NATIONAL RESEARCH UNIVERSITY HIGHER SCHOOL OF ECONOMICS

As a manuscript

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The role of emotional state in decisions on charitable giving

Dissertation Summary
for the purpose of obtaining academic degree
Doctor of Philosophy in Cognitive Sciences

Academic supervisor:
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Moscow – 2024

This thesis was prepared at the Institute for Cognitive Neurosciences, National Research University Higher School of Economics. Three published articles were selected for the defense procedure:

1. Shepelenko A., Kosonogov V., Shestakova A. How Emotions Induce Charitable Giving. A Psychophysiological Study // Social Psychology. —2023. — Vol. 54, № 5. — P. 261–270.
2. Shepelenko A., Shepelenko P., Obukhova A., Kosonogov V., Shestakova A. The relationship between charitable giving and emotional facial expressions: Results from affective computing // Heliyon. — 2024. — Vol. 10, № 2. — P. e23728.
3. Shepelenko A., Shepelenko P., Panidi K., Kosonogov V., Shestakova A. How the emotions evoked by homeless pets induce online charitable giving // Journal of Philanthropy and Marketing. — 2024. — Vol. 29, № 2. — P. e1842.

Table of contents

Introduction

The relevance of research

Charitable organizations play a significant role in socio-economic development by implementing programs that improve various aspects of people's lives [1]. As instruments for promoting the subjective well-being of community [2], charities are highly dependent on community support. In the United States, for example, about 70% of donations to charities were made by individuals in 2018 [3].

With economic instability and global challenges faced by people worldwide, the smoothing effect exerted by non-profit organizations (NPOs) is critical. However, raising funds to meet their obligations is a challenge for many charities [4].

Pet charities are in an especially difficult situation facing a lack of funding due to both intra-industry competition and ambiguous public attitudes towards their recipients [5]. Stray dogs, in particular, are often perceived as a threat due to the spread of zoonotic diseases [6–8] and possible aggressive behavior [9], which can lead to their mistreatment by humans [5, 10]. The role of charities in this regard is especially important, as they use humane methods to solve the problem, such as sterilization and vaccination, as well as promoting responsible ownership, [11, 12] etc.

Exploring the factors that influence the decision-making process may provide additional support to the nonprofit sector and animal charities in particular. However, prosocial behavior, which refers to the willingness to contribute one's resources for the benefit of others [13], is a complex psychological phenomenon [14], which makes it difficult to study, sometimes leading to contradictory conclusions.

Emotional state is one of the key factors affecting charitable behavior [15–17]. Emotions such as sadness, anger, fear, and happiness can impact a person's willingness to donate [17–20]. However, the effectiveness of applying specific discrete emotions in the context of charity appeals is still a matter of debate. Inconsistencies in research findings concern not only the type of emotions, but also their valence. In particular, some studies suggest that negative (unpleasant) emotions lead to higher donation rates [21, 22], while others show the opposite [23, 24]. Additionally, there is a lack of research on the

link between emotional arousal resulting from charity appeals and the willingness to donate.

In general, research on emotions and prosocial behavior has shown a significant bias toward helping intraspecies rather than interspecies. In other words, the bulk of published research examines appeals for charities that support people [17, 21–25], while the impact of emotions on prosociality toward animals remains understudied.

Regarding methodological approaches, it is worth noting that the majority of studies on charitable behavior and emotions utilize declarative methods, such as surveys and Likert scales. These methods have certain limitations, as participants may not always be able to accurately identify their feelings or may be unwilling to disclose them. This is especially true for controversial and taboo topics, such as sexual orientation and sexually transmitted diseases or helping socially undesirable or outcast groups [26]. This may also be applicable to stray dogs as the attitude toward them is often ambiguous [5].

The use of objective methods for measuring emotional states can help overcome some of the limitations associated with subjective assessments of emotions. One such method is facial expression-based automatic emotion recognition software, for instance FaceReader, iMotions and others, also called affective computing [27, 28]. This method allows for a comprehensive and discrete assessment of the emotional state due to the ability to recognize six basic emotions, i.e. happiness, sadness, fear, anger, surprise and disgust, as well as valence and arousal in real time. Electromyography (EMG) of facial muscles is also an objective and widely accepted method for assessing emotional state [29], which can be effective for validating data on valence obtained through affective computing.

In order to provide the most accurate assessment of the emotional state, different measurements of autonomic responses, such as electrodermal activity (EDA) and heart rate (HR), are used in addition to recording facial muscle activity. These methods are highly sensitive for assessing arousal [30, 31] and can also be used to validate affective computing data.

However, there is a lack of studies examining the effectiveness of charity appeals using objective methods. Specifically, there is a need for research into the attractiveness

of nonprofit advertising using automatic emotion recognition systems. In addition, there are no studies of charitable behavior towards stray animals based on physiological data (EMG, EDA, HR). Given the controversial attitudes towards stray dogs in society, these methods could be valuable in studying prosocial behavior.

The relevance of this study lies in the need for non-profit organizations to increase funding for their activities through the development of effective marketing communications aimed at collecting donations. To this end, it is essential to create a theoretical and methodological foundation for research into the relationship between prosocial behavior and emotions, based on objective methods for assessing the emotional state, including affective computing, EDA, EMG of facial muscles and recording of cardiac activity, which can be used to predict the success of charity advertising by NPOs, especially animal welfare funds.

Research problem

This study aims to examine the relationship between emotional state and charitable behavior in support of homeless pets. Special attention is paid to the characteristics of the animals in question, such as age, health status, signs of being homeless, and the presence or absence of a human companion as these factors may influence the emotional state of potential donors and the size of their donation.

To address this issue, methods to measure behavioral and physiological manifestations of emotions, including self-report, affective calculations, EMG, EDA, heart rate are used to provide a more comprehensive and objective understanding of the role that emotions play in the donation decision-making process.

State of development of the research problem

Emotions and prosocial behavior

Emotional state assessment is widely used to study various types of behavior and decision making. In the context of prosocial behavior, it has been shown that emotional state influences a person's willingness to give their resources to others [15–17]. Donations and helping behavior have been found to be associated with emotions, conceptualized in both discrete [32–34] and dimensional approaches [35, 36].

However, it is still unclear which emotions are most effective in promoting charitable behavior. Depending on the context, some discrete emotions can either initiate or suppress prosocial actions. In particular, when viewing public service announcements featuring a sad victim, the tendency to donate increases under the influence of emotional contagion [17]. Similar results have been found when pets are potential beneficiaries: people being more willing to donate when they see pictures of a sad dog rather than a happy one [35]. Nevertheless, there is a curvilinear relationship between sadness and donation size in the context of medical care: moderate levels of sadness in charity appeals increase the willingness to donate, whereas excessive sadness reduces it [37]. In contrast, when philanthropy is directed towards education and disaster relief, there is a positive linear relationship between sadness and donations [37].

