triggered in the individual's body, and that is associated to a specific emotion. Even without awareness of the physiological signals, people's judgments can be influenced as if they were subjectively experiencing that emotion (Oveis et al., 2010).

Oveis et al. (2010) integrate the idea of social concerns engaging moral emotions (Haidt & Graham, 2007). For instance, within the physiological scope, disgust has been associated with a low heart rate. An experimental situation with stimuli involving purity and impurity content can elicit a disgust response. Under such conditions, it is expected that participants with lowered heart rate – a disgust signal – will make stiffer judgments (Oveis et al., 2010).

A contemporary theoretical model that has been used to study the aforementioned moral topics is the Prototypical Model of moral emotions (Haidt, 2003). Emotions can be recognized and analyzed within different component features. Haidt suggests that moral emotions can be analyzed by two features: disinterested elicitors and prosocial action tendencies. The first concept pertains to the event that elicits the emotion - a triggering event that does not involve the self directly. Concrete examples of disinterested elicitors are seeing pictures of people suffering, tragedies broadcasted by the media, among others. The second concept assumes that a moral emotion would put an individual in a specific motivational and cognitive state, representing an elevated tendency to engage in a goal-oriented behavior (Haidt, 2003).

Accordingly, the more disinterested the elicitor event, the more prototypical the emotion is considered. Examples of such emotions are compassion, guilt, elevation, and anger. Concomitantly, these are also the ones that are strongly associated with prosocial tendencies and, consequently, the most effective in promoting prosocial behavior (Haidt, 2003).

Nevertheless, Vyver and Abrams (2017) draw attention to the assumption that people not directly involved in the triggering event feel prototypical moral emotions. Thus, to promote third party prosocial behavior, some of the emotions mentioned might be inappropriate. Guilt, for instance, has a focus on the self and it would not be appropriate for third parties to feel guilty – once they are not directly involved in the elicitor event.

Moreover, compassion is also considered inappropriate for promoting third party prosocial purposes. Although being experienced by third parties, compassion might induce

paternalistic help. According to Vyver and Abrams (2017), this might come from a perception of one target group depending on the goodwill of the other one – in a more advantageous situation. Hence, it is suggested that elevation and outrage are the most efficient emotions to promote third party prosocial behavior.

Elevation is described as an emotional response that occurs when witnessing virtuous and morally valued acts. It could be elicited by behaviors involving charity, fidelity, and others with strong virtue valence. Therefore, elevation would work as a motivating factor, so that the spectator would be prone to behave similarly (Algoe & Haidt, 2009). On the other hand, outrage can be felt when witnessing situations of injustice when others are being harmed. Nevertheless, this emotion is different from anger, since the latter involves the self directly – usually, the person who feels he/she was harmed by an unjust act (Vyver & Abrams, 2015).

### **Prosocial behavior**

Prosocial behavior is a common investigated topic when studying the repercussions of moral emotions on decision-making – at both individual and collective levels. It encompasses a broad category of actions that benefit other people (Penner, Dovidio, Piliavin, & Schroeder, 2005). Studying prosocial behavior with a focus on third parties is a less common perspective. However, this perspective is relevant, considering that social connections are usually plural and tend to engage more than two groups (Vyver & Abrams, 2017).

Many studies stress the influence of emotions on decisions and behavior (Haidt & Graham, 2007; Horberg, Oveis & Keltner, 2011; Tangney et al., 2007; Vyver & Abrams, 2017). Similarly, a study by Böckler, Tusche & Singer (2016) found that positive affect correlated positively with self-reported prosocial behavior. Concerning emotions and tendencies to act pro-socially, Oveis et al. (2010) investigated compassion and pride. While the first stimulated feelings of similarity with others, the second evoked dissimilarity – thus reinforcing that such association might influence the decision to help someone in need or not (Oveis et al., 2010).

In order to describe and classify prosocial behavior, Dunfield (2014) proposed that cognitive and social limitations propel it. In other words, witnessing someone struggling with such problems would bolster acts on behalf of that person. Dunfield's model categorizes these behaviors according to the negative state to which they respond to. The taxonomy establishes three requirements for such acts to happen. The first one is the ability to adopt another person's perspective, recognizing that s/he is going through difficulty. The second criterion

refers to the capacity for determining the cause of the problem. At last, the third one concerns the motivation to help that person overcoming the situation (Dunfield, 2014).

The referred model considers three types of negative states that people must deal with, establishing correspondent prosocial behaviors. Accordingly, an *instrumental need* - characterized by a difficulty with executing a goal-oriented behavior - would have *helping* as the correspondent prosocial behavior. Another negative state is called *material desire*, which occurs when a person has no access to resources such as food and money. The prosocial act for this problem is *sharing*. The third state is *emotional distress* or suffering from a negative emotional state. *Comforting* is the behavior suggested to help someone with this problem (Dunfield, 2014).

### **Prosocial behavior in economic games**

Based on the taxonomy proposed by Dunfield (2014), the present study adopts the concept of *sharing* as a way of operationalizing prosocial behavior, using fictitious money as the resource to be shared. Studies addressing this kind of decision in economic games have used tasks as the dictator game (DG) (Aguiar, Brañas-Garza & Miller, 2008; Ben-Ner, Kramer, & Levy, 2005; Engel, 2011) and the ultimatum game (UG) (Engel, 2011; Harlé & Sanfey, 2007). These games enable the investigation of how people make financial decisions, indicating some underlying aspects – like altruistic or strategic motives. Furthermore, such tasks are useful to study other kinds of decision-making and are very popular and straightforward to implement (Tisserand, Cochard & Le Gallo, 2015).

In its standard version, two participants play the UG (Güth et al., 1982): a proponent and a respondent. The proponent receives an endowment and is instructed to decide how much to share with the other player. The respondent can either accept or reject the offer. If s/he accepts it, then the endowment is distributed as decided by the proponent. However, the rejection of the offer leads to the return of the endowment, and no one receives any money (Harlé & Sanfey, 2007).

In the DG, on the other hand, the respondent has no option as to reject or accept an offer – the dictator simply decides about how s/he wants to share the money. Unlike the DG, the possibility of refusal in the UG includes a variable of strategic consideration in the experiment. Regarding the options to behave in this scenario, a meta-analysis conducted by Tisserand et al. (2015) verified that the majority of proponents in the UG offered, on average, 40% of the endowment. Moreover, offers equivalent or below 20% were rejected by most respondents.

Studies included by Tisserand et al. (2015) followed the standard protocol – proponents and respondents were recombined to form new pairs each round, and the proponent had 10 choice possibilities. Even with such particularities, some relevant considerations can be drawn from the meta-analysis. Firstly, there seems to be no effect of the initial amount of money on players' choices. Secondly, there is also no scientific support for the effect of age on decisions.

Furthermore, there is no substantial evidence to support whether different game formats – one-shot or repeated rounds- affect proponents' choices. However, this association is obtained in the respondents' behavior. The probability of a particular offer being accepted by the respondent increases when the current offer is higher than the previous one - and the opposite is also valid (Cooper & Dutcher, 2011).

