Pontifícia Universidade Católica
do Rio de Janeiro

Bruno Maciel de Carvalho Pinto Salles

Socio-Contextual Cognition in Vicarious Emotional Reactions

Dissertação de Mestrado

Dissertation presented to the Programa de Pós-graduação em Psicologia of PUC-Rio in partial fulfillment of the requirements for the degree of Mestre em Psicologia.

Advisor: Prof. Daniel Correa Mograbi

Rio de Janeiro
April 2018

Pontifícia Universidade Católica
do Rio de Janeiro

Bruno Maciel de Carvalho Pinto Salles

Socio-Contextual Cognition in Vicarious Emotional Reactions

Dissertação de Mestrado

Dissertation presented to the Programa de Pós-graduação em Psicologia of PUC-Rio in partial fulfillment of the requirements for the degree of Mestre em Psicologia. Approved by the undersigned Examination Committee

Prof. Daniel Correa Mograbi

Advisor

Departamento de Psicologia – PUC-Rio

Prof. Jesus Landeira-Fernandez

Departamento de Psicologia – PUC-Rio

Prof. Ronaldo Pilati Rodrigues

Departamento de Psicologia Social e do Trabalho – UNB

Prof ª. Monah Winograd

Vice Dean of Graduate Studies

Centro de Teologia e Ciências Humanas – PUC-Rio

Rio de Janeiro, April 2, 2018.

Bruno Maciel de Carvalho Pinto Salles

The author is graduated in Psychology at the Pontifícia Universidade Católica do Rio de Janeiro - PUC-Rio in 2015.

Ficha Catalográfica

Salles, Bruno Maciel de Carvalho Pinto

Socio-contextual cognition in vicarious emotional reactions / Bruno Maciel de Carvalho Pinto Salles ; advisor: Daniel Correa Mograbi. – 2018.
87 f. : il. color. ; 30 cm

Dissertação (mestrado)–Pontifícia Universidade Católica do Rio de Janeiro, Departamento de Psicologia, 2018.
Inclui bibliografia

1. Psicologia – Teses. 2. Cognição social. 3. Empatia. 4. Contágio emocional. 5. Expressões faciais de emoção. I. Mograbi, Daniel Correa. II. Pontifícia Universidade Católica do Rio de Janeiro. Departamento de Psicologia. III. Título.

CDD: 150

Acknowledgments

Começo agradecendo fortemente ao meu orientador Daniel Mograbi e ao meu parceiro de pesquisa João Fadel pelas longas horas de trabalho, auxílio, reuniões, e de amizade, especialmente nos momentos mais difíceis dessa minha caminhada pelo mestrado.

Sou muito grato à minha namorada Mariana Amaro pela paciência, afeto e todo apoio que foi me dado até o último minuto na construção desse trabalho, incluindo suas opiniões e sugestões muitas bem colocadas.

Gostaria de agradecer também aos meus colegas de laboratório pela troca de ideias enriquecedoras e pelo compartilhamento de muitas das alegrias e dores da vida acadêmica.

Agradeço aos meus pais e familiares, sem vocês nada disso seria possível.

Abstract

Salles, Bruno Maciel de Carvalho Pinto; Mograbi, Daniel Correa (Advisor); **Socio-Contextual Cognition in Vicarious Emotional Reactions**. Rio de Janeiro, 2018. 87p. Dissertação de Mestrado – Departamento de Psicologia, Pontifícia Universidade Católica do Rio de Janeiro

Recent findings suggest that social and contextual cues may moderate responses toward other's emotions. Therefore, the current work investigated socio-contextual cognition in vicarious emotional reactions. It was examined if convergent and divergent responses depend on group membership, gaze direction, and the emotion showed by the displayer; and if degrees of closeness moderate aversive and compassionate responses to other's suffering. These emotional variables were assessed by self-report, facial expressions, gaze behavior and pupil dilatation. Findings supports theories of social cognition and its effects on emotion and empathy.

Keywords

Social Cognition; Empathy; Emotional Contagion; Facial Expressions of Emotion

Resumo

Salles, Bruno Maciel de Carvalho Pinto; Mograbi, Daniel Correa (Orientador); **Cognição Sócio-Contextual em Reações Emocionais Vicárias**. Rio de Janeiro, 2018. 87p. Dissertação de Mestrado – Departamento de Psicologia, Pontifícia Universidade Católica do Rio de Janeiro

Achados recentes sugerem que pistas sociais e contextuais podem moderar respostas a emoções alheias. O presente trabalho investigou cognição sócio-contextual em reações emocionais vicárias. Foi examinado se respostas convergentes e divergentes dependem da afiliação grupal, direção do olhar e a emoção mostrada pelo emissor; e se o grau proximidade modera respostas aversivas e compassivas ao sofrimento alheio. Essas variáveis emocionais foram analisadas por autorrelato, expressões faciais, rastreio ocular e dilatação de pupila. Os achados respaldam teorias de cognição social e seus efeitos sobre emoção e empatia.

Palavras-chave

Cognição Social; Empatia; Contágio Emocional; Expressões Faciais de Emoção

Table of contents

List of figures

THEORETICAL BACKGROUND

ARTICLE 1

ARTICLE 2

List of tables

ARTICLE 1

ARTICLE 2

I. THEORETICAL BACKGROUND

1. Interpersonal Emotional Transfer

Emotions are brief psychophysiological phenomena that represent effective ways to adapt to new environment demands (LEVENSON, 1994). They are commonly elicited by personal-relevant situations (WONDRA & ELLSWORTH, 2015) and maintained through evolution to solve specific problems of survival or adjustment (KELTNER & GROSS, 1999). Distinct emotions, therefore, have their own functions: fear prepares the organism in risky situations (e.g., flight reactions in imminent danger); anger helps overcome obstacles (real or abstract); sadness recovers resources after a loss and attracts support and help from close people; etc. (EKMAN, 2007, FISCHER & MANSTEAD, 2008).

However, emotions are not only evoked by personal reasons. In fact, emotional states tend to spread among close people (PARKINSON, 2011). Studies provide evidence that affective states often automatically spreads across groups (see KELLY, MCCARTY, & IANONNE, 2014). Shared affect in groups may serve to coordinate group activities towards the achievement of common goals (SPOOR & KELLY, 2004), in addition to developing and maintaining interpersonal bonds (VAN KLEEF & FISCHER, 2015). Nevertheless, the mechanisms and conditions under which people share and become emotionally affected by others are still sources of debate. Two distinct accounts seek to explain this interpersonal emotional transfer: *emotional contagion* and *social appraisal*.

1.1 Emotional Contagion Theory

Emotional contagion theory suggests that being in contact with someone puts another person in a similar emotional state. In this view, emotions are like “diseases” that spread without will and largely inaccessible to the person awareness (HATFIELD et al., 2014). *Primitive emotional contagion* is defined as a tendency to converge emotionally through automatic mimicry

and synchronization of facial expressions, vocalization, posture, and movements of another person (HATFIELD, CACIOPPO, & RAPSON, 1994). This account presupposes a three-stage process underlying the mechanisms of emotional contagion. The first stage is mimicry, in which the perceived emotional expression leads to the automatic mimicry of this behavior (CHARTRAND & BARGH, 1999). After that, it is assumed that the observer then experiences the emotion that has been imitated by afferent feedback mechanisms, most commonly facial feedback (STRACK, MARTIN, & STEPPER, 1988). Third, as a consequence of mimicry and feedback, people would tend to "catch" others' emotions from moment to moment. In this way, individuals become behaviorally aligned through mimicry and emotionally converged by emotional contagion (VAN DER SCHALK ET AL., 2011a).

Despite still remaining influential and popular in research on interpersonal transfer of emotion (PARKINSON & MANSTEAD, 2015), there is little direct evidence for emotional contagion theory and the operation of the specific mimicry–feedback–contagion sequence (see PARKINSON, 2011). In addition, findings suggest that convergence of emotion-related movements seems to involve identifying the meaning of the behavior rather than simple "motor resonance", in which only the specific perceived physical movements get copied. For example, Tamietto et al. (2009) noted that the participants' faces reflected expressions of fear or joy even in response to bodily rather than facial signals associated with those emotions (see also HESS, HERRERA, BOURGEOIS, AND BLAIRY, 1997). These, and other findings (e.g., MOODY et al., 2007; SOUSSIGNAN et al., 2013), open the possibility that emotional correspondence between individuals may not be caused by "blind", automatic processes, but rather by moderators of emotional context in a given situation.