Mixed effects can arise when prosocial behavior appeals evoke fear. In the context of ecology, Hine and Gifford [18] showed that fear-inducing messages about environmental pollution were more likely to promote charitable behavior than non-affective messages. When the goal of fundraising was to fight climate change, fear appeals did not significantly impact donations [38]. Furthermore, fearful messages have been found to be ineffective when soliciting online donations for low-income people and providing disaster relief [37].

Other feelings and emotions, such as anger, shock, anxiety, and empathy have also been shown to have varying levels of effectiveness in attracting donations, depending on the context and the study design used [37, 39–42]. Therefore, there is no consensus in the academic literature on exactly how discrete emotions affect the willingness to donate. This is largely due to the differences in the goals that charities aim to achieve.

Inconsistencies in research findings relate not only to specific emotions, but also to their valence. For instance, Burt and Strongman [21] found that images depicting negative emotions led to increased donations, including financial, material, and time contributions. Additionally, EEG research showed that negative-valence advertising induces more attention to potentially threatening stimuli, as evidenced by the amplitude of the ERP component P1 [43].

At the same time, the frequent use of negative emotions in charity appeals has been criticized [44, 45] and can lead to hostility towards charities [46]. Against this backdrop, there is growing evidence that positive (pleasant) emotions can be an effective tool for attracting donations [24, 47]. Specifically, functional magnetic resonance imaging (fMRI) data showed that participants were more likely to donate when images increase activity in the nucleus accumbens, a brain region associated with positive arousal [24]. In the context of affective computing, research demonstrated that donation is positively correlated with happiness and positive valence, which is recorded before making a donation decision [23].

Particular attention should be paid to the impact of arousal on donations. Results from eye tracking showed that as arousal increases, so does interest in viewing charity advertising which, in turn, can increase the likelihood of donating [48]. According to a survey conducted by Amato [39], after a major fire in Australia, people who experienced higher levels of emotional arousal, such as horror or shock, were more likely to donate to charities and were more willing to help fire victims [39]. To our knowledge, the relationship between donation size and arousal has not been well studied.

Thus, it could be concluded that the results of studies on the relationship between emotions and charitable behavior are contradictory. Specifically, some studies showed the effectiveness of positive emotions in fundraising, while others found the opposite. The role of individual discrete emotions in general also remains unclear, as various studies demonstrated the effectiveness of a range of emotions, which may be due to differences in research paradigms and the conditions under which donation decisions were made. The impact of arousal on charitable behavior also remains understudied. Therefore, further research on the relationship between emotions and charitable behavior is needed.

Influence of animal characteristics on donation decisions

Given the variety of activities of charitable organizations, it is important to understand the specifics of each of them. To date, there is a lack of academic publications devoted to peoples' prosocial behavior caused by charity appeals in support of animals. Pet charities often use the photographs of their animals in advertising messages to attract

attention. The condition of the animals presented may be associated with charitable behavior, since these images can evoke a certain emotional state, as well as demonstrate a problem for which donations are required.

The age of the animal may be a factor influencing charitable behavior. It has previously been shown that willingness to donate to children is higher than to adults [49]. This may be due to the fact that young children, as well as puppies or kittens, are perceived as a more vulnerable category compared to adult humans or animals. In addition, it is likely that puppies may provoke patterns of parental behavior in humans, similar to infants [50]. Therefore, donations for puppies may exceed those for adult dogs.

Health status and signs of homelessness may also be factors influencing willingness to donate money. Images showing human suffering and sadness have been shown to evoke the highest levels of compassion [51], which can also be seen in the case of animals. Thus, it is likely that the images of stray or sick dogs highlight the problems that the fundraiser is trying to solve and also generate more sympathy, which in turn may increase the size of the donation.

The absence of a potential guardian is another sign that emphasizes the animal's plight. It is likely that the images of dogs with people present may trigger a bystander effect or diffusion of responsibility [52, 53], which may reduce the likelihood of donating to support such animals compared to those that are alone.

Therefore, dog characteristics such as health status, age, signs of homelessness, and the presence of a human nearby may be associated with the size of donations.

Purpose and objectives of the study

The purpose of the study was to examine the relationship between emotional state and the size of donation to support stray dogs and to determine how animal welfare characteristics are associated with emotions and charitable behavior.

The objectives of this study include the following *theoretical, methodological, and empirical tasks:*

— analyze the main theoretical approaches to the study of emotions, as well as the results of empirical studies on the relationship between emotions and prosocial behavior;

— analyze the results of empirical studies examining the characteristics of recipients of assistance that influence prosocial behavior;

— prepare reliable tools for studying the relationship between emotions and the size of donations in support of dogs;

— prepare reliable tools for studying the relationship between the characteristics of dogs and the size of donations in their support;

— collect data from laboratory and online experiments aimed at studying the relationship between the size of donations and the emotions and characteristics of dogs;

— analyze the collected data to determine if there is a relationship between the size of the donation and emotions;

— analyze the collected data to determine if there is a relationship between the size of the donation and the characteristics of dogs;

— compare the results obtained with data from previously published empirical studies on the relationship between emotions and charitable behavior;

— compare the results obtained with data from previously published empirical studies on the relationship between the characteristics of aid recipients and charitable behavior;

— systematize the results obtained and prepare the main conclusions regarding the relationship between the size of the donation and the emotions and characteristics of stray dogs.

Theoretical and methodological foundations of the study

The theoretical and methodological basis of the study consists of publications in the following areas:

— approaches to describing emotions (J. A. Russell, L. F. Barrett, P. Ekman, W. V. Friesen);

— empirical studies of the relationship between emotions and prosocial behavior (P. M. Homer, D. A. Small, N. M. Verrochi, C. D. B. Burt, K. Strongman, J. Liang, Z. Chen, A. Genevsky, B. Knutson, P. R. Amato, H. Sabato, T. Kogut);

— measuring emotions by recording facial muscle activity (P. J. Lang, M. K. Greenwald, M. M. Bradley, A. O. Hamm, I. B. Mauss, M. D. Robinson, U. Dimberg, B. Karlsson);

— measurement of emotions based on reactions of the autonomic nervous system (P. J. Lang, M. K. Greenwald, M. M. Bradley, A. O. Hamm, J. P. Sanchez-Navarro, J. M. Martinez-Selva);

— recognition of emotions from facial expressions, affective computing (P. Ekman, W. V. Friesen, A. Hadinejad, B. L. Loijens, O. Krips, D. Maison, B. Pawlowska, B. D. Moyle).