As pointed by Tisserand et al. (2015), the literature on economic games includes a variety of protocols with variations of the UG. The tasks can have many rounds, an avatar can represent participants, and the researcher can give information about the players. The latter can influence the amount offered by the proponent and his or her emotions while deciding (Aguiar et al., 2008).

In this way, a study by Sircar, Turley, van der Windt and Voors (2018) tested the effect of social information in the UG, in villages where people knew each other. The results showed that revealing the respondents' identity led to an increase in the offers, likely because of a decrease in social distance. Furthermore, even though controlled experiments can isolate the pertinent behavior, they lack accurate representation of real social contexts. Therefore, it is suggested that revealing the recipient's identity can help determine what a just offer is (Sircar et al., 2018).

However, even if the participants of a study are not from the same community, some considerations remain relevant. For instance, an anonymous UG overlooks some critical points. Those are knowledge of the opponent's characteristics, players' common social networks, and the possibility of previous and future interactions (Sircar et al., 2018).

In sum, economic games are alternatives to investigate prosocial behavior, considering tendencies of justice and altruism. Even in other sorts of tasks, it is verified that information concerning the social context can evoke specific emotions and affect help intentions (Pilatti, 2011; Tangney et al., 2007). In addition, just as there are many protocols for the UG, there is also a range of stimuli with social relevance that can be used in economic games as information about players. One example of stimuli with social relevance includes moral patterns (Clifford, Iyengar, Cabeza & Sinnott-Armstrong, 2015).

## **Psychophysiology and social decision-making**

In order to better comprehend decision-making, studies usually rely on objective measures such as psychophysiological ones. Current studies have investigated how both sympathetic and parasympathetic autonomic nervous systems (ANS) relate to moral decision-making. While the first system is well known as responsible for fight-or-flight responses, the second is more activated during relaxation and rest states (Dulleck, Schaffner, Ristl, & Torgler, 2011).

Regarding social concerns, Berger (2011) investigated the influence of arousal on the decision to pass on social information. The results showed that the mobilization caused by the state of arousal would increase the chances of the individual sharing information. The excitation felt by the participant might mediate the effect of emotional induction, for this particular case of social communication. Therefore, the results of this study suggested that psychophysiological variables could influence social outcomes (Berger, 2011).

One of the theories that aim to integrate physiology and human behavior is Porges' Polyvagal theory (2011). It defends that the vagal nerves contain subsystems responsible for regulating adaptive responses. Humans are capable of auto regulating them and behaving pro-socially. According to this perspective, a standardized assessment of the vagal tone would be a useful marker for emotional self-regulation (Shaffer, McCraty, & Zerr, 2014).

Considering the potential interfaces between studies in psychophysiology and social decision-making, specific measures can be used. For instance, the heart rate (HR) and heart rate variability (HRV) have been adopted to operationalize the investigation of ANS and its relation to experimental tasks. The HR corresponds to the number of beats in one minute, and it is measured through subjacent R-R peaks. These peaks occur at the end of the atrial systole and the beginning of the ventricular systole (Berntson, Quigley, & Lozano, 2007).

The HRV, on the other hand, refers to the oscillation in the intervals between consecutive beats, as well as between consecutive HRs (Taskforce, 1996). It can be considered a neurocardiac measure that reflects the interaction between the heart, the brain, and the ANS (Shaffer et al., 2014). Optimal values of this measure positively influence an individual's adaptation and flexibility to his or her environment, promoting well-being and health (Shaffer et al., 2014).

HRV is also regarded as an indicator of psychological resilience and behavioral flexibility (Berntson et al., 2007). Higher HRV values are also associated with good performance in cognitive tasks that engage executive functions (Thayer, Hansen, Saus-Rose, & Johnsen, 2009). In economic games, HRV measures have been used to assess participants'

reactions- such as those related to pay-off consequences and psychological states (Dulleck et al., 2011).

Regarding the HR, Fourie et al. (2011) developed an emotional induction paradigm in order to be ecologically valid and intense enough to trigger arousal. The HR results after the experiment showed that the group where guilt was the manipulated emotion had higher HR, compared to the pride and control group. That endorses other studies indicating that negative emotions correlate to higher cardiac reactivity (Fourie et al., 2011).

In investigations involving other-praising emotions, such as elevation, Algoe and Haidt (2009) used a self-reporting instrument to appraise physical sensations. Participants associated experiencing elevation to a feeling of "heat" on the chest, and "knot" in the throat. However, this kind of report depends considerably on the subjective perception of the respondent. Thus, an additional accurate alternative would be the use of physiological measures, such as HR and HRV, assessed by adequate equipment. In addition, a study by Bornemann, Kok, Böckler and Singer (2016) stressed that an association of these variables with social and emotional dispositions self-reports is incipient in the literature.

Another possibility is to investigate Electrodermal Activity (EDA), which can be measured by passing a small current through the skin, and then measuring the resulting resistance of the passage. A different method is the endosomatic technique, not involving external current. The first has evolved to what is known as a measurement of skin conductance (SC), used more often (Stern, Ray, & Quigley, 2001). For the purposes of this study, the target variable is the skin conductance response (SCR) amplitude, which refers to the phasic increase in conductance that follows the stimulus onset. The SCR amplitude can be considered as an index of sympathetic activity and can be elicited by stimuli with social or emotional content (Dawson, Schell, & Filion, 2007).

Therefore, the present study aimed to investigate the effects of prototypical moral emotions on prosocial behavior in an economic task, in interaction with physiological markers of arousal - measured through Electrodermal Response and Heart Rate, and of parasympathetic response - measured through Heart Rate Variability. Specifically, we tested the effect of information with moral emotions content (elevation and outrage) on prosocial decision-making, assessed by the UG. We also tested the differences in decisions made in both emotional blocks on arousal, measured as the increase of HR; and on parasympathetic activation, measured through HRV. Moreover, we investigated how DASS measures of depression, anxiety, and stress correlated with prosocial behavior – assessed by the value of offers.

Considering the literature on moral emotions and prosocial behavior, we expected that the average money offered in the elevation context would be higher than in outrage. In line with studies reporting higher arousal in negative valence contexts, we also hypothesized that HR means and EDA amplitude would be higher in the outrage context, compared to the elevation. On the other hand, we expected that HRV means would be higher in elevation trials.

## METHOD

### Participants

Volunteers aged between 18 and 35 were invited by public advertisement. The initial sample consisted of 45 healthy undergraduate and postgraduate students, male and female. Participants were invited to participate in a study about pro-social behavior, and the research was conducted with informed consent. Data collection occurred in the Biosignals lab dependencies, located in the Psychology Institute at Universidade Federal do Rio Grande do Sul (UFRGS).

While scheduling the appointments, participants received recommendations. Firstly, they were told to abstain from using caffeine, nicotine, and other stimulating drugs (e.g., amphetamine derivatives) 4 hours before the data collection. Additionally, alcohol and other drugs that depress the central nervous system (e.g., anxiolytics, *cannabis*) should not be used 24h before the appointment. It was also recommended that participants had a good night's sleep - equivalent to habitual. In cases where the recommendations above were not followed, the researcher rescheduled the appointment.