1.2 Social Appraisal Theory

Social appraisal theory is used as an alternative account to explain interpersonal and contextual influences in emotional correspondence, in

which the integration of others' emotions and context in which they are expressed plays a central role (BRUDER et al., 2014). In this case, emotional expressions are regarded as meaningful signs (HESS & FISCHER, 2014), and therefore provide important information about current situations.

According to this theory, the individual integrates his/her own appraisal of a situation with the information derived from the emotional expressions of other people in the same place (BRUDER et al., 2014). Emotional displays produced by other person allow perceivers to re-evaluate their own appraisal of the situation or to adopt the sender's appraisals without appraising the situation for themselves. (KITAYAMA & MASUDA, 1995; PARKINSON & SIMONS, 2012). In this case, the observer can use this emotional information to appropriately respond to the people around or to the current situation *per se* (VAN DER SCHALK et al., 2011a).

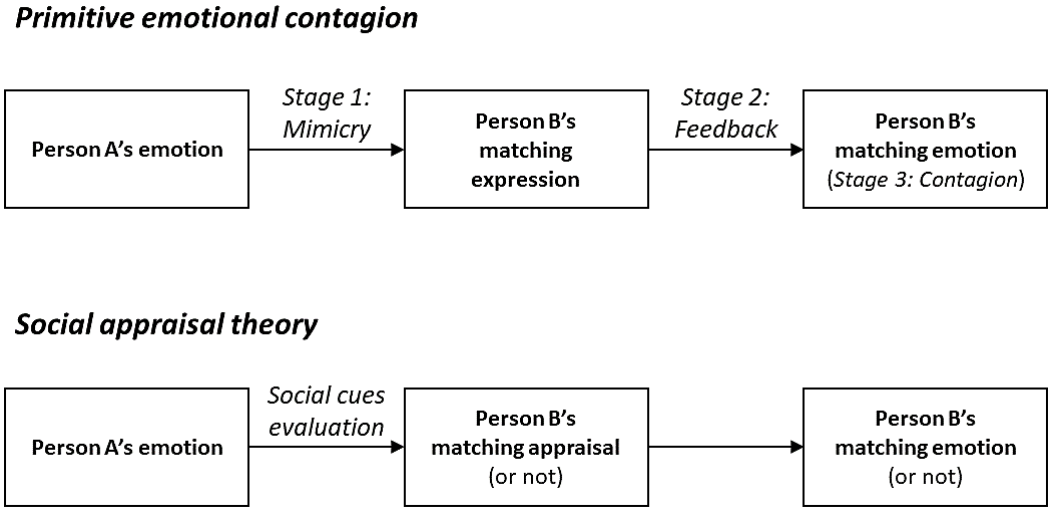

Figure 1. Process of emotional contagion and social appraisal theory (Adapted from PARKINSON, 2011).

Emotional contagion and social appraisal, therefore, make distinct predictions about whether social cues (e.g., gaze direction, group membership) may influence reactions to other's emotions. Emotional contagion predicts little influence of context and social cues, with authors arguing that social context might be a weaker factor than expected (Hatfield

et al., 2014). By contrast, social appraisal theory considers these factors as essential to determine emotional convergence (figure 1). In this case, not only the specific emotion displayed influences responses, but also who is expressing it.

According to the reliability hypothesis, Bruder et al. (2014) propose that people tend to mostly converge their appraisal, and consequently their emotional reactions, to closest ones identified as friends, members of the family and members of their own group. This is based on evidence indicating that friends converge in their appraisals, feelings, and emotional expressions stronger than in relation to strangers (ANDERSON et al., 2003; BRUDER, DOSMUKHAMBETOVA, NERB, & MANSTEAD, 2012). Studies suggest that interpersonal closeness also promotes empathic responses (see PRESTON & DE WAAL, 2002). Thus, it is possible to consider that empathic processes are somehow involved in contexts of affective congruence.

2. Empathy

Empathy is a construct that can be divided into distinctive, but potentially interactive, aspects that helps to maintain interpersonal relationships. Decety (2015) distinguish emotional, cognitive, and motivational aspects of empathy. The emotional aspect refers to affective sharing, i.e., the capacity to share or become affected by other's emotion. Perspective-taking is the cognitive facet of empathy, corresponding to the ability to understand what a person is thinking or feeling by consciously putting oneself into the other's perspective. Finally, empathic concern encompasses motivations to care for another's welfare, which may lead to prosocial behaviors. Altruistic actions have been found both in infant developmental studies (EISENBERG & EGGUM, 2009) and experimental animal research (Preston & de Waal, 2002b) - mainly with primates (CORDONI et al. 2002; KOSKI & STERCK, 2006), thus suggesting an evolutionary basis for these behaviors (DE WAAL, 2008).

Batson (1991) characterized empathy as a family of vicarious emotional responses, including feelings of sympathy, compassion, tenderness, and the like, that are more other-focused than self-focused. Defined as a concerned reaction to the emotional state of other person (EISENBERG et al., 1994), sympathy has been empirically associated with feelings of sorrow and prosocial behavior (i.e., voluntary behaviors in order to benefit the other; EISENBERG & MILLER, 1987). Some authors (NUSSBAUM, 1996; GOETZ, KELTNER & SIMON-THOMAS, 2010) prefer the term compassion because it would encompass a larger set of states than sympathy. Goetz, Keltner & Simon-Thomas (2010) place affective labels like sympathy, pity and empathic concern in the same family of emotional states related to compassion, which have as their main characteristic the concern for the relief of the suffering of another individual.

In addition to compassion, studies also distinguish another vicarious feeling resulting from witnessing another's suffering. *Personal distress* is defined as a self-focused, aversive emotional reaction to other's distress (BATSON, 1991). It is suggested that this is related to confusion between self and other (DECETY & LAMM, 2009), potentially stemming from empathic over arousal (i.e., high levels of vicariously induced aversive emotion; EISENBERG et al., 1996; HOFFMAN, 2000). Feelings of personal distress can be expected to lead to egoistical prosocial behavior, motivated by the desire to relieve one's own aversive state by reducing contact with the unpleasant situation, rather than altruistically alleviate the other's suffering (see EISENBERG et al., 2006).

Dispositional differences in individuals' abilities to regulate their emotions have been demonstrated as a factor that determines the experience of compassion versus personal distress (e.g., EISENBERG et al., 1994; 1996). However, it is less clear the extent to which interpersonal factors may moderate these vicarious responses to another's suffering. Familiarity and similarity are factors of interpersonal closeness that have been suggested to improve empathy (PRESTON & DE WAAL, 2002). However, to date there is no study aiming to distinguish their effects in moderating compassion and personal distress responses.

II. OBJECTIVES

Based on the theoretical background presented above, the general objective of the present dissertation is to investigate if social and contextual factors moderate vicarious emotional reactions. For that purpose, two experimental studies were conducted, with the following specific objectives:

- Study 1 – To investigate if degrees of closeness (i.e., familiarity and similarity) moderate vicarious responses to another person's suffering, exploring in particular differences in terms of aversive (personal distress) or concerned (compassion) reactions to suffering;
- Study 2 – To explore if convergent and divergent responses depend on group membership, gaze direction, and the emotion showed by the displayer, within a competitive context.