Research methods

In the course of this study, two laboratory experiments were conducted. The first experiment was carried out with the registration of peripheral physiological data, and the second was conducted with the recognition of facial expressions using the FaceReader software. In addition, one online behavioral experiment was performed. Each of the three experiments consisted of two parts. In the first part, the participants made voluntary donations to support homeless dogs. In the second part, they assessed their emotions caused by images of animals. All research procedures were carried out in accordance with the Declaration of Helsinki and were approved by the HSE committee on interuniversity surveys and ethical assessment of empirical research.

Donation task

This task design was similar for all three experiments. The participants received 320 rubles for participating in the study, which they could voluntarily donate to the needs of the dogs shown in the images, at a rate of 0 to 10 rubles for each of the 32 animals. The participants determined the donation amount independently using a scale that appeared after each image. Next to the scale selecting the size of the donation (from 0 to 10 rubles), the participants could see the image number (for example, 3 out of 32) and the balance of funds from the reward amount (balance = 320 rubles - the sum of all previously made donations). After presenting all the images, the participants could take the remaining balance. All collected donations were transferred to the pet charity about which the participants were informed in advance.

Methods for assessing emotions

This study used a comprehensive approach to assess emotions in the donation decision-making process, including both subjective (self-report of emotions) and objective methods.

Self-report of emotions

In the second part of the experiment, the participants repeatedly viewed 32 pictures of animals and rated their emotions using a 9-point scale. In the first laboratory experiment and online experiment, the participants rated only valence and arousal. In the second laboratory experiment, the participants rated the valence and arousal, as well as six basic emotions. When assessing valence on a 9-point scale, a value of "1" meant very unpleasant emotions, and a value of "9" meant very pleasant emotions. When assessing discrete six basic emotions and arousal, "1" meant very weak emotions, "9" meant very strong emotions.

Objective methods for assessing emotions

Experiment 1

As part of this experiment, the following methods were used to assess the emotional state of participants:

1. Electromyography of facial muscles was performed on the corrugator supercilii and zygomaticus major. EMG corrugator supercilii is a reliable marker of negative emotions, while the EMG of zygomaticus major reflects positive emotions [54, 55]. Muscle EMG activity was recorded using bipolar placement of 4-mm Ag/ AgCl surface electrodes [56] on the right side of the face. The raw EMG signal was amplified and frequencies outside the 10–350 Hz range were filtered. The signal was also subjected to full-wave rectification and off-line integration with a time constant of 500 ms. For the analysis, the average EMG activity one second before the stimulus was subtracted from the average EMG activity recorded throughout the entire stimulus presentation period, which was six seconds. This approach made it possible to neutralize the influence on the results of the emotional state of the participants before the presentation of the stimulus [57].

2. Registration of the electrical activity of the skin. Skin conductance correlates with arousal, so this method is sensitive to affective stimuli of either valence [54, 58]. EDA data was recorded using bipolar Ag/ AgCl surface electrodes placed on the second and fourth fingers of the left hand (non-dominant for all participants). The raw signal was set to detect activity in the range 0–100 μs. EDA was calculated as the value of all peaks appearing in the interval from 0.9 to 4 seconds after the onset of stimulus presentation. Data was transformed (log10[SCR + 1]) to correct for skewed distribution [30, 57].
3. A photoplethysmogram was used to measure heart rate. This method is sensitive to changes in arousal levels. It has been found that stimuli eliciting strong emotions (both pleasant and unpleasant) lead to heart rate deceleration in the few seconds of presentation compared to neutral stimuli [54, 59]. The photoplethysmometer recorded the amplitude of blood volume changes in the finger using a photoelectric cell placed on the distal phalanx of the third finger on the non-dominant hand. Heart rate was calculated from peaks in the amplitude and deceleration was determined by comparing heart rates at each second to a baseline (one second before stimulus presentation). Maximum decelerations were measured from the baseline in the first three (1-3) and last three (4-6) seconds of stimulus presentation [57, 60].

These methods were used to measure emotions during the first part of the experiment, i.e. at the moment of the first presentation of the stimulus, immediately before the decision to donate was made [57].

Experiment 2

As part of this experiment, affective computing, namely FaceReader (version 8.0, Noldus Information Technology) was used to assess the emotional state of the participants. This software has one of the highest recognition accuracy rates among the eight most common automatic emotion recognition software [27]. FaceReader simultaneously assesses two dimensions of emotion (valence and arousal), six basic emotions (happiness, anger, disgust, fear, sadness and surprise), and a “neutral” state. Valence values range from -1 (extremely negative emotions) to 1 (extremely positive

emotions). The arousal, as well as the six basic emotions, range between 0 (inactive) and 1 (active). FaceReader data was recorded at a sampling rate of 10 Hz and a resolution of 720 pixels (1280 × 720). For the analysis, the average value for each emotion was taken within 1 second prior to the presentation of the stimulus and subtracted that from the average value during the entire stimulus presentation period (6 seconds) [61].

This method of affective computing was used to assess emotions in the first part of the experiment, i.e. at the moment of the first presentation of the stimulus, immediately before the decision to donate was made.

Experiment 3

This experiment was conducted online to validate the data obtained during the laboratory part of the study in order to exclude the influence of the laboratory environment on the decision to donate. Thus, in this experiment, only a subjective method was used, i.e. self-report of valence and arousal.

Characteristics of stimulus material

Thirty-two photographs of dogs were used as stimulus material that could potentially affect the emotional state of the participants. The photos of animals similar to charity appeals which are typically used by pet charities were chosen. Each image contained four binary characteristics of the dog's condition that were identified as potentially relevant to the donation decision: health status (healthy/sick), signs of homelessness (home/stray), age (puppy/adult), and presence of a person nearby (with a person/without a person). Stimulus materials were pre-tested in an online survey (N =17) to determine whether the images matched the specified characteristics averaging 84–100% agreement among the respondents for each image across all four characteristics. There was no pretesting of the stimuli for valence and arousal, as well as the six basic emotions. The total set of pictures contained sixteen categories with combinations of four characteristics, two pictures for each category. A table of characteristics of each category is presented in Appendix 1.

Additional Variables

In addition to the data collected during the experiments, the study used personal data of the participants, such as age, gender, level of financial well-being, and level of

satisfaction with their financial well-being and the subjective value of the amount of participation reward.