Participants were excluded from the sample if they did not follow the recommendations and if they had neurological or cardiovascular diseases. According to these criteria, three participants were excluded due to problems with physiological recording, and two due to artifacts. The final sample size was  $N = 40$  (64% female). The mean age was 23.48 (SD = 3.74).

### Instruments and data acquisition

*Physiological measures:* data were recorded using Shimmer3 GSR+ (Shimmer, Dublin), with a sampling rate of 52,1 Hz. The electrodes were placed on the medial phalanges of the middle and ring fingers, and an optical pulse clip was connected to the fleshy part of the ear lobe.

*Cardiac measures:* Beat detection errors and ectopic beats were analyzed and corrected; *Interbeat Intervals* (IBIs) were extracted using Artiifact software (Kaufmann, Sütterlin, Schulz, & Vögele, 2011). A low-pass filter (10 Hz) was applied, and a global threshold method was used for peak detection. That was done considering the entire recording. Afterward, HR and HRV indexes were calculated using Kubios-HRV 3.1 (Tarvainen, Niskanen, Lipponen, Ranta-Aho & Karjalainen, 2014), separately for each experimental block - from a 3min recording window. HR was calculated through the average of IBIs throughout the block, and HRV indices were derived and analyzed in time-domain,



through RMSSD (*Root Mean Square of the Successive Differences*), and frequency-domain and HF (high-frequency power) (Shaffer & Ginsberg, 2017). The HF frequency band is defined to range from 0.15 to 0.4 Hz.

*Electrodermal activity (EDA)*: Ledalab Matlab-based software was used, and the Continuous Decomposition Analysis (CDA) method was adopted. The analyzed index was the CDA.AmpSum, which refers to the sum of the skin conductance response (SCR) amplitudes of significant SCRs wrw, in  $\mu\text{S}$  (Benedek & Kaernbach, 2010).

*Socio-demographic and health questionnaire*: questions to characterize the sample and analyze exclusion criteria.

*Depression, Anxiety, and Stress Scale – Short Form (DASS-21)*: developed by Lovibond and Lovibond (1995), it is a reliable measure of depression, anxiety, and stress in both clinical and non-clinical population. The scale was adapted and validated to Brazilian Portuguese (Vignola & Tucci, 2014), and used in this study to control for the respective psychological variables.

## **Design and procedures**

The study has an experimental cross-sectional design with intra-subjects comparisons. The experimental conditions were obtained through the manipulation of moral emotion (independent variable), with three factors: elevation, outrage, and neutral. Dependent variables were the value of the offer, reaction time, HR, HRV, and EDA measures.

Firstly, participants signed an Informed Consent Form, the questionnaire, and the DASS-21. Subsequently, explanations about the Shimmer device and the task were given and the participant entered a soundproof cabinet, where they remained seated in front of a computer to complete the task. The cardiac variables assessment was non-invasive and went throughout the experiment.

*Experimental Task*: This was a computerized version of the Ultimatum Game developed in Psychopy Coder 3.0 (Peirce, 2007). This economic game has a proponent, a respondent, and an endowment to be shared between them. The proponent decides how they will split the sum, and the respondent can either accept or reject the offer. If he or she accepts it, the decision is implemented. Otherwise, no one gets any money (Harlé & Sanfey, 2007). Participants played as proponents, and an algorithm was developed to represent the respondent's decisions. In each trial, the participant had R\$50 to share with the computer. The options for the offers ranged from R\$5 to R\$45, in intervals of R\$5. Offers equal or lower than R\$20 were automatically rejected by the computer.

The task started with the instructions, then a training block consisting of eight trials of neutral information. After this practice step, the researcher checked the participants' understanding of the task. Afterward, two emotional blocks were presented randomly to each person. Each emotional block had 20 trials of two types of stimuli: 16 of moral emotion vignettes (elevation or outrage) and four neutral. The mentioned vignettes were used as information to describe the respondent and were based on Clifford et al. (2015) or designed by the author of this study.

The information describing the respondent was displayed on the screen until the participant typed to move forward – to the screen containing the possible choices of offer. After clicking the correspondent offer, the next screen displayed an outcome for that round (offer accepted or rejected) for 4 seconds. Then the next trial started. Before moving to the next block, there was an interval of either three, four, or five seconds, assigned randomly. The approximate duration of the participation was 35 minutes.

## **Data Analysis**

All the measured variables were represented by descriptive statistics (mean, standard deviation), and tested for normality with the Shapiro Wilk test. The physiological measures were log-transformed with the formula  $y = \log(1 + x)$  (Benedek & Kaernbach, 2010) to approximate data from normality. Inferential statistics observed a 5% alpha. Means of the value offered by trial, as well as of the physiological indices (HR and HRV), were compared by types of information (elevation x outrage) with the Wilcoxon rank test, as the data had a non-normal distribution.

*Average Offers Difference (AOD)* – In order to better understand to what extent participants' offers were driven by prosociality – rather than by strategic considerations – we used a difference index. This corresponds to the difference between the means of offers made in the elevation and the outrage block – not computing neutral trials within the blocks. We considered the value of R\$25 as a turning point, as offers equal or lower than R\$20 were rejected by the computer. The underlying assumption was that, for the elevation block, the more offers were above R\$25, the more prosocial the decision was. For the outrage block, offers below R\$25 indicated that the fictitious responders were held as not deserving by participants. Moreover, offers around this cut-point were considered strategically motivated (the minimum in order to avoid rejection); offers above R\$25 would indicate prosocial behavior, but these were rare. Thus, we considered that index as an alternative to classifying a participant's level of prosociality, or at least the level of sensibility to the emotional induction.

**Ethical Considerations**

This study respected the principles of ethics in research with human beings, following guidelines proposed by the Brazilian legislation, based on the Resolution 466/12 of the National Health Council, and the Resolution 16/2000 by the Federal Council of Psychology. The study was approved by the Ethics Committee of the Institute of Psychology at UFRGS, with the register number **CAAE:** 10441019.4.0000.5334.

## RESULTS

### Behavioral measures

#### *Mean offers and reaction time*

Participants' mean offer in the elevation block was higher ( $M = 31.9$ ,  $SD = 5.5$ ) than in the outrage block ( $M = 13.3$ ,  $SD = 4.9$ ). The Wilcoxon signed rank test showed that the difference between the means was significant ( $W = 780$ ,  $p < 0.5$ ). Regarding the reaction time (RT), the mean in the outrage block was higher ( $M=13.3s$ ,  $SD=4.9$ ) than the one of the elevation block ( $M = 3.3s$ ,  $SD= 2$ ). This difference was also significant ( $W = 5$ ,  $p < 0.5$ ). For these analyses, we considered the neutral vignettes as parts of the blocks. Even when they were excluded, the difference in offers remained significant.