III. ARTICLES SECTION

ARTICLE 1

Salles, B. M., Fadel, J. V., Mograbi, D. C. From Aversion to Compassion: Closeness Effects in Vicarious Reactions to Other's Suffering. (Manuscript in preparation)

From Aversion to Compassion: Closeness Effects in Vicarious Reactions to Another's Suffering

Abstract

Background: Familiarity and similarity are associated with increased empathy. However, to date, no study has explored experimentally whether their effects are different or indistinguishable. The current study investigated if degrees of closeness (i.e., familiarity and similarity) moderate vicarious responses to another person's suffering, exploring in particular differences in terms of aversive (personal distress) or concerned (compassion) reactions to suffering. **Methods:** 87 participants watched a videoclip of an athlete suffering an injury, but this was preceded by different stimuli according to the experimental condition: 29 participants (unknown condition) watched a control videoclip about Olympics trivia; the remaining participants watched a videoclip describing the trajectory of the athlete, with half of the participants watching a video in which the athlete had the same (familiar-similar condition; n=29) or a different nationality (familiar-dissimilar; n=29). Self-report, facial display, gaze behavior and pupil diameter were measured. **Results**: The familiar conditions responded more compassionately (with more sadness facial expressions) than the control condition (unknown). Additionally, participants from the familiar-dissimilar condition reported more sadness and concern than those from the familiar-similar and unknown conditions. As expected, the familiar-similar and unknown conditions led to more personal distress (i.e., disgust) than the familiar-dissimilar condition. Moreover, in the familiar-similar condition participants exhibited more pupil dilation than in the control condition. **Discussion:** These findings indicate over arousal, suggesting personal distress, when both familiarity and similarity are present, and greater emotional regulation when familiarity is not followed by similarity. Findings are discussed in terms of clinical implications to healthcare professionals and salutary distances between them and their patients.

Keywords: compassion, empathy, pain, facial expression of emotion, FACS

Introduction

Empathy is considered an essential part of the human condition and constitutes one of the foundations of human societies (DE WAAL, 2005; Feldman et al. 2015). Although different attempts to define the term have been made (cf. BATSON, 2011), it is generally thought that empathy involves the ability to share, understand and respond with care to others affective states (DECETY, 2012). Studies commonly distinguish two emphatic-related (or vicarious) feelings resulting from witnessing another's suffering: personal distress and compassion. Personal distress is defined as a self-focused, aversive emotional reaction to other's distress (Batson, 1991), with potential confusion between self and other (DECETY & LAMM, 2009), and may stem from empathic over arousal (i.e., high levels of vicariously induced aversive emotion; EISENBERG et al., 1996; HOFFMAN, 2000). Feelings of personal distress can be expected to lead to egoistically prosocial behavior, motivated by the desire to relieve one's own aversive state by reducing contact with the unpleasant situation, rather than altruistically alleviate the other person's suffering (see EISENBERG et al., 2006). By contrast, compassion or sympathy (GOETZ, KELTNER, & SIMON-THOMAS, 2010) refers to emotional reactions based on apprehending another's condition, involving typically feelings of concern for the other person (EISENBERG et al., 1994, p. 776), leading to altruistically motivated behavior (BATSON, 1991). Compassion is crucial for clinical care, being linked to improvements in clinical outcomes and quality of care, increased patient satisfaction with services, and enhancing the quality of information gathered from patients (EPSTEIN et al., 2005; NAJJAR et al., 2009; RENDELMEIR et al., 1995; SANGHAVI, 2006).

Individual differences in terms of emotional regulation, such as personality traits, have been shown to influence the experience of compassion and personal distress (e.g., EISENBERG et al., 1994; EISENBERG et al., 1996). However, few studies explored how interpersonal factors moderate these vicarious responses to another's suffering. It is widely known that therapists and other health professionals are not advised to assist close ones (e.g., relatives and friends; APA, 2010), because this may result in

overidentification and jeopardize the treatment due to negative emotions triggered by the therapist's own conflicts (COREY, 1991). Also, high levels of proximity with others are associated with empathy (or compassion) fatigue (e.g. female partners of war veterans; VERBOSKY & RYAN, 1988). Familiarity and similarity are proximity factors that have been suggested to improve empathy (PRESTON & DE WAAL, 2002a). However, to date there is no study aiming to distinguish the effects between familiarity and similarity in moderating empathic reactions (see KHALIL, 2002).

Emotion and empathic responses are commonly measured by self-report (see EISENBERG, SPINRAD, & KNAFO-NOAM, 2015). However, this kind of measurement is more vulnerable to social desirability (MASCARO et al., 2015). The measurement of facial expressions has been used as an alternative/complementary method, since we may not be fully aware of our facial behavior. There is some indication that compassion is demonstrated by the lifting of the inner corners of the eyebrows (see GOETZ, KELTNER, & SIMON-THOMAS, 2010), a facial configuration long identified as a behavioral marker of sadness (EKMAN, 2007). However, it is less clear if personal distress has a distinct nonverbal display. ROSENBERG et al. (2015) distinguish between sadness displays as compassionate signals or rejection emotions (anger, contempt, disgust) to human suffering. Ekman (2007) commented that films of injured people who were suffering provoked disgust in most viewers in his studies. However, he also noted how some participants reacted with sadness and pain, as if identified with the victim (EKMAN, 2007). Nonetheless, to the best of our knowledge, no study has been done to distinguish the contextual cues that favor empathic sadness versus aversive reactions when exposed to suffering and injured people.

Concerned attention was proposed by Eisenberg et al. (1994) as an indicative of compassion, because it seems to reflect other-oriented attention. However, in their study concerned attention was measured through body orientation and facial appearance of the viewer, not by where participants looked while watching a person in suffering. It is known that face perception allows rapid access to information about someone, and is essential for effective social interactions (GOBBINI & HAXBY, 2007).

Focusing the attention to others' faces presumably demonstrates concern, since it provides potential information about their emotional state. (EKMAN & CORDARO, 2011). Thus, measuring gaze behavior may be a better indicator of concerned attention than merely the facial appearance of the viewer.

There is also some evidence that compassion and personal distress can be distinguished by physiological measures. Heart rate deceleration has been found in sympathy-inducing contexts (e.g., CRAIG & LOWERY, 1969) and has been associated with prosocial behavior in children and adults (EISENBERG, FABES, et al., 1989; see EISENBERG & FABES, 1990). By contrast, heart rate acceleration has been linked to high arousal (e.g., emotional stress responses) (VISTED et al., 2017) and associated to personal distress (EISENBERG & FABES, 1990).

Although these findings suggest that empathic reactions can be assessed by self-report, behavioral and physiological variables, no study so far has used all these measures together to distinguish between compassion and personal distress. In addition, the effects of familiarity and similarity have not been disentangled in previous studies. Accordingly, the current study assessed compassion and personal distress through a combination of self-report, facial expressions, gaze behavior and pupil dilation, in a paradigm investigating the impact of familiarity and similarity on empathic responses. Specifically, participants were divided into three conditions: unknown, familiar-dissimilar (f. dissimilar) and familiar-similar (f. similar). We hypothesized that familiarity would lead to more compassionate responses, but with reduced personal distress only in the familiar-dissimilar condition.

Methods

Participants

Participants with normal or corrected-to-normal vision and with no previous history of neurological or psychiatric disorders were recruited in Pontifical Catholic University of Rio de Janeiro. Eighty-seven undergraduate students

participated in the experiment, fifty-one women and thirty-six men, aged from 18 to 29 years (M_{age} = 21.4, SD_{age} = 2.46), and the conditions were matched on sex (17 women and 12 men per condition). The sample size was determined based on other studies investigating empathy and emotional reactivity (EISENBERG et al., 1989; ROSENBERG et al. 2015). However, because the present study used a different design, similar effect sizes cannot be assumed.

Procedures

After signing the informed consent, participants were seated in front of a computer, where the experiment was administered individually. Participants were randomly allocated to three different conditions: *f. similar*, *f. dissimilar* and *unknown* conditions.

In the *f. similar* condition, participants were shown a video clip about the life trajectory of a weightlifting athlete trying to represent their country in the upcoming Olympic Games of 2020. In the *f. dissimilar* condition, participants were presented to a video containing the same story, however this time the athlete was from a different country. In both conditions the participants would be familiar with the athlete, although in the first they would be *similar* (because the participant and athlete shared the same nationality) and in the second *dissimilar* (different nationalities). Participants allocated to the *unknown* condition were shown a video about Olympic Games trivia. In this control condition, the athlete is not presented, therefore he is *unknown* to the participants.