Data Analysis Methods

In the mathematical and statistical processing of data, the following methods were used: Shapiro-Wilk and Kolmogorov-Smirnov tests to check the normality of data distribution, Student's *t*-test and Wilcoxon test to compare means, Spearman and Pearson correlation analysis to identify relationships between variables, as well as linear mixed-effects models with subject-level random effects to determine the effect of various variables on donations. *P* values below 5% were considered significant. The Benjamini–Hochberg procedure for false discovery-rate correction (FDR) was used to correct the multiple comparisons [62]. JASP version 0.11.1.0 and the statistical environment R v4.1.1 (package lme4) were used as software.

Sample and empirical basis of the study

The results of three experiments, i.e. two laboratory and one online experiment, form the empirical basis of the study. The sample size for each experiment was calculated for effect size *d* according to Cohen 0.40 and power 80%. Analyzes were performed using G*Power [63] taking into account the statistical methods used for each experiment.

Experiment 1 sample

The experiment involved 54 participants, which is two participants more than the recommended sample size. Additional participants were invited in case of data loss. Thus, the sample size was 54 (N = 54) healthy participants (63% female, M_{age} = 24.5 years, SD = 5.7, range = 18–43). The participants were Russian-speaking members of the general public recruited through online advertising [57].

Experiment 2 sample

Forty-six participants took part in the experiment, which is two participants more than the recommended sample size. Additional participants were invited in case of data loss. One participant was excluded due to a failure to recognize the FaceReader data. The final sample size was 45 (N = 45) healthy participants (58.8% female, M_{age} = 23.9 years, SD = 5.3, range = 19–40). Having glasses, a beard, and a mustache was a barrier to

participation, as the pilot found that these elements may interfere with emotion recognition using FaceReader. Before participating in the experiment, all participants reported that they had never been injected with botulinum toxin or other drugs that affect the activity of the facial muscles. The participants were Russian-speaking members of the general public recruited through online advertising [61].

Experiment 3 sample

The sample size was 54 participants (64.8% female, M_{age} = 23.6 years, SD = 7.2, range = 18–56). The participants were Russian-speaking members of the general public who responded to advertisements posted on social media and followed a link to the experiment's web page [64].

Theoretical and practical significance of the research

This study is the first to explore the role of emotions in making decisions about donations using a comprehensive approach that includes measuring physiological responses (HR, EDA), facial expression data (EMG, FaceReader), and self-reported emotions. Its findings contribute to the study of the relationship between emotional state and charitable behavior. In particular, conclusions are drawn about how six basic emotions, as well as valence and arousal, are associated with the willingness to donate to support homeless animals. In addition, the study expands the theoretical framework for examining cross-species human prosocial behavior induced by charity appeals.

This work helps to fill a gap in the academic literature on evaluating the effectiveness of advertising materials using affective computing. It also proposes a new experimental paradigm that can be used for further research in the field of charity and commercial advertising. Since this study is the first to evaluate the effectiveness of charity appeals using affective computing (FaceReader) and physiological response data (EDA, HR, EMG), based on the results obtained, it is possible to assess the feasibility of using these methods for further research on non-profit advertising.

The practical significance of this work lies in the fact that the results obtained and the procedures described can help charitable organizations to evaluate the effectiveness of their advertising messages before they are produced and posted, which will allow them

to optimize the cost of attracting donations. This study also draws the attention of the academic community to the problems of homeless animals, which still remain relevant in many countries of the world.

Main results of the study and provisions submitted for defense

Main results of the study

Experiment 1

Correlation analysis of the data from the first experiment showed that the size of the donation was negatively correlated with valence ($r(32) = -0.81$, $p < 0.001$) and positively correlated with arousal ($r(32) = 0\ .48$, $p = 0.006$) (Fig. 1). Donation size was also negatively correlated with zygomaticus major muscle activity ($r(32) = -0.39$, $p = 0.029$) and positively correlated with corrugator muscle activity ($r(32) = 0.84$, $p < 0.001$). Additionally, heart rate deceleration was also shown to be negatively correlated with donation size ($r(32) = -0.41$, $p = 0.021$). EDA did not show a significant correlation with charitable behavior ($r(32) = 0.18$, $p = 0.34$).

Thus, according to the self-report of emotions, the participants in the experiment donated more when they experienced strong and unpleasant emotions, which is consistent with physiological data. Corrugator muscle activity predicted increases in donation size, while zygomaticus major activity predicted decreases in donation size.

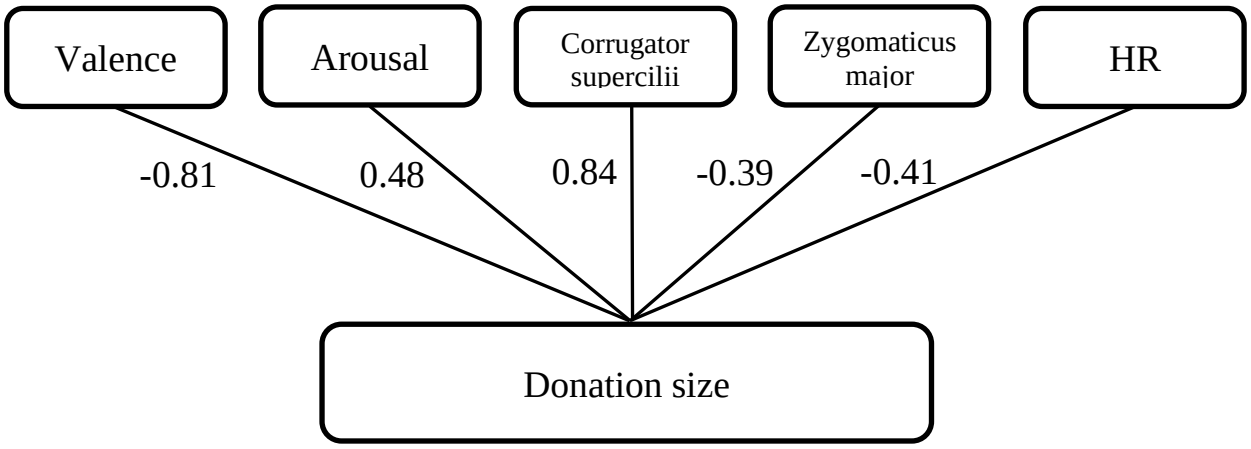

Figure 1. Correlations between donations and affective measures.