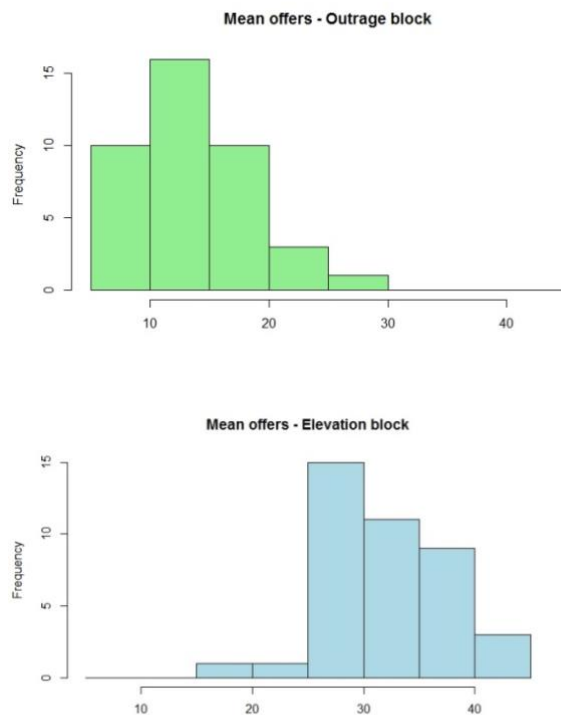


Figure 1. Mean of offers distribution, neutral vignettes considered.

Considering the percentiles of means distribution, the elevation block had 75% of the cases concentrated in an R\$18.75 – R\$35.44 interval (i.e., 37% - 78.9% of the endowment). In respect to the outrage block, the same proportion of cases was below R\$5.50 - R\$15.75 (i.e., 11% - 31.5% of the endowment).

*Correlations between the variation in offers and DASS-21*

For the AOD index, the neutral trials were not considered ( $M = 24.3$ ,  $SD = 8.85$ ). A Spearman's correlation test showed that participants' depression score was positively correlated with the delta measure ( $r_s = .324$ ,  $p < 0.05$ ).

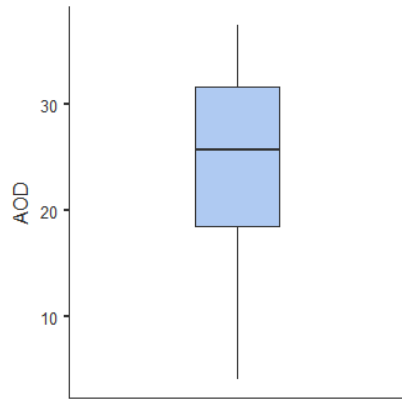


Figure 2. Boxplot for AOD

Table 1. Correlation Matrix for DASS 21 scores and AOD

|          |                | <b>AOD</b> | <b>DASS_DEP</b> | <b>DASS_ANX</b> | <b>DASS_STR</b> |
|----------|----------------|------------|-----------------|-----------------|-----------------|
| AOD      | Spearman's rho | —          |                 |                 |                 |
|          | p-value        | —          |                 |                 |                 |
| DASS_DEP | Spearman's rho | 0.324      | —               |                 |                 |
|          | p-value        | 0.042      | —               |                 |                 |
| DASS_ANX | Spearman's rho | 0.045      | 0.344           | —               |                 |
|          | p-value        | 0.782      | 0.030           | —               |                 |
| DASS_STR | Spearman's rho | 0.057      | 0.483           | 0.718           | —               |
|          | p-value        | 0.729      | 0.002           | < .001          | —               |

## Physiological measures

### *Cardiac Measures (HR and HRV)*

Table 2. Descriptive Statistics - Cardiac measures (log transformed)

|                | <b>N</b> | <b>Mean</b> | <b>Median</b> | <b>SD</b> | <b>SE</b> |
|----------------|----------|-------------|---------------|-----------|-----------|
| LOG_RMSSD_ELEV | 40       | 1.8608      | 1.8625        | 0.2179    | 0.03445   |
| LOG_RMSSD_OUT  | 40       | 1.8761      | 1.9113        | 0.2121    | 0.03354   |
| LOG_HF_ELEV    | 40       | 0.0980      | 0.0934        | 0.0259    | 0.00409   |
| LOG_HF_OUT     | 40       | 0.0955      | 0.0899        | 0.0257    | 0.00406   |
| LOG_HR_ELEV    | 40       | 1.8974      | 1.9009        | 0.0516    | 0.00817   |
| LOG_HR_OUT     | 40       | 1.8963      | 1.9039        | 0.0499    | 0.00789   |

A Wilcoxon rank test did not show significance in the means for HR between both emotional blocks ( $W=490$ ,  $p=0.285$ ). The differences in *HF* measure ( $W=371$ ,  $p=0.561$ ) and *RMSSD* ( $W=309$ ,  $p=0.175$ ) between the emotional blocks were also not significant.

### *Electrodermal Response (EDA - CDA.AmpSum [muS])*

The variable had the same mean for both blocks ( $M=0.04$   $\mu\text{S}$ ). We performed a Wilcoxon rank test, and the results showed that the means did not differ significantly. For the sake of control, we compared the physiological measures between males and females, finding no significant difference on any of the measures.

## DISCUSSION

### Behavioral results

The present study examined the effects of different moral emotions, namely elevation and outrage, on prosocial behavior in an adapted version of the Ultimatum Game. Furthermore, we explored relevant psychophysiological interactions of the paradigm with arousal and parasympathetic activation, through measures of cardiac and electrodermal responses.

According to our initial hypothesis, the behavioral results revealed that participants offered significantly more money to responders described by elevation vignettes than by outrage vignettes. That is in line with other studies indicating that elevation might motivate prosocial behavior (Algoe & Haidt, 2009; Ding et al., 2018) and help to put moral values into action (Schnall & Roper, 2012).

Our results have gone differently considering the literature on how offers are usually distributed in previous UG experiments. According to Tisserand et al.'s (2015) meta-analysis, offers larger than 50% are rare, and equal sharing is the modal in the UG. Our results showed that the positive emotion block had half of the cases above R\$32. For the negative emotion block, this proportion concentrated above R\$12. For this study, we analyzed the distribution of participants' means and not of all offers individually – what could be more precise to compare with Tisserand et al.'s findings.

Despite not considering the offers individually, the mean-block values show that the moral emotion content changed the usual response pattern in this game. Likewise, Ding et al. (2018) investigated how moral judgment, moral elevation, and moral identity motivated prosocial behavior among young Chinese. The authors found that moral judgment motivates prosocial behavior both directly and also through moral elevation mediation. In the present study though, the majority of the sample was female, what must be taken into account since studies show that women usually score more on moral traits and moral beauty (Diessner, Iyer, Smith & Haidt, 2013).

Moreover, reaction times differed significantly when comparing the moral emotions blocks. Participants responded faster in the elevation block ( $M = 3.3s$ ), whereas in the outrage block they took more time to decide ( $M = 13.3s$ ). One plausible explanation for the difference and its direction concerns the different motivations present in this game format. The decisions in the UG can be either strategic or altruistic motivated (Tisserand et al., 2015). Sharing money with "good and deserving" people might be an easy decision, and in such a scenario, the strategic motive (e.g., make fair offers to avoid rejection) would have little weight. Thus,

in the elevation block, participants might have had their altruistic motivations dominant at decision-making.