After this, all participants were informed that they would see a video of an athlete attempting to qualify for the Tokyo Olympic Games (2020). The athlete suffers a broken arm when lifting his weight, being supported by the paramedical team while screaming with pain. A few minutes later (~2 minutes), he is taken out on a stretcher under the audience's applause. The video was taken from a real accident which occurred during the Rio Olympics. No participant reported seeing it previously, and the videos were edited to display different national flags and names, congruent with the

similar and dissimilar storylines (no nationality defined, and the athlete only identified as Competitor 47 in the unknown condition).

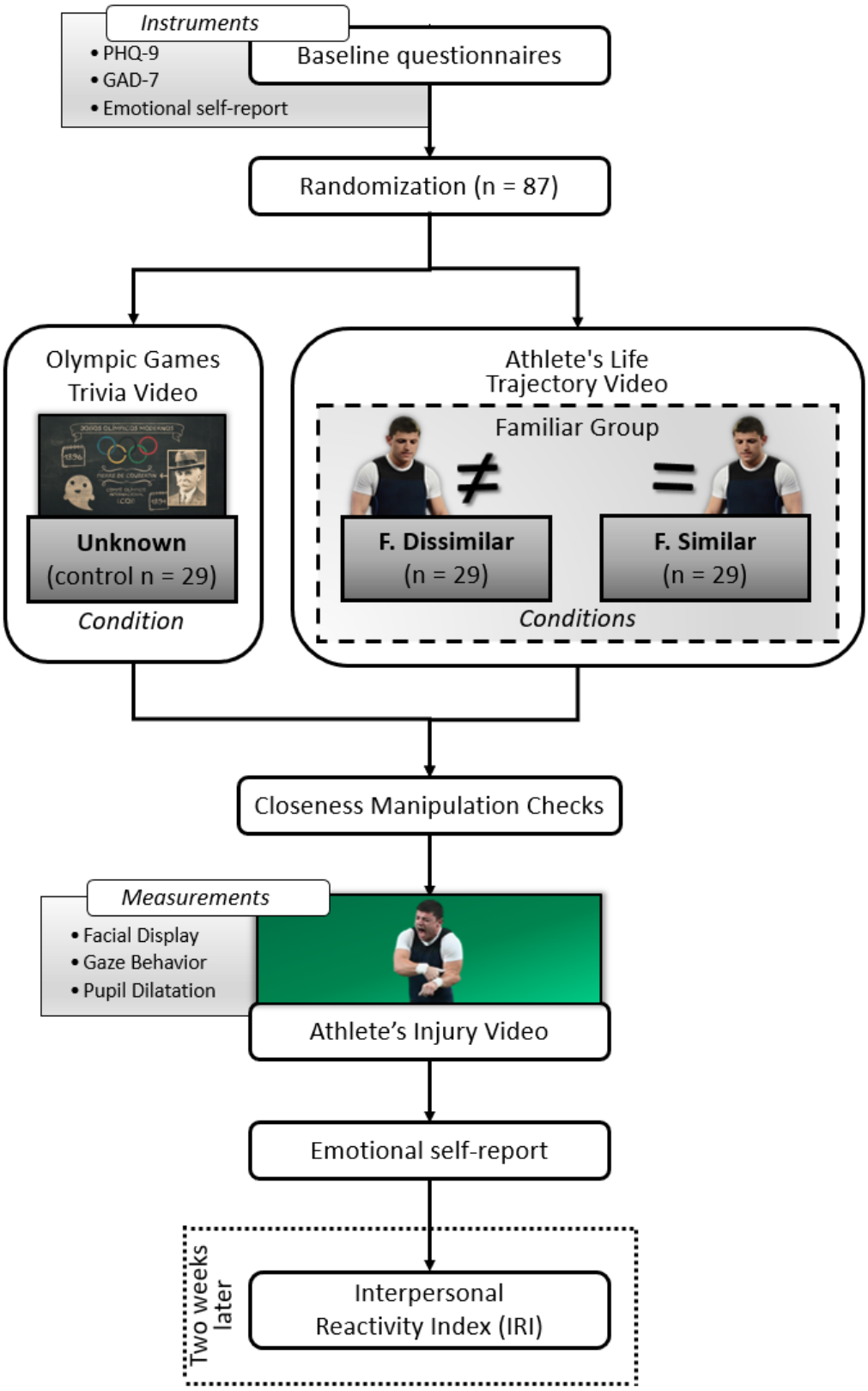

Figure 1. Procedure sequence

During the experiment, facial expressions, eye gaze and pupil dilation were measured. Self-reported measures of emotion, degree of closeness and background questionnaires were collected before and/or after the videos (below). The order of procedures can be seen in Figure 1.

Measurements

Degree of closeness manipulation checks

As a manipulation check for degree of closeness, participants were asked on a scale from 0 (“not at all”) to 5 (“totally”): familiarity, “How much do you think you know the athlete?”; similarity, “How much is he similar to you? (i.e., how much do you consider that you and he share common characteristics and/or identity?”.

Self-Reported Emotion

A self-report scale was used to assess twelve emotions, separated in three different categories. The anger category was composed of the following emotional labels: anger, irritation, rage, and annoyance; compassion category: compassion, sadness, concern, and pity; aversion category: aversion, repulsion, queasiness, and disgust. Empathic concern, sadness, and pity are common responses toward others in compassionate states (GOETZ, KELTNER & SIMON-THOMAS, 2010; EISENBERG, MCCREATH, & AHN, 1988), therefore they were all included in the category of compassion. Participants indicated the extent to which they felt these emotions on a scale from 0 (“not at all”) to 5 (“totally”).

Facial Display

During the whole procedure, participants were recorded using a digital video camera positioned above the computer screen. Facial behavior was scored using the Facial Action Coding System (FACS; EKMAN, FRIESEN, & HAGER, 2002a). This is a comprehensive, anatomically based system for

measuring all visually discernible facial movement in terms of 44 unique action units (AUs), as well as several categories of head and eye positions and movements (EKMAN & ROSENBERG, 1997). Coders did not make explicit judgments about emotions; rather, they indicated the incidence and intensity of all observable facial behavior based on elemental actions of the facial musculature. Facial muscle movements are scored on a 5-point intensity scale: trace (A), slight (B), marked (C), extreme (D) and maximum (E), with more intense AUs characterized by stronger muscular activity and more evident appearance changes. Changes in the intensity of the facial movement (increase or decrease of 2 points or more) were used to break prolonged movements into more than one scorable event (EKMAN, FRIESEN, & HAGER, 2002b).

Because participants were aware of being recorded, suppression and control of facial expressions were expected. To avoid loss of emotional data, partial expressions of emotion, which involve components of full-face emotional expressions, but are presented only in eyebrows, eyes and cheek or lower face, were considered. Therefore, although every facial movement was measured, just some AUs were used to score the frequency of an emotion. These action units (and their combinations) are based on theory (EKMAN, FRIESEN, & HAGER, 2002b) and empirically supported as components of emotional display (SAYETTE, COHN, WERTZ, PERROTT, & PARROTT, 2001; ROSENBERG & EKMAN, 1994). AUs criteria for each emotion were: sadness: AU1 (without AU2 or AU 4), or 1+4, or 11, or 15, or 17 (alone or in combination with one of the previous AUs for sadness); disgust: AU 9 or 10; anger: 4+5, or 4+7, or 23 or 24; fear: 1+2+4, or 5CDE, or 20. AUs without alphabetical codes can occur at any level of intensity. The coding was carried out by B.M.S., a certified FACS coder with 100 h of training. Inter-rater reliability was assessed by J.V.F., an equally trained coder, rating 50% of the material and producing 78.6% agreement (Cohen's kappa coefficient = 0.70). The emotions of interest in the current study were sadness (as indicative of compassionate concern) and disgust (as a signal of aversion state). Anger and fear displays were also measured as control emotions.