An analysis of the influence of animal characteristics on donations levels showed that more money was donated to the needs of sick dogs than to the needs of healthy ones ($t(53) = 6.93$, $p < 0.001$, $d = 0.94$), more was donated to homeless dogs than to pets ($t(53) = 2.30$, $p = 0.025$, $d = 0.31$), while age and the presence of a person near the animal did not affect the size of the donation [57].

Experiment 2

Correlation analysis of data obtained in the second experiment showed that valence was negatively correlated with donation size, which was confirmed by both self-report data ($\rho(32) = -0.96$, $p < 0.001$) and FaceReader (FR) data ($\rho(32) = -0.83$, $p < 0.001$) (Fig. 2). Unlike the first experiment, the data from the second experiment did not confirm the existence of a connection between arousal and the size of donations ($\rho(32) = 0.28$, $p = 0.12$ (self-report), $r(32) = -0.20$, $p = 0.28$ (FR)). Thus, the more unpleasant emotions the participants experienced, the more they donated, while arousal did not significantly affect the amount of donations.

According to FaceReader data regarding discrete emotions, donations were negatively correlated with happiness ($\rho(32) = -0.84$, $p < 0.001$ (self-report), $\rho(32) = -0.77$, $p < 0.001$ (FR)) and were positively correlated with sadness ($\rho(32) = 0.94$, $p < 0.001$ (self-report), $r(32) = 0.51$, $p = 0.003$ (FR)). Moreover, donations were correlated with anger ($\rho(32) = 0.87$, $p < 0.001$ (self-report), $r(32) = 0.55$, $p = 0.001$ (FR)). In other words, viewing photos that evoked less happiness and more sadness and anger led to larger donations, as shown by self-report data and FaceReader affective computing. [61].

Regarding other emotions, self-report and FaceReader data showed contradictory results. Specifically, donations were correlated with subjective fear ($\rho(32) = 0.94$, $p < 0.001$), disgust ($\rho(32) = 0.87$, $p < 0.001$), and surprise ($\rho(32) = 0.81$, $p < 0.001$), while according to the FaceReader data, donations were not correlated with fear ($r(32) = -0.12$), disgust ($\rho(32) = 0.014$) and surprise ($r(32) = -0.22$) (all p s > 0.23) [61].

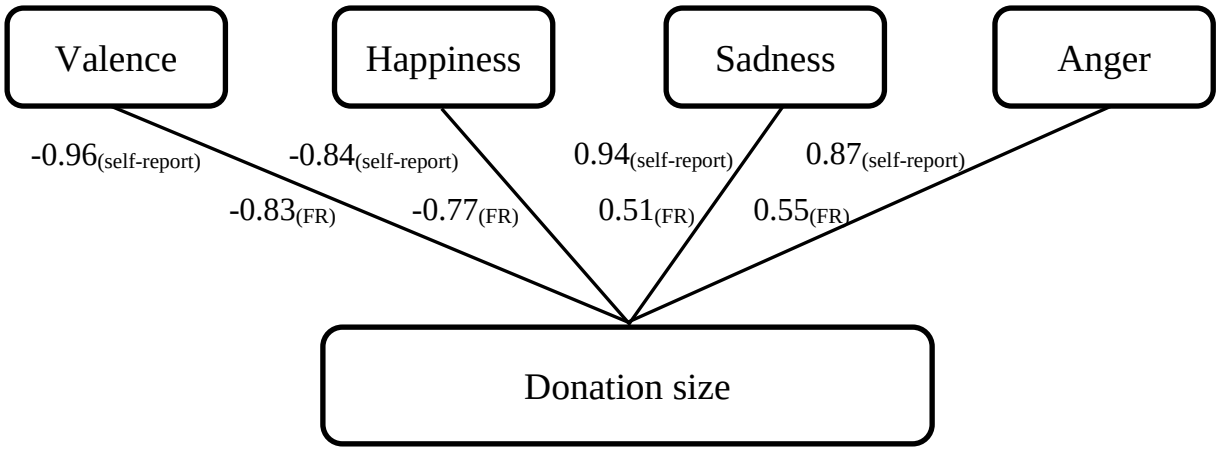

Figure 2. Correlations between donations and self-report and FaceReader affective measures.

Differences in the results of affective computing and self-report may have arisen due to differences in the moments of fixation of emotions: the software analyzed the reactions obtained during the first presentation of the pictures prior to making the decision to donate, while the self-report of emotions was carried out after viewing the pictures again. In addition, framing questions about specific emotions could create a “mere-measurement effect” and affect the respondents' responses so that they indicate not only the emotions they experienced, but also those they considered appropriate depending on the state of the animal in the photographs. Based on this, there is a reason to believe that data obtained using FaceReader complement self-reports, which allows us to more accurately identify emotions at the moment of decision-making and reduce the influence of experimental procedure or cognitive biases on research results.

Additional variables, such as the level of economic well-being, satisfaction with level of economic well-being, and monthly earnings were not associated with the amount of participants' donations (all ps > 0.51). At the same time, the subjective value of the reward for participating in the experiment (320 rubles) was associated with the size of donations in such a way that the more valuable the reward was for the participants, the less they gave to charity ($\rho(32) = -0.53$, $p < 0.001$) [61].

Experiment 3

The analysis of the data from the third experiment, as well as the data from the first, showed that the size of online donations was significantly correlated with valence ($\rho(32) = -0.91$, $p < 0.001$) and arousal ($\rho(32) = 0.89$, $p < 0.001$).

Regarding the characteristics of the animals, according to the obtained Wilcoxon tests, the participants donated more to stray dogs than domestic ones ($p < 0.001$), and they donated more to sick dogs than healthy ones ($p < 0.001$). These results are consistent with the data from the first experiment. It was also shown that significantly less was donated to puppies than to adult dogs ($p = 0.037$). The presence of a person in photographs did not significantly affect the amount of donations ($p = 0.20$) [64].

To determine the overall effect of various variables on donation size, six linear mixed models with subject-level random effects were estimated (Table 1).

Table 1. Effect of evoked emotions and dog characteristics on donation size. All models are linear mixed models with random effects at the subject level.