On the other hand, making lower offers to those who "do not deserve" money is somehow expected, but quite risky here – as low offers tend to be rejected. Being so, we argue that the strategic motives might have arisen with more strength in the outrage block. Specifically, the more time spent deciding how to split the money might be explained by a possibly higher amount of conflict present in this situation. Participants had to decide if it worth the risk - make very unequal offers (e.g., R\$5) and do not receive any money themselves. To address this question, future studies can investigate altruistic x strategic tendencies before the experiment and see how these individual differences drive peoples' decisions.

For the outrage block, participants who made more offers below the rejection rate might have been more prosocial and less strategically motivated, as they did not want to give the money – possibly following moral values respectively associated with the elevation and outrage emotions. Despite the occurrence of fair offers (R\$25) in this block, this can be interpreted as cooperation motivated by the sanctioning (i.e., rejection, strategic motive) (Drouvelis & Grosskopf, 2017). However, it is not clear from these results to what extent the effect of each motivation is due to experimental manipulation or individual preferences. In that direction, future studies should include measures of individual preferences in prosocial behavior, as well as other variables concerning individual differences in constructs and processes subsidiary for the model, such as moral values or foundations, social cognition, and emotion regulation.

Besides comparing the mean offers between conditions, we computed an index of subtracting participants' average offers in elevation trials from outrage trials. Some studies have used computations such as that to better understand participants' behavior in economic games (Steinbeis et al., 2012; Böckler et al., 2016). We proposed an index, AOD, as a measure of participants' sensitivity to the moral content of the vignettes. In other words, high values for this index means that the participant behaved differently in each block, being more prosocial in the elevation context, and/or more prone to “punish” the character described by outrage vignettes.

Furthermore, we investigated how individual differences in depression, anxiety and stress correlated with the AOD. We found that participants' depression score was positively correlated with the AOD index. Considering our purpose for the AOD, we argue that people who scored higher in depression were more sensitive to the moral content of the vignettes.



According to Robson et al (2019), proponents with depression tend to offer more money in the UG.

### **Psychophysiological effects**

Our hypotheses regarding physiological measures of arousal and parasympathetic responses - EDA, HR, and HRV - were not confirmed. Participants did not differ significantly from one emotion-type block to the other. Our manipulation of moral emotions could elicit behavioral effects (difference in average offers), but was not sufficient to provoke physiological ones. The implications of that interpretation are twofold. First, a sampling rate of 52, 1 Hz might have been insufficient for a good data acquisition. Studies reporting guidelines for HRV measurement point out that a minimum sampling rate of 200 Hz or 250 Hz as adequate (Shaffer et al, 2014; Quintana, Alvares, & Heathers, 2016).

Nevertheless, our results showed that a moral emotion induction can influence prosocial behavioral response in the absence of significant concomitant physiological effects. In other words, an autonomic change is not necessary for a change in sharing behavior. Additionally, our results possibly reflect an effect of the opposite emotional valence of the emotions inducted. Conflict between perceptions, cognitions, and feelings is among the most important factors correlated with autonomic alteration (Critchley, Eccles & Garfinkel, 2013).

Thus, the unambiguous difference between emotion types in blocks might have rendered the manipulation to reduce conflict to a minimum, thus facilitating the decisions in trials at the respective blocks. Other UG experiments may be able to create a similar contingency to test effects of recipient characteristics where they are manipulated to be closer together, or ambivalent, as to cause conflict in the player.

Growing evidence shows that emotional states bear corresponding specific physiological features that can be mapped and analyzed (Lisetti & Nasoz, 2004). However, there is a caveat regarding economic games, which refers to the arbitrary sum of money and participants having neither effort nor investment involved (Bland et al., 2017). In addition, it is arguable whether playing with a computer – and not with a human - influences psychophysiological measures. Van Wout et al. (2006) compared skin conductance (SC) measurements in responders playing with computers and humans. They found that SC was related to unfair offers of human proposers, but there was no such relationship for computer proposers.

Moral vignettes worked as a framing for the context of decision-making and were effective in differentiating behavior along the blocks. Nevertheless, this type of stimuli had no significant effect on physiological variables. It is possible that if a comparison between

resting state and experimental context had been conducted those measures could have differed. However, between positive and negative emotions, the manipulation had no physiological effect. Other alternatives could be implemented in order to evoke more arousal (e.g., visual and auditory stimuli).

### **Limitations and future studies**

The present study brings some contributions to the investigation of moral emotions and prosocial behavior. Nevertheless, it has certain limitations that must be addressed. First, no instrument was used to check for moral preferences before the experiment was conducted. That might have hindered the possibility of inferring that the behaviors were actually prosocial. We should also consider that social desirability is commonly discussed in this kind of study, and participants knew that it was a research about prosocial behavior. Although engagement with moral beauty (e.g. moral elevation) was not mediated by social desirability in Diessner et al.'s (2013) study, we cannot infer that this would not be the case here.

Considering the physiological measures, we argue that the stimuli used might have not been a good alternative to cause significant changes in HR, HRV and EDA. Additionally, the absence of physiological effects might have been due the sampling rate of 52, 1 Hz used. Studies reporting guidelines for HRV measurement report that sampling rates of 200 Hz or 250 Hz might be sufficient (Shaffer et al, 2014; Quintana et al, 2016). Finally, in this kind of recording, it is important that participants follow the recommendations prior to the appointment. This was a challenge, considering that there were some cases where they forgot about this, which led to some appointments being rescheduled. Therefore, we suggest future studies to implement reminders (e.g. sending text messages) to avoid this setback.

Lastly, we opted by separating the blocks, maintaining neutral vignettes within them, thinking about the optimal time necessary to record the HRV measures. As a consequence, the neutral trials might have affected the emotion induction, possibly interfering in physiological alterations in a way that was not possible to assess here. Futures studies could address this with different experimental designs.

## CONCLUSION

In the present study, we were able to investigate how moral elevation and outrage affect prosocial decision-making in an economic game. The results were in line with the assumption that emotions evoked by a disinterested elicitor can influence one's decision to help or not a third-party. Additionally, we addressed both emotions in a way that elevation promoted prosocial behavior and outrage led to a punishment behavior. Nevertheless, we would like to have investigated other points. For instance, how moral outrage promotes prosocial behavior in this kind of experiment. This could be done by describing the responder as someone who suffered injustice (i.g. participants could feel outrage for a third-party who was unjust to the responder).