Eye-tracking data

While the participants were watching the videoclips, eye movement data was collected using a Tobii TX300 eye tracker in its supplied screen (integrated screen setup), a 23″ TFT monitor, at a sampling rate of 300 Hz. Tobii Studio software was used to simultaneously capture stimulus video and eye movements for the analysis. An individual calibration was carried out for each participant. Raw data obtained from the experiment was classified into total fixations duration using the I-VT fixation filter available in Tobii studio.

To analyze the eye movement data, an area-of-interest (AOI) analysis approach was used. Average fixation duration was analyzed using the hypotheses-based AOIs, with a fixation defined as both eyes being statically locked (i.e., not perceptibly moving) on an area of the screen. Fixation duration measures are the sum of fixation times while looking within the AOI. We defined two AOIs: the athlete's *injured arm* and his *face in pain*.

Hidden infrared sensors below the Tobii monitor captured pupil dilation. The baseline pupil size was extracted on the first pupil diameter data computed on the second videoclip. Pupillary response was observed over a period of 2 minutes and 13 seconds, starting at the injury scene and finishing at the end of the video.

Background measures

Participants were asked to complete self-reported questionnaires for depression, anxiety and empathy. For depression, the Patient Health Questionnaire (PHQ-9; KROENKE et al., 2001) was used; total scores range from 0 to 27, with higher scores indicating more severe symptoms. Anxiety was measured with the Generalized Anxiety Disorder scale (GAD-7), developed by Spitzer, Kroenke, Williams, and Lowe (2006); scores range from 0 (no symptoms) to 21 (most severe symptoms). Finally, empathy was assessed with the Interpersonal Reactivity Index (IRI). The IRI is a 28-item questionnaire developed by Davis (1980) exploring the multi-dimensionality of empathy. It is divided in four subscales: two measuring cognitive components (perspective taking and fantasy) and two assessing emotional

components of empathy (empathic concern and personal distress); scores range from 28 (lowest empathy) to 140 (highest empathy). To avoid prompting participants about the purpose of the experiment, the IRI was only applied 2 weeks after the experiment.

Ethical Issues

The project was approved by the Rio de Janeiro State University Ethics Committee (Research Ethics Committee number 65456316.0.0000.5282). All participants provided informed consent.

Statistical Analysis

Differences between groups in background variables, proximity manipulation checks, self-report, facial display, gaze behavior and pupil diameter were explored with one-way ANOVAs. In the case of the self-report and pupil diameter variables, this was calculated for changes scores (after minus before) and baseline scores. Because we had specific hypotheses for the effects of experimental condition on self-report, facial display and gaze behavior, we used planned contrasts. To investigate the effects of familiarity, the contrast considered the experimental conditions (i.e., dissimilar and similar) as a *familiar group*, which was compared with the control condition (*unknown group*). Because we expected that familiarity leads to more compassionate and less personal distress responses than unfamiliarity (control condition), we hypothesized that participants from the familiar group would: (1) report more emotions from the compassion category and less from the aversion category than the unknown group; (2) show more sadness and less disgust facial display than the unknown group; (3) gaze more time at the athlete's face in pain than the unknown group. Pair-wise comparison followed ANOVAs main effect to isolate the impact of similarity, so the experimental conditions (i.e., *f. dissimilar* and *f. similar*) could be individually compared with the control condition (i.e., *unknown* condition). In those analyses, to account for the effect of multiple testing, p-values were adjusted by Bonferroni–Hochberg corrections (Hochberg, 1988).

Table 1. Demographical characteristics and background measures

Variables	Familiar		(Control)	Statistic[e]	*p-value*
	Dissimilar (n = 29)	Similar (n = 29)	Unknown (n = 29)		
	Mean (SD). Range	Mean (SD). Range	Mean (SD). Range		
Age	21.9 (2.2). 18–28	21.4 (2.8). 18–29	20.9 (2.3). 18–25	1.04	.357
Gender[a]				0.00[g]	.999
Female	58.6%	58.6%	58.6%		
Male	41.4%	41.4%	41.4%		
PHQ-9[b]	17.7 (3.9). 11–27	19.1 (4.8). 11–32	17.2 (4.6). 11–32	1.44	.242
GAD-7[c]	15.2 (4.3). 7–23	15.4 (4.0). 9–23	14.5 (4.6). 7–27	0.34	.711
IRI (pathy)[d]	97.2 (13.9). 70-123	96.2 (9.1). 81-115	94.6 (11.7). 71-118	0.34	.715

[a] % ([b] Patient Health Questionnaire; [c] Generalized Anxiety Disorder; [d]Interpersonal Reactivity Index; [e] ANOVA F

Results

Sample characteristics

Results can be seen in Table 1. There were no significant differences between conditions in terms of demographic and clinical variables, suggesting that the randomization procedure was effective.

Closeness manipulation checks

There was a significant effect for familiarity, F (2, 49.13) = 121.41, p < .001, η^2 = .656. As expected, planned contrasts revealed that familiar group (i.e., dissimilar and similar conditions) reported more familiarity to the athlete than the unknown group, t (83.49) = 15.65, p < .001. A post hoc test indicated that the f. dissimilar and f. similar conditions did not differ statistically on familiarity (p = .998).

There was a significant effect for similarity, F (2, 54.88) = 44.90, p < .001, η^2 = .449. Post hoc tests showed that the unknown condition reported less similarity to the athlete than the f. dissimilar and f. similar conditions (p < .001 in both cases), with the f. similar condition reporting more similarity than the f. dissimilar condition (p = .001).

These results suggest the effectiveness of the experimental manipulation.

Self-Report

Table 2. Emotional Self-Report

Emotional Self-Report	Before			After		
Groups	*Familiar*		*Control*	*Familiar*		*Control*
Conditions	**F. Dissimilar** Mean (SD)	**F. Similar** Mean (SD)	**Unknown** Mean (SD)	**F. Dissimilar** Mean (SD)	**F. Similar** Mean (SD)	**Unknown** Mean (SD)
Anger						
Anger	0.5 (0.8)	0.8 (1.4)	0.7 (1.3)	0.6 (1.0)	0.5 (0.9)	0.3 (0.9)
Irritation	0.8 (1.1)	1.3 (1.3)	0.9 (1.3)	1.1 (1.2)	1.0 (1.3)	0.5 (0.9)
Rage	0.3 (0.8)	0.2 (0.5)	0.3 (0.3)	0.7 (1.1)	0.4 (0.8)	0.2 (0.8)
Annoyance	0.9 (1.2)	1.6 (1.6)	1.2 (1.4)	2.2 (1.5)	1.6 (1.6)	1.4 (1.4)
Compassion						
Compassion	1.6 (1.7)	2.1 (1.7)	1.6 (1.3)	4.3 (1.0)	4.2 (1.3)	3.8 (1.3)
Sadness	0.7 (1.0)	1.5 (1.4)	1.0 (1.3)	3.5 (1.4)	3.5 (1.6)	2.3 (1.3)
Concern	2.1 (1.5)	2.4 (1.7)	2.5 (1.5)	3.9 (1.3)	3.7 (1.6)	2.6 (1.5)
Pity	0.6 (1.5)	0.7 (1.2)	0.7 (1.2)	4.3 (1.0)	3.8 (1.6)	4.0 (1.1)
Aversion						
Aversion	0.2 (0.5)	0.6 (1.3)	0.5 (1.0)	1.3 (1.7)	1.4 (1.5)	1.6 (1.6)
Repulsion	0.1 (0.7)	0.4 (0.9)	0.3 (0.7)	1.0 (1.2)	1.0 (1.5)	1.2 (1.3)
Queasiness	0.7 (1.2)	0.9 (1.4)	0.7 (1.3)	1.5 (1.6)	1.2 (1.3)	1.3 (1.4)
Disgust	0.0 (0.2)	0.3 (0.9)	0.2 (0.6)	0.3 (0.7)	0.7 (1.5)	0.7 (1.0)

There was a significant effect of closeness on self-report of annoyance F (2, 84) = 4.31, p = .016, η^2 = .093; sadness F (2, 84) = 3,92, p = .024, η^2 = .085; and concern F (2, 84) = 5.09, p = .008, η^2 = .108. There was no significant effect on other emotions. Planned contrasts revealed that familiar group (i.e., dissimilar and similar conditions) reported more sadness t (84) = 2.28, p = .025, and concern t (84) = 3.05, p = .003 than the unknown group. Post hoc tests showed that the f. dissimilar condition reported more sadness (p = .020) and concern (p = .008) than the unknown condition (control); the f. similar was not statistically different from the f. dissimilar or control conditions in self-reported sadness (respectively, p = .291, p = .570) and concern (respectively, p = .727, p = .093). It was also shown that f. dissimilar condition reported statistically significant more annoyance than control (p = .021), but the f. similar did not exhibit significant differences between f. dissimilar (p = .077) and unknown conditions (p = .943).