	Dependent variable:					
	Donation					
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	3.36***	4.93***	1.27**	5.46***	7.35*	3.24
Homeless	0.71***	0.27*	0.46***	0.22	0.22	0.46***
Sick	2.10***	1.45***	1.47***	0.63*	0.63*	1.46***
Human	-0.09	-0.09	-0.03	-0.10	-0.10	-0.03
Puppies	-0.12	0.02	0.01	-0.01	-0.01	0.01
Valence		-0.26***		-0.34***	-0.34***	
Arousal			0.41***			0.41***
Age					-0.05	-0.07
Gender					-0.40	-0.28
Financial level (1-7)					-0.17	-0.24
Satisfaction with financial level (1-7)					0.55	0.69
Subjective value of 320 MU (1-7)					-0.65	-0.60
Sick x Valence				0.20***	0.20***	
Observations	1728	1728	1728	1728	1728	1728
Log Likelihood	-3809.18	-3782.32	-3732.00	-3777.88	-3773.33	-3726.90
Akaike Inf. Crit.	7632.35	7580.65	7479.99	7573.76	7574.65	7479.79
Bayesian Inf. Crit.	7670.54	7624.28	7523.63	7622.85	7651.02	7550.70

Note: * p<0.05
** p<0.01
*** p<0.001

In general, the data presented in Table 1 are consistent with the results of correlation analysis and the Wilcoxon test regarding the influence of emotions and characteristics of animals on the size of the donation. The only difference is the relationship between the age of the animal and the donation, which was not confirmed by the regression analysis. Additional variables, such as the age of the participants, their gender, level of financial well-being, satisfaction with the level of financial well-being, and the subjective value of the reward did not have any significant effect on the amount of donations [64].

Provisions for defense

1. Charitable behavior is associated with emotional state. Valence is associated with the donation size: the more unpleasant the emotions evoked by charity appeals, the greater the willingness to donate.
2. Emotions such as happiness, anger, and sadness are associated with charitable behavior: the less happiness and the more sadness and anger caused by charity appeals, the higher the willingness to donate.
3. Objective measures of emotional state, such as facial muscle activity and heart rate, can be a reliable tool for evaluating the effectiveness of charity appeals.
4. Beneficiaries' characteristics may evoke different donors' emotions which, in turn, are associated with willingness to donate.

Conclusion

This thesis aims to explore charitable behavior, specifically the relationship between emotions and the willingness to donate in support of animals. The results show that unpleasant emotions, compared to neutral and pleasant emotions, lead to an increase in the amount of donations. These results are supported by both subjective self-report measures of emotion and objective measures based on physiological responses and facial muscle activity. Individual emotions such as anger, sadness, and happiness have also been shown to be associated with charitable behavior. Thus, the more sadness and anger and the less happiness the benefactors experienced, the larger the size of their donations. These results are supported by both self-report data and measures obtained through affective computing.

Characteristics of charity beneficiaries, such as health status and signs of homelessness, were also associated with the amount given. The participants made larger donations to support sick and stray dogs compared to healthy and domestic ones. The age of the animal and the presence of a person nearby did not affect charitable behavior. At the same time, willingness to donate was associated with the subjective value of money, but not with the subjective financial well-being of donors.

The results obtained contribute to the study of human prosocial behavior in relation to other biological species. They also help to create a theoretical and methodological basis for further research and practical application.

Approbation of research results

The results obtained as part of the work on studying the role of emotions in the decision to donate were presented in the following publications and at international conferences.

Publications:

1. Shepelenko A., Kosonogov V., Shestakova A. How Emotions Induce Charitable Giving. A Psychophysiological Study // Social Psychology. —2023. — Vol. 54, № 5. — P. 261–270.
2. Shepelenko A., Shepelenko P., Obukhova A., Kosonogov V., Shestakova A. The relationship between charitable giving and emotional facial expressions: Results from affective computing // Heliyon. — 2024. — Vol. 10, № 2. — P. e23728.
3. Shepelenko A., Shepelenko P., Panidi K., Kosonogov V., Shestakova A. How the emotions evoked by homeless pets induce online charitable giving // Journal of Philanthropy and Marketing. — 2024. — Vol. 29, № 2. — P. e1842.

Conferences:

1. 3rd International Forum “Cognitive Neuroscience – 2020”, December 2020, Yekaterinburg, Russia
2. International Conference “Society for Affective Science 2021”, March 2021, virtual
3. All-Russian Conference “Current Problems of Science and Technology”, March 2021, Rostov-on-Don, Russia
4. International conference “Increasing the effectiveness of social advertising”, December 2021, Moscow, Russia

References

1. Ott J.S., Dicke L. The Nature of the Nonprofit Sector // The Nature of the Nonprofit Sector. 4th ed. / ed. Ott J.S., Dicke L.A. New York: Routledge, — 2021. 1–604 p.
2. Ressler R.W., Paxton, P., Velasco, K., Pivnick, L., Weiss, I., & Eichstaedt, J. C. Nonprofits: A Public Policy Tool for the Promotion of Community Subjective Well-being // Journal of Public Administration Research and Theory. — 2021. — Vol. 31, № 4. — P. 822–838.
3. Giving USA [Electronic resource] // Giving USA 2019: Americans gave $427.71 billion to charity in 2018 amid complex year for charitable giving. 2019. URL: https://givingusa.org/giving-usa-2019-americans-gave-427-71-billion-to-charity-in-2018-amid-complex-year-for-charitable-giving/ (date of the application: 16.09.2023).
4. Gratton P.C. Organization development and strategic planning for non-profit organizations // Organization Development Journal. — 2018. — Vol. 36, № 2. — P. 27–38.
5. Whyke T.W., López-Múgica J. Content and Discourse Analysis of Cruelty towards Stray Dogs as Presented in Chinese Social Media // Society & Animals. — 2020. — Vol. 31, № 2. — P. 139–158.
6. Kalthoum S., Ben Salah C., Rzeigui H., Gharbi R., Guesmi K., Ben Salem A., Ferchichi S., Zammel F., Fatnassi N., Bahloul C., Seghaier C. Owned and free-roaming dogs in the North West of Tunisia: estimation, characteristics and application for the control of dog rabies // Heliyon. — 2021. — Vol. 7, № 11. — P. e08347.
7. Parry N.M.A. COVID-19 and pets: When pandemic meets panic // Forensic Science International: Reports. — 2020. — Vol. 2. — P. 100090.
8. Razali K., Kaidi R., Abdelli A., Menoueri M.N., Ait-Oudhia K. Oral flora of stray dogs and cats in Algeria: Pasteurella and other zoonotic bacteria // Vet World. — 2020. — Vol. 13, № 12. — P. 2806–2814.