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## APPENDIX

### Appendix A

#### Socio-demographic and health questionnaire

Nome Completo: \_\_\_\_\_ Data: \_\_\_/\_\_\_/\_\_\_

Telefone para contato:(\_\_ ) \_\_\_\_\_ - \_\_\_\_\_ E-mail: \_\_\_\_\_

Endereço: \_\_\_\_\_

Sexo:1.( ) Feminino / 2.( ) Masculino

Data de Nascimento: \_\_\_/\_\_\_/\_\_\_ Idade: \_\_\_ anos \_\_\_ meses

Local de Nascimento: \_\_\_\_\_ UF: \_\_\_

Lateralidade: 1. ( ) Canhoto / 2. ( ) Destro / 3. ( ) Ambidestro

Etnia ou raça: 1. ( ) Asiática/2. ( ) Branca/ 3.( ) Indígena/ 4. ( ) Negra/ 5. ( ) Parda /

6. ( ) Outra: \_\_\_\_\_ / 7. ( ) Prefiro não responder

Faz uso de alguma medicação atualmente? 1. ( ) Sim / 2. ( ) Não

Qual: \_\_\_\_\_

Dose: \_\_\_\_\_

Alguma dessas medicações foi utilizada nas últimas 24 horas? 1. ( ) Sim / 2. ( ) Não

Qual: \_\_\_\_\_

Fez uso de alguma medicação no passado? 1. ( ) Sim / 2. ( ) Não

Qual: \_\_\_\_\_

Dose: \_\_\_\_\_

Faz uso de alguma droga (incluindo álcool e tabaco) atualmente? 1. ( ) Sim / 2. ( ) Não

Qual: \_\_\_\_\_

Quantidade: \_\_\_\_\_

Alguma dessas drogas foi utilizada nas últimas 4 horas? 1. ( ) Sim / 2. ( ) Não

Qual: \_\_\_\_\_

Fez uso de alguma droga (incluindo álcool e tabaco) no passado? 1. ( ) Sim / 2. ( ) Não

Qual: \_\_\_\_\_

Quantidade: \_\_\_\_\_

Você já teve algum tipo de doença, acidente ou infecção neurológica ou problema de visão?

(Ex.: traumatismo cranioencefálico, meningite, sífilis, miopia, astigmatismo)

1. ( ) Sim / 2. ( ) Não

Qual: \_\_\_\_\_

Você já teve alguma doença neurológica ou cardiovascular agravada? (Ex.: hipertensão, epilepsia, insuficiência cardíaca, arritmia).

1. ( ) Sim / 2. ( ) Não

Qual: \_\_\_\_\_

Você já foi diagnosticado com algum transtorno psiquiátrico? 1. ( ) Sim / 2. ( ) Não

Qual: \_\_\_\_\_

Quantas horas você dormiu de ontem para hoje? \_\_\_\_\_

Você considera que teve uma noite de sono normal/adequada? 1. ( ) Sim / 2. ( ) Não

Você ingeriu café/caféina, outro estimulante ou nicotina (cigarro) nas últimas 4 horas?

1. ( ) Sim / 2. ( ) Não

## Appendix B

### ESCALA DE DEPRESSÃO, ANSIEDADE E ESTRESSE – VERSÃO REDUZIDA

**Instruções:** Por favor, leia cuidadosamente cada uma das afirmações abaixo e marque o número apropriado de 0, 1, 2, ou 3 que indique o quanto ela se aplicou a você durante a última semana, conforme indicação a seguir:

- 0 Não se aplicou a mim de forma alguma
- 1 Aplicou-se a mim de alguma forma ou em algumas vezes
- 2 Aplicou-se a mim de forma considerável ou em boa parte do tempo
- 3 Aplicou-se muito a mim ou na maior parte do tempo

1. Eu tive dificuldade para me acalmar

0      1      2      3

2 Eu percebi que estava com a boca seca

0      1      2      3

3 Eu não consegui ter sentimentos positivos

0      1      2      3

4 Eu tive dificuldade para respirar (por exemplo, tive respiração muito rápida, ou falta de ar sem ter feito esforço físico)

0      1      2      3

5 Eu achei difícil ter iniciativa para fazer as coisas

0      1      2      3

6 Eu tive reações exageradas às situações

0      1      2      3

7 Eu tive tremores (por exemplo, nas mãos)

0      1      2      3

8 Eu senti que estava bastante nervoso(a)

0      1      2      3

9 Eu fiquei preocupado(a) com situações em que poderia entrar em pânico e fazer papel de bobo

0      1      2      3

10 Eu senti que não tinha expectativas positivas a respeito de nada

0 1 2 3

11 Eu notei que estava ficando agitado(a)

0 1 2 3

12 Eu achei difícil relaxar

0 1 2 3

13 Eu me senti abatido(a) e triste

0 1 2 3

14 Eu não tive paciência com nada que interrompesse o que eu estava fazendo

0 1 2 3

15 Eu senti que estava prestes a entrar em pânico

0 1 2 3

16 Eu não consegui me empolgar com qualquer coisa

0 1 2 3

17 Eu senti que não tinha muito valor como pessoa

0 1 2 3

18 Eu senti que eu estava muito irritado(a)

0 1 2 3

19 Eu percebi as batidas do meu coração na ausência de esforço físico (por exemplo, a sensação de aumento dos batimentos cardíacos, ou de que o coração estava batendo fora do ritmo)

0 1 2 3

20 Eu me senti assustado(a) sem qualquer razão

0 1 2 3

21 Eu senti que a vida não tinha sentido

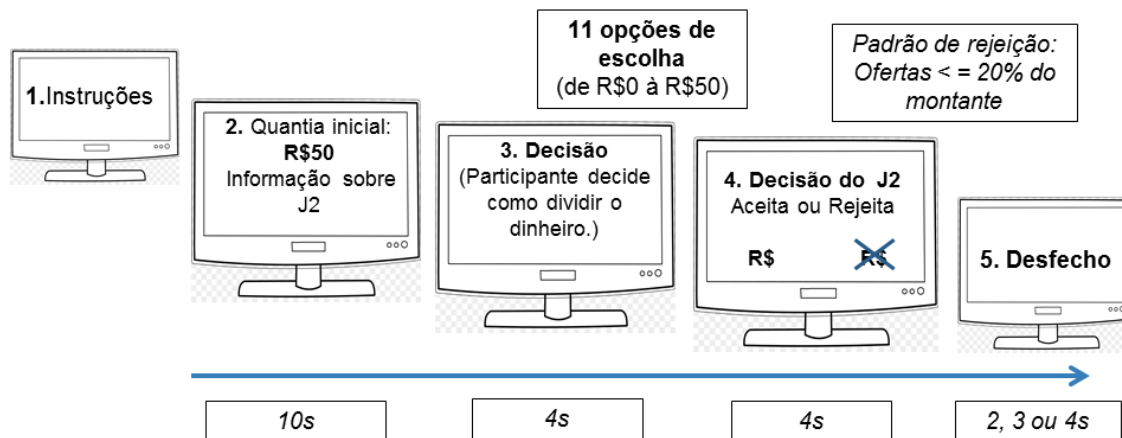
0 1 2 3

## Appendix C

### Experimental Task

#### Jogo do Ultimato

- Versão computadorizada: Psychopy 3.0 (Peirce, 2007)
- Participantes: jogador 1 (proponente)
- Computador: jogador 2 (recipiente)



## Appendix D

### Vignettes

\*Informações referentes ao jogador fictício (respondente) que serão apresentadas ao participante.