Facial Display

There was a significant effect of closeness in frequency of sadness display, F (2, 39.50) = 4.07, p = .023, η^2 = .088. Planned contrasts revealed that familiar group (i.e., dissimilar and similar conditions) showed more sadness displays than the unknown group, t (54.40) = 3.95, p < .001. Post hoc tests showed that f. similar and unknown conditions differed statistically on sadness displays (p = .040); the f. dissimilar condition was not statistically different from f. similar (p = .999), but showed a marginally significant trend to display more sadness than the unknown condition (p = .052).

There was a significant effect of closeness in frequency of disgust display, F (2, 53.27) = 3.46, p = .039, η^2 = .076 (figure 2). Planned contrasts revealed that familiar group (i.e., dissimilar and similar conditions) showed less disgust displays than the unknown group, t (34.39) = -2.09, p = .044. Post hoc tests showed that f. dissimilar and unknown conditions differed statistically on disgust displays (p = .047); the f. similar condition was not statistically different from f. dissimilar (p = .964), nor was different from the unknown condition (control) in relation to disgust displays (p = .128). There

was not a significant effect of closeness in frequency of anger, F (2, 84) = 0.13, p = .396, η^2 = .022, or fear display, F (2, 84) = 0.24, p = .786, η^2 = .006.

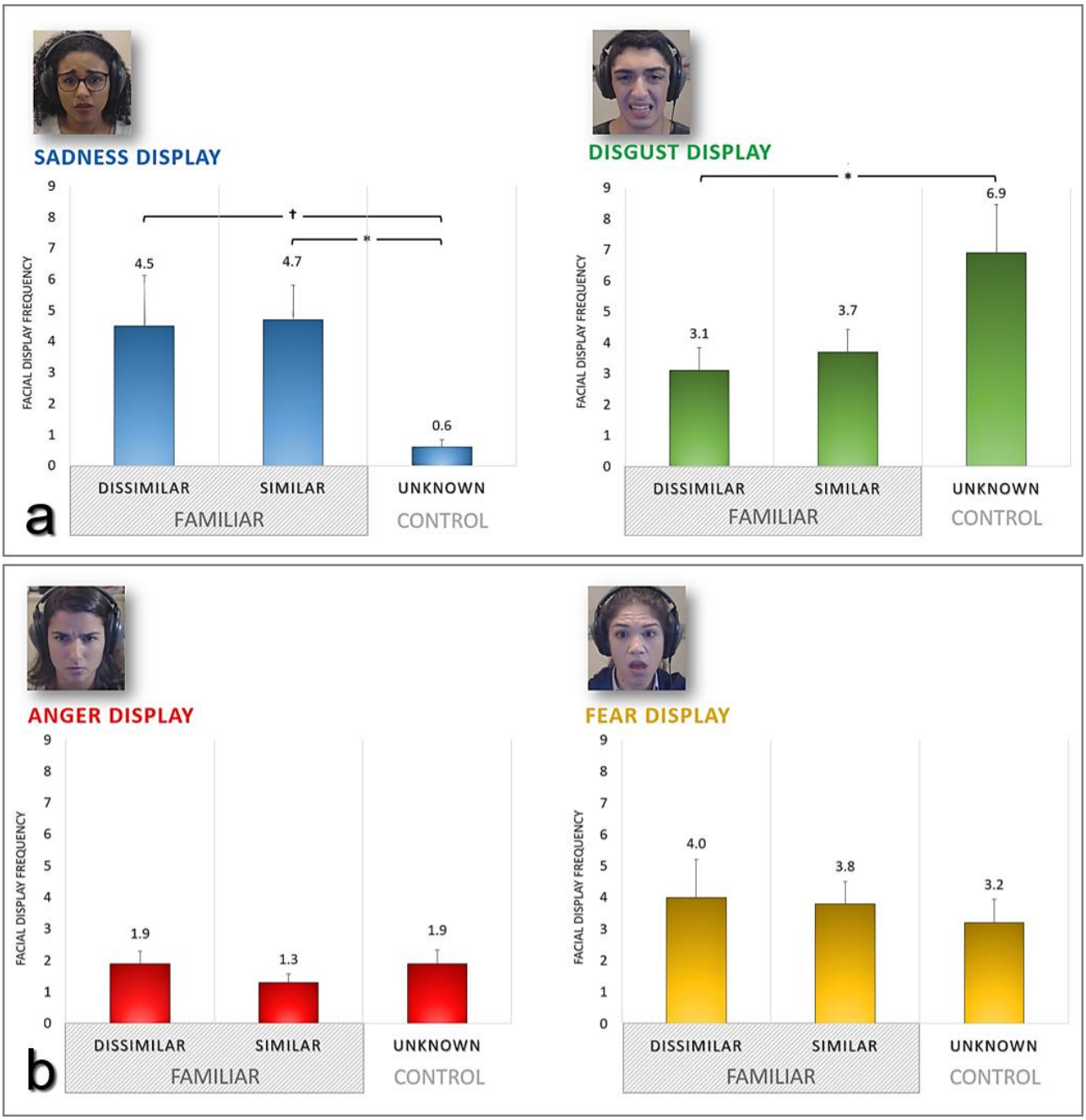

Figure 2. Facial displays frequency by groups and conditions. (a) experimental target emotions (sadness, disgust); (b) control emotions (anger, fear). * p < .05; † p = .052. Informed consent was obtained from participants to use their images in publications.

Gaze Behavior

Figure 3. Heat maps and clusters gaze behaviors by conditions. Familiar-dissimilar condition (left). Unknown condition (right). (a): face in pain. (b): injured arm.

There was a significant effect of closeness on gaze behavior. Although there was no significant effect of closeness in fixation duration on the injured arm, F (2, 66) = 0.11, p = .896, η^2 = .003, there was a significant effect in fixation duration on the face in pain, F (2, 34.04) = 8.06, p = .001, η^2 = .157. Planned contrasts revealed that familiar group (i.e., dissimilar and similar conditions) gazed statistically significant more to the face in pain than the unknown group, t (47.87) = 3.65, p > .001 (figure 3). Post hoc tests showed that unknown condition gazed statistically significant less to the face in pain than f. dissimilar (p = .036) and f. similar conditions (p = .005), but these last two conditions did not differ statistically (p = .983), as can be seen in Table 3.

Table 3. Gaze Behavior

Areas of Interest (seconds)	Familiar		(Control)	ANOVA F	*p-value*
	Dissimilar (n = 17)	Similar (n = 25)	Unknown (n = 27)		
	Mean (SD). Range	Mean (SD). Range	Mean (SD). Range		
Injured arm	0.76[a] (0.6). 0.0-1.9	0.81[a] (0.7). 0.0-2.4	0.73[a] (0.6). 0.0-2.0	0.11	.896
Face in pain	0.24[b] (0.2). 0.0-0.9	0.26[b] (0.2). 0.0-0.5	0.11[a] (0.1). 0.0-0.4	8.06	**.001**

Means in the same row with a different superscript differ at α = .05.

Pupil Diameter

There was a significant effect of closeness on diameter of the left pupil F (2, 78) = 3.91, p = .024, η^2 = .091; right pupil F (2, 78) = 3.88, p = .025, η^2 = .090; and means of both pupils F (2, 78) = 4.03, p = .022, η^2 = .094. Post hoc tests showed that f. similar condition showed statistically significant larger diameter of the left pupil (p = .022), right pupil (p = .022) and means of both pupils (p = .020) than the unknown condition (Table 4). The dissimilar condition was not statistically different from the similar condition, neither was different from the unknown condition on diameter of the left pupil, right pupil and means of both pupils (p > .200 in all cases).