9. Katica M., Gradascevic N., Hadzimusic N., Obradovic Z., Mujkanovic R., Mestric E., Coloman S., Dupovac M. Widespread of Stray Dogs: Methods for Solving the Problem in Certain Regions of Bosnia and Herzegovina // International Journal of Research -GRANTHAALAYAH. — 2017. — Vol. 5, № 6. — P. 414–422.
10. Gupta N., Gupta R.K. Animal Welfare and Human Health: Rising Conflicts over Stray Dogs in Chandigarh // South Asia Research. — 2019. — Vol. 39, № 3. — P. 339–352.
11. Mota-Rojas D., Calderón-Maldonado N., Lezama-García K., Sepiurka L., Garcia R.D.C.M. Abandonment of dogs in Latin America: Strategies and ideas // Vet World. — 2021. — Vol. 14, № 9. — P. 2371–2379.
12. Zumpano R., Tortosa A., Degregorio O.J. Estimación del impacto de la esterilización en el índice de crecimiento de la población de caninos // Revista de Investigaciones Veterinarias del Perú. — 2011. — Vol. 22, № 4. — P. 336–341.
13. Eisenberg N., Sadovsky A. Prosocial Behavior, Development of // Encyclopedia of Applied Psychology, Three-Volume Set. 1st ed. / ed. Spielberger C. Elsevier Science Ltd., — 2004. — P. 137–141.
14. Tusche A., Böckler A., Kanske P., Trautwein F. M., Singer T. Decoding the Charitable Brain: Empathy, Perspective Taking, and Attention Shifts Differentially Predict Altruistic Giving // Journal of Neuroscience. — 2016. — Vol. 36, № 17. — P. 4719–4732.
15. Homer P.M. When sadness and hope work to motivate charitable giving // Journal of Business Research. — 2021. — Vol. 133. — P. 420–431.
16. Liang J., Chen Z., Lei J. Inspire me to donate: The use of strength emotion in donation appeals // Journal of Consumer Psychology. — 2016. — Vol. 26, № 2. — P. 283–288.
17. Small D.A., Verrochi N.M. The Face of Need: Facial Emotion Expression on Charity Advertisements // Journal of Marketing Research, — 2009. — Vol. 46, № 6. — P. 777–787.

18. Hine D.W., Gifford R. Fear appeals, individual differences, and environmental concern // The Journal of Environmental Education. — 1991. — Vol. 23, № 1. — P. 36–41.
19. Telzer E.H., Fuligni A.J. Daily Family Assistance and the Psychological Well-Being of Adolescents From Latin American, Asian, and European Backgrounds // Developmental psychology. — 2009. — Vol. 45, № 4. — P. 1177–1189.
20. van Doorn J., Zeelenberg M., Breugelmans S.M. The impact of anger on donations to victims // International Review of Victimology. — 2017. — Vol. 23, № 3. — P. 303–312.
21. Burt C.D.B., Strongman K. Use of images in charity advertising: Improving donations and compliance rates // International Journal of Organisational Behaviour. — 2005. — Vol. 8, № 8. — P. 571–580.
22. Sabato H., Kogut T. Happy to help—if it's not too sad: The effect of mood on helping identifiable and unidentifiable victims // PLoS One. — 2021. — Vol. 16, № 6. — P. e0252278.
23. Fiala L., Noussair C.N. Charitable Giving, Emotions, and the Default Effect // Economic Inquiry. — 2017. — Vol. 55, № 4. — P. 1792–1812.
24. Genevsky A., Västfjäll D., Slovic P., Knutson B. Neural Underpinnings of the Identifiable Victim Effect: Affect Shifts Preferences for Giving // Journal of Neuroscience. — 2013. — Vol. 33, № 43. — P. 17188–17196.
25. Septianto F., Tjiptono F. The interactive effect of emotional appeals and past performance of a charity on the effectiveness of charitable advertising // Journal of Retailing and Consumer Services. — 2019. — Vol. 50. — P. 189–198.
26. Maison D., Pawłowska B. Using the Facereader Method to Detect Emotional Reaction to Controversial Advertising Referring to Sexuality and Homosexuality // Springer Proceedings in Business and Economics. — 2017. — P. 309–327.
27. Dupré D., Krumhuber E.G., Küster D., McKeown G.J. A performance comparison of eight commercially available automatic classifiers for facial affect recognition // PLoS One. — 2020. — Vol. 15, № 4. — P. e0231968.

28. Stöckli S., Schulte-Mecklenbeck M., Borer S., Samson A.C. Facial expression analysis with AFFDEX and FACET: A validation study // Behavior research methods. — 2018. — Vol. 50. — P. 1446–1460.
29. Mauss I.B., Robinson M.D. Measures of emotion: A review // Cognition and emotion. — 2009. — Vol. 23, № 2. — P. 209–237.
30. Boucsein W. Electrodermal activity. 2nd ed. Springer US, — 2012. 1–618 p.
31. Schretzmayer L., Kotrschal K., Beetz A. Minor immediate effects of a dog on children's reading performance and physiology // Frontiers in veterinary science. — 2017. — Vol. 4. — P. 257186.
32. Paramita W., Septianto F., Tjiptono F. The distinct effects of gratitude and pride on donation choice and amount // Journal of Retailing and Consumer Services. — 2020. — Vol. 53. — P. 101972.
33. Vitaglione G.D., Barnett M.A. Assessing a New Dimension of Empathy: Empathic Anger as a Predictor of Helping and Punishing Desires // Motivation and Emotion. — 2003. — Vol. 27, № 4. — P. 301–325.
34. Urbonavicius S., Adomaviciute K., Urbutyte I., Cherian J. Donation to charity and purchase of cause-related products: The influence of existential guilt and experience // Journal of Consumer Behaviour. — 2019. — Vol. 18, № 2. — P. 89–96.
35. Haynes M., Thornton J., Jones S.C. An exploratory study on the effect of positive (warmth appeal) and negative (guilt appeal) print imagery on donation behaviour in animal welfare // Proceedings of the Marketing Accountabilities and Responsibilities: ANZMAC 2004 Conference. Wellington, New Zealand: Australian and New Zealand Marketing Academy, 2004.
36. Zarghamee H.S., Messer K.D., Fooks J.R., Schulze W.D., Wu S., Yan J. Nudging charitable giving: Three field experiments // Journal of behavioral and experimental economics. — 2017. — Vol. 66. — P. 137–149.
37. Ge R., Zhang S., Zhao H. Do expressions of sadness, anxiety and fear have different impacts on attracting donations? Evidence from a Chinese online charitable crowdfunding platform // Information Technology and People. — 2022. — Vol. 36. №. 7. — P. 2869-2893.