#### **Vinhetas para bloco de indignação:**

1. Na prova mais recente na faculdade, copiou a folha de respostas de um colega sem permissão. O professor descobriu e zerou a prova de ambos.
2. É um atleta corredor. Na última maratona, pegou um atalho no percurso a fim de vencer a corrida. Venceu trapaceando.
3. Subornou o síndico de seu prédio, para que seu apartamento fosse o primeiro a ser reformado. Isso prejudicou outros moradores, que estavam com problemas mais urgentes em seus apartamentos.
4. É um jogador de futebol. No último campeonato, simulou que um jogador do time oponente o havia ferido em campo. O jogador acusado injustamente foi expulso do jogo.
5. Em vários jogos de cartas dos quais participa, trapaceia ganha muito dinheiro.
6. É um juiz que, recentemente, aceitou pegar um caso em que o réu era seu amigo. O crime foi grave, e o juiz sabia que o acusado era culpado.
7. É um árbitro de futebol, que apitou lances errados no último jogo intencionalmente a fim de ajudar seu time preferido a ser vencedor.
8. No trabalho, cometeu um erro grave na elaboração de um relatório. Contudo, colocou a culpa em um colega, e este foi severamente punido pelo chefe do setor.
9. Quando vai a uma determinada loja de departamentos, sempre muito lotada, fura a fila pois um dos funcionários é seu amigo.
10. Um prefeito de uma cidade pequena que usou dinheiro público para fazer uma reforma em sua casa.
11. Proprietário de uma rede de empresas familiar, constantemente pressiona seus funcionários a comprar produtos nas lojas de sua família.
12. Um garoto que gosta de colocar armadilhas para matar gatos de rua na vizinhança.

13. Este garoto colocou percevejos no assento de outro estudante, que sofre bullying na escola, e este se machucou ao sentar.
14. Professor bate na mão de um aluno com uma régua por ele ter dormido durante a aula.
15. Funcionário rindo de um colega com uma deficiência física na perna direita, durante uma partida de futebol.
16. Dono de uma empresa de lanches escolares. Subornou figuras públicas para que ganhasse uma licitação, e sua empresa fosse a escolhida para fornecer a alimentação nas escolas municipais.

**Vinhetas para bloco de elevação:**

1. Um professor de uma escola pública, que está em condições precárias de instalação e materiais. O professor luta para trazer melhorias para a escola, trazendo sempre o melhor de si para a sala de aula.
2. Nota que um colega de trabalho, novato na empresa, está tendo dificuldades com o serviço e é constantemente pressionado pelo chefe. Então, procura ajudá-lo e ensinar-lhe as atividades durante sua adaptação.
3. Está com muita pressa e atrasado para um compromisso, mas oferece carona a um colega de trabalho, que demoraria muito para chegar em casa de ônibus.
4. É médico, procura deixar sempre em sua agenda semanal um horário destinado a atender gratuitamente pessoas sem condições financeiras.
5. Participa constantemente de trabalhos voluntários em uma residência de longa permanência para idosos.
6. Atuante em causas ambientais, é um vereador que contribui muito com projetos de leis em defesa e proteção do meio ambiente. Suas ações já trouxeram várias melhorias para a cidade.
7. Tem acesso privilegiado a informações importantes na empresa onde trabalha. Empresas concorrentes já tentaram suborná-lo com altas quantias para transmitir tais informações, mas ele recusou pois não considera isso correto.
8. Viu que um pedestre deixou sua carteira cair na calçada. Pegou o objeto e viu que tinha R\$100. A pessoa que perdeu a carteira já estava longe, mas correu até ela e devolveu.

9. É um cantor e mora em uma cidade pequena, não é muito famoso. Com frequência, dedica uma parte do seu lucro para uma instituição que atua com jovens em situação de vulnerabilidade.
10. Teve um câncer agressivo na infância e se curou após um tratamento muito difícil. Ao longo de sua vida, encontrou-se no propósito de auxiliar as pessoas que passaram pela mesma doença.
11. É uma mulher adulta, tornou-se responsável pelos cuidados de sua mãe, já bem velha e doente. A idosa tem outros filhos, mas esta foi a única que disponibilizou a cuidar da mãe com presteza e carinho.
12. É um homem com uma vida simples, mas com uma casa espaçosa. Gosta e se preocupa muito com os animais. Adotou seis gatinhos de rua que estavam doentes, cuidou deles e os tem de companhia em seu lar.
13. Uma grande área da cidade onde mora foi devastada por uma enchente recentemente. Essa pessoa ajudou muito no auxílio aos cidadãos que ficaram desabrigados.
14. É voluntário em uma instituição filantrópica, dando aulas de reforço escolar para adolescentes de uma comunidade carente.
15. É dentista e, há muitos anos, oferece consultas de graça em uma instituição de voluntariados.
16. É uma idosa muito rica, mensalmente faz grandes doações a uma instituição de ajuda à crianças com câncer. Contudo, prefere fazer isso de forma anônima.

### **Vinhetas para bloco de informações neutras:**

\* Essas vinhetas representam violações de padrões tidos como comuns na sociedade, mas não constituem violações morais.

1. Usa o mesmo celular há 10 anos e se recusa a comprar um novo.
2. Fica em casa com as cortinas fechadas em um dia raro e bonito de sol.
3. Bebe um copo de café utilizando uma colher.
4. Come sua sobremesa antes do prato principal.
5. Permanece usando chapéu mesmo dentro de seu apartamento.
6. Exercita-se na academia vestindo um terno.
7. Come uma tigela de cereal com água, ao invés de leite.
8. Usa garfo para tomar sorvete.



9. Coloca açúcar na sua salada de frango e legumes
10. Usa roupas várias vezes maiores que seu tamanho.
11. Anda no escuro com óculos de sol.
12. Dirige um carro extremamente sujo, que não foi lavado recentemente.
13. Vê um jogo na TV em preto e branco, ao invés de colorida.
14. Lê o final de um romance de espionagem antes de ler o início.
15. Usando um sobretudo em uma tarde quente de verão.
16. Atendendo uma ligação telefônica usando a palavra "tchau" ao invés de "Alô".

## Appendix E

### Informed Consent Term

#### UNIVERSIDADE FEDERAL DO RIO GRANDE DO SUL TERMO DE CONSENTIMENTO LIVRE E ESCLARECIDO

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##### DADOS SOBRE A PESQUISA

**Título da Pesquisa:** Marcadores cardiovasculares e emoções morais em decisões pró-sociais

**Pesquisador responsável:** Dr. Gustavo Gauer (Professor do Instituto de Psicologia da Universidade Federal do Rio Grande do Sul); **Pesquisadora executante:** Ana Paula Souza Santana (Mestranda do Programa de Pós-Graduação em Psicologia da Universidade Federal do Rio Grande do Sul)

Você está sendo convidado (a) a participar de um estudo cujo objetivo é investigar a relação entre medidas da frequência cardíaca e como as pessoas tomam decisões sociais. Caso você aceite participar do estudo, será convidado a concluir duas etapas simples: 1) Fornecer alguns dados de saúde geral e demográficos; 2) Realizar uma tarefa, envolvendo a partilha de quantias fictícias, enquanto utiliza um aparelho de monitoramento cardíaco. Será solicitado que permaneça alguns minutos em repouso antes e após essa tarefa. A conclusão dessas etapas leva aproximadamente 35 minutos. A sua atenção na tarefa é importante para os resultados da pesquisa.