Table 4. Pupil Diameter

Pupil Diameter (Millimeter)	Familiar		(Control)	ANOVA F	*p-value*
	Dissimilar (n = 26)	Similar (n = 26)	Unknown (n = 29)		
	Mean (SD). Range	Mean (SD). Range	Mean (SD). Range		
Before					
Left Pupil	4.1[a] (0.5). 3.1 – 5.0	3.9[a] (0.6). 2.9 – 5.5	4.3[a] (0.5). 3.5 – 5.7	2.52	.087
Right Pupil	4.1[a] (0.5). 3.1 – 4.9	4.0[a] (0.5). 2.9 – 5.2	4.2[a] (0.5). 3.2 – 5.2	0.80	.454
Pupil Left/Right	4.1[a] (0.5). 3.1 – 4.9	4.0[a] (0.5). 2.9 – 5.3	4.2[a] (0.5). 3.4 – 5.5	1.59	.211
Difference (After - Before)					
Left Pupil	0.6[a,b] (0.3). -0.2 – 1.4	0.7[b] (0.2). 0.3 – 1.1	0.5[a] (0.2). -0.1 – 1.1	3.91	**.024**
Right Pupil	0.6[a,b] (0.3). -0.2 – 1.3	0.7[b] (0.2). 0.3 – 1.1	0.5[a] (0.2). -0.2 – 1.0	3.88	**.025**
Pupil Left/Right	0.6[a,b] (0.3). -0.2 – 1.4	0.7[b] (0.2). 0.3 – 1.1	0.5[a] (0.2). -0.2 – 1.0	4.03	**.022**

Means in the same row with a different superscript differ at α = .05.

Correlations

Pearson correlation coefficient was used to assess the association between measures (e.g. emotional self-report and facial display of emotion; Table 5). There was a significant correlation between self-report of concern and

sadness facial displays, *r* = .26, *p* = .015. Self-report of concern was also significantly related to anger facial displays, *r* = .25, *p* = .020. Self-report of aversion was significantly related with disgust facial displays, *r* = .24, *p* = .022; anger facial displays, *r* = .29, *p* =.007; and fear facial displays, *r* = .24, *p* = .027.

There were significant correlations between degree of closeness and emotional self-report (Table 6). Self-report of concern was positively related with familiarity manifested by the participant, *r* = .21, *p* = .047; and similarity was negatively related with self-report of aversion, *r* = -.25, *p* = .018.

Correlations between degree of closeness and facial display were also found. There was a significant positive correlation between sadness facial displays and familiarity, *r* = .22, *p* = .045; and a significant negative relationship between familiarity and disgust facial display, *r* = -.21, *p* = .048 (table 7).

There was a relationship between the eye-tracking measures (i.e., gaze behavior, and pupil diameter). A significant negative correlation between the fixation duration toward the injured arm and mean diameter (size) of both pupils was observed, *r* = -.31, *p* = .008. No further relationship was found with the eye tracking measures.

For exploratory purposes, it was examined whether demographical characteristics and background measures were correlated with emotional measures. Overall IRI (empathy questionnaire) score was significantly correlated with self-report of compassion, *r* = .26, *p* = .015; and self-report of pity, *r* = .22, *p* = .040. The Perspective Taking subscale was significantly related with self-report of concern, *r* = .21, *p* = .048; and self-report of pity, *r* = .24, p .024.

Table 5. Pearson correlations of emotional self-report and facial display

Pearson correlations					
Emotional Self-Report		***Facial Display***			
ANGER		**Sadness**	**Disgust**	**Anger**	**Fear**
Anger	Pearson's *r*	.06	-.09	-.09	.08
	p-Value	.575	.379	.397	.433
Irritation	Pearson's *r*	-.06	.09	-.12	.05
	p-Value	.573	.406	.283	.615
Rage	Pearson's *r*	-.04	.15	-.07	.01
	p-Value	.681	.151	.481	.893
Annoyance	Pearson's *r*	.14	.03	.06	.20
	p-Value	.188	.774	.547	.065
COMPASSION					
Compassion	Pearson's *r*	-.05	.08	.01	-.17
	p-Value	.665	.471	.963	114
Sadness	Pearson's *r*	.15	-.02	.19	.05
	p-Value	.161	.835	.082	.628
Concern	Pearson's *r*	**.26***	.14	**.25***	.15
	p-Value	**.015**	.192	**.020**	.151
Pity	Pearson's *r*	.05	.01	.15	.06
	p-Value	.612	.918	.158	.580
AVERSION					
Aversion	Pearson's *r*	.13	**.24***	**.29****	**.24***
	p-Value	.222	**.022**	**.007**	**.027**
Repulsion	Pearson's *r*	.05	.08	.20	.18
	p-Value	.621	.443	.059	.087
Queasiness	Pearson's *r*	.08	.19	.16	.17
	p-Value	.460	.084	.139	.120
Disgust	Pearson's *r*	-.02	.02	.18	.15
	p-Value	.834	.854	.088	.166

Table 6. Pearson correlations of emotional self-report and degree of closeness

Pearson correlations			
Emotional Self-Report		***Degree of Closeness***	
ANGER		**Familiarity**	**Similarity**
Anger	Pearson's *r*	.10	.07
	p-Value	.348	.496
Irritation	Pearson's *r*	.14	.09
	p-Value	.186	.398
Rage	Pearson's *r*	.18	.17
	p-Value	.098	.105
Annoyance	Pearson's *r*	.21	-.05
	p-Value	.055	.626
COMPASSION			
Compassion	Pearson's *r*	.08	-.08
	p-Value	.459	.466
Sadness	Pearson's *r*	.21	.01
	p-Value	.054	.984
Concern	Pearson's *r*	**.21***	.12
	p-Value	**.047**	.281
Pity	Pearson's *r*	.08	-.19
	p-Value	.453	.073
AVERSION			
Aversion	Pearson's *r*	-.03	**-.25***
	p-Value	.800	**.018**
Repulsion	Pearson's *r*	.03	-.05
	p-Value	.812	.659
Queasiness	Pearson's *r*	-.01	-.08
	p-Value	.911	.443
Disgust	Pearson's *r*	-.08	-.16
	p-Value	.454	.138

Table 7. Pearson correlations of degree of closeness and facial display

Pearson correlations					
Degree of Closeness		***Facial Display***			
		Sadness	**Disgust**	**Anger**	**Fear**
Familiarity	Pearson's *r*	**.22***	**-.21***	-.09	.05
	p-Value	**.045**	**.048**	.407	.642
Similarity	Pearson's *r*	.14	-.19	-.15	.02
	p-Value	.197	.079	.158	.878

There was a significant negative relationship between overall GAD-7 (anxiety questionnaire) and self-report of irritation, r = -.21, p = .046; and a significant negative correlation with self-report of annoyance, r = -.31, p = .004. A relationship between gender and emotional self-report was also found. Gender was significantly related with self-report of compassion, r = .31, p = .003; sadness, r = .22, p =. 043; concern, r = .23, p = .032; and queasiness, r = .21, p = .049; showing a significant relationship between the self-report of these emotional labels with the female gender. Sadness facial displays were significantly correlated with overall IRI, r = .22, p .038; and gender, r = .26, p = .016; also showing a significant correlation between this emotional facial display and female gender.

Discussion

Results indicated that participants from the familiar group reported more sadness and concern than the control group. Also, sadness facial displays were exhibited more frequently in response to a familiar victim than to an unknown person. The opposite was found in relation to disgust displays, in which participants displayed more disgust when the athlete was unknown than when he was familiar, with no differences between the f. similar and

unknown conditions. In addition, eye-tracking data showed that participants looked more time to the athlete's face in pain when he was familiar than unknown. Pupil dilation was higher in the f. similar condition than in the control condition. The f. dissimilar condition was not significantly different from the f. similar or unknown conditions in pupillary response.