38. Palosaari E., Herne K., Lappalainen O., Hietanen J.K. Effects of fear on donations to climate change mitigation // Journal of Experimental Social Psychology. — 2023. — Vol. 104. — P. 104422.
39. Amato P.R. Emotional Arousal and Helping Behavior in a Real-Life Emergency // Journal of Applied Social Psychology. — 1986. — Vol. 16, № 7. — P. 633–641.
40. Basil D.Z., Ridgway N.M., Basil M.D. Guilt and giving: A process model of empathy and efficacy // Psychology & marketing. — 2008. — Vol. 25, № 1. — P. 1–23.
41. Cockrill A., Parsonage I. Shocking People Into Action: Does It Still Work? // J Advert Res. Journal of Advertising Research, — 2016. — Vol. 56, № 4. — P. 401–413.
42. O'Loughlin Banks J., Raciti M.M. Perceived fear, empathy and financial donations to charitable services // Service Industries Journal. — 2018. — Vol. 38, № 5–6. — P. 343–359.
43. Zubair M., Wang X., Iqbal S., Awais M., Wang R. Attentional and emotional brain response to message framing in context of green marketing // Heliyon. — 2020. — Vol. 6, № 9. — P. e04912.
44. Ash S. The Barnardo's Babies: Performativity, Shame and the Photograph // Continuum. — 2005. — Vol. 19, № 4. — P. 507–521.
45. Beswick D., Dasandi N., Hudson D. International development NGOs, representations in fundraising appeals and public attitudes in UK–Africa relations // Britain and Africa in the twenty-first century. Between ambition and pragmatism / ed. Beswick D., Fisher J., Hurt S.R. Manchester University Press, — 2019. — P. 196–213.
46. Stayman D.M., Aaker D.A. Are All the Effects of Ad-Induced Feelings Mediated by AAd? // Journal of Consumer Research. — 1988. — Vol. 15, № 3. — P. 368–373.
47. Cavanaugh L.A., Bettman J.R., Luce M.F. Feeling Love and Doing More for Distant Others: Specific Positive Emotions Differentially Affect Prosocial

Consumption // Journal of Marketing Research. — 2015. — Vol. 52, № 5. — P. 657–673.

48. Sciulli L.M., Bebko C.P., Bhagat P. How Emotional Arousal and Attitudes Influence Ad Response: Using Eye Tracking to Gauge Nonprofit Print Advertisement Effectiveness // Journal of Marketing Management. — 2017. — Vol. 5, № 1. — P. 1–11.
49. Lee D.I., Park J.H. The relationship between a charity crowdfunding project's contents and donors' participation: An empirical study with deep learning methodologies // Computers in Human Behavior. — 2020. — Vol. 106. — P. 106261.
50. Lehmann V., Huis in't Veld E.M.J., Vingerhoets A.J.J.M. The human and animal baby schema effect: Correlates of individual differences // Behavioural processes. — 2013. — Vol. 94. — P. 99–108.
51. Mercadillo R.E., Barrios F.A., Díaz J.L. Definition of Compassion-Evoking Images in a Mexican Sample // Perceptual and motor skills. — 2007. — Vol. 105, № 2. — P. 661–676.
52. Wiesenthal D.L., Austrom D., Silverman I. Diffusion of Responsibility in Charitable Donations* // Basic and Applied Social Psychology. — 1983. — Vol. 4, № 1. — P. 17–27.
53. Garcia S.M., Weaver K., Moskowitz G.B., Darley J.M. Crowded minds: The implicit bystander effect // Journal of personality and social psychology. — 2002. — Vol. 83, № 4. — P. 843–853.
54. Bradley M.M., Codispoti M., Cuthbert B.N., Lang P.J. Emotion and Motivation I: Defensive and Appetitive Reactions in Picture Processing // Emotion. — 2001. — Vol. 1, № 3. — P. 276–298.
55. Dimberg U., Karlsson B. Facial reactions to different emotionally relevant stimuli // Scandinavian Journal of Psychology. — 1997. — Vol. 38, № 4. — P. 297–303.
56. Fridlund A.J., Cacioppo J.T. Guidelines for Human Electromyographic Research // Psychophysiology. — 1986. — Vol. 23, № 5. — P. 567–589.

57. Shepelenko A., Kosonogov V., Shestakova A. How Emotions Induce Charitable Giving. A Psychophysiological Study // Social Psychology. — 2023. — Vol. 54, № 5. — P. 261–270.
58. Zieliński P. An Arousal Effect of Colors Saturation // Journal of Psychophysiology. — 2016. — Vol. 30, № 1. — P. 9–16.
59. Sánchez-Navarro J.P., Martínez-Selva J.M., Torrente G., Román F. Psychophysiological, Behavioral, and Cognitive Indices of the Emotional Response: A Factor-Analytic Study // The Spanish journal of psychology. — 2008. — Vol. 11, № 1. — P. 16–25.
60. Messerotti Benvenuti S., Buodo G., Dal Bò E., Palomba D. Attention and affect in dysphoria: Insights from startle reflex modulation and cardiac deceleration // Behaviour Research and Therapy. — 2020. — Vol. 131. — P. 103626.
61. Shepelenko A., Shepelenko P., Obukhova A., Kosonogov V., Shestakova A. The relationship between charitable giving and emotional facial expressions: Results from affective computing // Heliyon. — 2024. — Vol. 10. — P. 23728.
62. Benjamini Y., Hochberg Y. Controlling the False Discovery Rate: A Practical and Powerful Approach to Multiple Testing // Journal of the Royal Statistical Society: Series B (Methodological). — 1995. — Vol. 57, № 1. — P. 289–300.
63. Faul F., Erdfelder E., Lang A.G., Buchner A. G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences // Behavior research methods. — 2007. — Vol. 39, № 2. — P. 175–191.
64. Shepelenko A., Shepelenko P., Panidi K., Kosonogov V., Shestakova A. How the emotions evoked by homeless pets induce online charitable giving // Journal of Philanthropy and Marketing. — 2024. — Vol. 29, № 2. — P. e1842.

Appendix 1

Table P1

Stimulus category	Stimulus characteristics			
	Homeless (yes = 1, no = 0)	Sick (yes = 1, no = 0)	Puppy (yes = 1, no = 0)	Human presence (yes = 1, no = 0)
1	0	0	0	1
2	0	1	1	1
3	0	0	1	1
4	1	1	1	0
5	1	0	0	1
6	0	0	1	0
7	1	1	1	1
8	1	0	0	0
9	1	0	1	1
10	1	1	0	1
11	1	1	0	0
12	0	0	0	0
13	0	1	0	0
14	0	1	1	0
15	1	0	1	0
16	0	1	0	1

Note: Each category has a different combination of 4 characteristics: 1) homeless/not homeless; 2) sick / not sick (healthy); 3) puppy / not puppy (adult); 4) with and without the presence of a person in the picture.