A sua participação é totalmente voluntária e você poderá retirar-se do estudo a qualquer momento, sem qualquer prejuízo para você ou para o estudo. Não está previsto nenhum tipo de pagamento pela sua participação na pesquisa e você não terá nenhum custo com respeito aos procedimentos envolvidos mesmo em caso de desistência.

Os possíveis riscos decorrentes da sua participação são mínimos, como cansaço por ficar sentado diante do computador, ou incômodo com as informações lidas. Com relação ao aparelho para monitoramento cardíaco, apenas colocado em contato com a superfície da sua pele um sensor de borracha ou gel, neutro e antialérgico. Caso tenha alguma dúvida relacionada a qualquer procedimento, poderá perguntar à(o) pesquisador(a). A sua participação na pesquisa não trará benefícios diretos para você. Mesmo assim, você terá a oportunidade de conhecer como

são realizadas pesquisas em Psicologia. Além disso, contribuirá para o desenvolvimento da ciência e compreensão de alguns aspectos relacionados aos comportamentos pró-sociais. Os dados coletados durante a pesquisa serão sempre tratados confidencialmente. Os resultados somente serão apresentados em forma conjunta, sem a identificação individual dos participantes, ou seja, o seu nome não aparecerá de forma alguma na publicação dos resultados.

O material produzido no estudo, com suas respostas descritivas ou comportamentais e seus marcadores cardíacos, ficará arquivado em local seguro no BIOSIG - Laboratório de Biosinais cognitivos da UFRGS por um período de cinco anos, após o qual eles serão destruídos. Os dados coletados serão publicados em periódicos científicos e o anonimato dos dados será assegurado pelos coordenadores do estudo.

Caso você tenha dúvidas, poderá entrar em contato com o pesquisador responsável Prof. Dr. Gustavo Gauer, pelo telefone (51) 3308 5303 ou com o Comitê de Ética da UFRGS, telefone (51) 3308-5698 (Rua Ramiro Barcelos, 2600). O citado Comitê de Ética em Pesquisa avalia os estudos realizados e foi criado para defender os interesses dos participantes da pesquisa em sua integridade e dignidade e para contribuir no desenvolvimento da pesquisa dentro de padrões éticos. Todos os passos do protocolo de estudo serão acompanhados e supervisionados por pesquisadores treinados sob supervisão e orientação do professor Dr. Gustavo Gauer.

Tendo sanado eventuais dúvidas com o pesquisador, declaro, para os devidos fins que eu, \_\_\_\_\_, fui informado (a) dos objetivos especificados acima e da justificativa desta pesquisa de forma clara e detalhada. Recebi informações específicas sobre cada procedimento em que estarei envolvido (a), dos desconfortos ou riscos previstos tanto quanto dos benefícios esperados. Estou ciente de que nenhum dado deste estudo será usado de forma individual, sendo garantido o sigilo das informações prestadas. Todas as minhas dúvidas foram respondidas com clareza e estou ciente de que poderei solicitar novos esclarecimentos a qualquer momento que eu solicitar e terei liberdade de retirar meu consentimento de participação a qualquer momento.

Sou maior de 18 anos e aceito participar da pesquisa.

Assinatura do participante: \_\_\_\_\_

Assinatura do pesquisador: \_\_\_\_\_

## Appendix F

### Ethical Approval

#### PARECER CONSUBSTANCIADO DO CEP

##### DADOS DA EMENDA

**Título da Pesquisa:** Marcadores cardiovasculares e emoções morais em decisões pró-sociais

**Pesquisador:** Gustavo Gauer

**Área Temática:**

**Versão:** 3

**CAAE:** 10441019.4.0000.5334

**Instituição Proponente:** Instituto de Psicologia - UFRGS

**Patrocinador Principal:** Financiamento Próprio

##### DADOS DO PARECER

**Número do Parecer:** 3.374.877

##### Apresentação do Projeto:

Trata-se de uma emenda a um projeto previamente aprovado por este CEP.

A emenda foi necessária porque os pesquisadores adicionaram um passo ao procedimento, referente a uma pequena entrevista (3 minutos aproximadamente). Tal entrevista contém perguntas sobre a percepção do participante com relação ao experimento. Em função dessa alteração, o Termo de Consentimento Livre e Esclarecido também foi alterado, trazendo a informação sobre a entrevista.

O novo procedimento foi descrito no projeto detalhado, com inclusão das perguntas no anexo do projeto.

##### Objetivo da Pesquisa:

Não foi alterado: De acordo com o pesquisador, o objetivo principal do projeto é testar efeitos de informações eliciadoras de emoções morais de elevação e indignação sobre decisões pró-sociais medidas por meio do jogo do ultimato (tarefa experimental informatizada que avalia como as pessoas repartem valores financeiros fictícios em situação induzida de tensão moral). Além disso, quer testar diferenças entre decisões tomadas em contexto de elevação e em contexto de indignação sobre o arousal, medido como aumento da FC (frequência cardíaca), e sobre a ativação parassimpática, medida pela VFC (variância da frequência cardíaca).

##### Avaliação dos Riscos e Benefícios:

Também não foram alterados.

Os riscos e benefícios foram apontados pelo pesquisador, sendo uma pesquisa de riscos mínimos e nenhum benefício direto.

**Comentários e Considerações sobre a Pesquisa:**

Emenda apresenta alteração pontual.

**Considerações sobre os Termos de apresentação obrigatória:**

Foram apresentados os documentos necessários. Pequenas alterações foram realizadas no TCLE previamente aprovado, contemplando a mudança nos procedimentos.

**Conclusões ou Pendências e Lista de Inadequações:**

Emenda aprovada.

**Considerações Finais a critério do CEP:**

**Este parecer foi elaborado baseado nos documentos abaixo relacionados:**

| Tipo Documento  | Arquivo                                | Postagem               | Autor                      | Situação |
|---|--|------------------------|----------------------------|----------|
| Informações Básicas do Projeto                            | PB_INFORMAÇÕES_BÁSICAS_136686_0_E1.pdf | 28/05/2019<br>17:30:22 |                            | Aceito   |
| Projeto Detalhado / Brochura Investigador                 | projeto.docx                           | 28/05/2019<br>17:26:57 | Ana Paula Souza<br>Santana | Aceito   |
| TCLE / Termos de Assentimento / Justificativa de Ausência | termo.docx                             | 28/05/2019<br>17:26:47 | Ana Paula Souza<br>Santana | Aceito   |
| Folha de Rosto  | folha.pdf                              | 26/03/2019<br>18:33:44 | Ana Paula Souza<br>Santana | Aceito   |
| Outros  | 20190321_105316.jpg                    | 25/03/2019<br>13:53:57 | Ana Paula Souza<br>Santana | Aceito   |

**Situação do Parecer:**

Aprovado

**Necessita Apreciação da CONEP:**

Não

PORTO ALEGRE, 06 de Junho de 2019

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**Assinado por:**

**Milena da Rosa Silva**

**(Coordenador(a))**