These results suggest that although people tend to respond more compassionately when they witness a similar person in suffering, they also react more aversively to this situation. When the victim is known but dissimilar, people may experience more compassion without being affected by personal distress. These findings are in accordance with the empathy construct that presumes some level of self-other distinction (LAMM, BATSON, & DECETY, 2007), especially in cognitive empathy (BEHRENDS, MÜLLER, & DZIOBEK, 2016), which is positively correlated with compassion and prosocial behaviors (VAISH, CARPENTER, & TOMASELLO, 2009; LOCKWOOD, SEARA-CARDOSO, & VIDING, 2014). This account is also supported by the results of emotional self-report, in which although the familiar group have reported more sadness and concern (emotional labels related to the category of compassion), only the f. dissimilar condition participants felt significantly more sadness and concern than the control condition (i.e., unknown). It is possible that participants from f. dissimilar condition were more regulated and aware about their vicarious feelings, which implies reflection on their inner states and by definition more awareness than those from f. similar and unknown conditions.

The eye-tracking results, with more gaze directed to the face in the familiar conditions, may indicate more concerned attention. In addition, pupil size of participants witnessing a similar person in suffering was larger than witnessing an unknown victim. This suggests that witnessing a similar person in suffering may cause emotional over arousal, an indicator of personal distress (EISENBERG et al., 1989). Thus, emotional regulation processes seem more effective when the victim is unknown and or even dissimilar (STRAUSS et al., 2016). Although, it is possible to speculate distinct emotional regulation strategies between unknown and f. dissimilar condition (see GROSS, 2014). Participants in the unknown condition may

have used attentional strategies to regulate their emotions, since they spent more time looking at the injured arm than in the athlete's face in pain. Participants from the f. dissimilar condition, however, may have employed more cognitive strategies, such as reappraisal, to avoid self over arousal.

One unexpected finding was that in the f. dissimilar condition participants reported more annoyance (label from anger category) after witnessing the athlete being injured than in the other conditions. Despite anger being typically seen as a negative emotion, with negative associations with empathy and social behaviors (STRAYER & ROBERTS, 2004; LEACH et al., 2006; MCCALL et al., 2014), there are various indications in the emotion literature that anger can have positive interpersonal consequences (for a review see VAN DOORN, ZEELENBERG, & BREUGELMANS, 2014). Anger can be triggered vicariously, leading to altruistic punishment, and is also considered a moral emotion (HAIDT, 2003). When people observe an unfair situation, anger may be elicited together with intentions to compensate the victim (e.g., helping, or donating money; LOTZ, OKIMOTO, SCHLÖSSER, & FETCHENHAUER, 2011). Unfairness often presumes a perpetrator that is the agent of the injustice toward a victim (STILLWELL et al., 2008). In the current study, however, it is unlikely to attribute responsibility for the athlete's accident to another person. An alternative explanation comes from appraisal theories of emotion. Most appraisal theorists consider that goal blocking is a common theme to evoke anger (e.g., BERKOWITZ & HARMON-JONES, 2004 SMITH & LAZARUS, 1990; SCHERER, 1984, 1993), which motivates actions to solve the obstruction and attain the desired goal. Therefore, when a person gets injured, one may appraise this situation as goal-obstructive, and feel annoyed, if the other person's wellbeing is placed as one's personal goal (WONDRA & ELLSWORTH, 2015).

Significant correlations between facial displays and self-reported emotions were found. Curiously, sadness facial displays were significantly correlated with self-report of concern, but not with self-report of sadness. This finding supports the claim that, although sadness and compassion share facial features, they are distinct emotions (see GOETZ, KELTNER, & SIMON-

THOMAS, 2010). Similarly, disgust facial displays were significantly correlated with self-report of aversion, but not with self-report of disgust. This finding may provide supportive evidence to arguments that distinguish core disgust – elicited by rotting foods, waste products, and other stimuli associated with dirt and disease characteristics –, and animal reminder disgust, that reflects the aversion of stimuli that serve as reminders of the animalistic nature of humans, such blood, veins, tissue, and death (Rozin, Haidt, and McCauley, 1993). This distinction in disgust classification may have been reflected in the self-report, with aversion being a better emotional label to indicate disgust for seeing other's injury than the label of disgust itself.

As expected, a significantly positive correlation between the degree of familiarity manifested by the participants and self-report of concern and sadness facial displays was found. In addition, familiarity had a negative correlation with facial reactions of disgust. This supports the claim that familiarity provokes compassionate responses toward others in suffering and attenuate aversive reactions. It was also found a negative relationship between self-report of aversion and similarity. However, the low level of similarity of the control group may have misleadingly created this negative correlation.

The impossibility to completely isolate similarity and familiarity is one limitation of the current research. However, being similar with someone presumes some knowledge (familiarity) about that person. Also, other studies (e.g., STOTLAND, 1969; BATSON et al., 1981) investigating effects of similarity did not controlled for familiarity, neither considered its possible effects. In the same way, common characteristics are expected to be found as we become more familiar with any person. Thus, this was seen as a feature of the study. The weak correlations between self-reported emotional measures and facial emotion displays may be seen as limitations of the present study. However, since these are measures with different levels of explicitness, this low correlation is not at all unexpected.

In sum, the current study indicates how the degree of proximity may moderate vicarious responses to another's suffering. Mainly, the findings suggest that although some level of familiarity may enhance empathy towards others, a high degree of similarity may jeopardize empathic concern if the other person is in pain or suffering. This finding has important clinical implications, suggesting the importance of keeping optimal distances between healthcare professionals and their patients. Although the study did not assess prosocial behavior *per se*, the results from self-report, facial display and physiological measures have been shown to be positively correlated with helping behaviors and altruism in the literature. Further studies should investigate empirically if degree of proximity moderate direct prosocial behavior as well.

Acknowledgements

D.C.M. acknowledges funding from FAPERJ and CNPq. Also, B. M. S. acknowledges support from the CAPES foundation.

Conflict of interest

The authors declare no conflict of interests.

References

AMERICAN PSYCHOLOGICAL ASSOCIATION. Ethical principles of psychologists and code of conduct. Retrieved from http://www.apa.org/ethics. 2010.

BATSON, C. Daniel. *The altruism question: Towards a social social–psychological answer.* Hillsdale, NJ: Erlbaum, 1991.

BATSON, C. Daniel. These things called empathy: eight related but distinct phenomena. 2011.

BATSON, C. Daniel et al. Is empathic emotion a source of altruistic motivation?. **Journal of personality and Social Psychology**, v. 40, n. 2, p. 290, 1981.

BEHRENDS, Andrea; MULLER, S.; DZIOBEK, Isabel. Dancing supports empathy: the potential interactional movement and dance for psychotherapy. **Eur. Psychother**, v. 8, p. 99-131, 2016.

BERKOWITZ, Leonard; HARMON-JONES, Eddie. Toward an understanding of the determinants of anger. **Emotion**, v. 4, n. 2, p. 107, 2004.

COREY, Gerald. **Theory and practice of counseling and psychotherapy**. Nelson Education, 2015.

DAVIS, Mark H. et al. A multidimensional approach to individual differences in empathy. 1980.

DECETY, Jean. Introduction: Why Is Empathy So Important?. **Empathy: From bench to bedside**, 2012.

DECETY, Jean; LAMM, Claus. Empathy versus personal distress: Recent evidence from social neuroscience. **The social neuroscience of empathy**, p. 199-213, 2009.

DE WAAL, Frans BM. Putting the altruism back into altruism: the evolution of empathy. **Annu. Rev. Psychol.**, v. 59, p. 279-300, 2008.

EISENBERG, Nancy; MCCREATH, Heather; AHN, Randall. Vicarious emotional responsiveness and prosocial behavior: Their interrelations in young children. **Personality and Social Psychology Bulletin**, v. 14, n. 2, p. 298-311, 1988.

EISENBERG, Nancy et al. Relation of sympathy and personal distress to prosocial behavior: a multimethod study. **Journal of personality and social psychology**, v. 57, n. 1, p. 55, 1989.

EISENBERG, Nancy; FABES, Richard A. Empathy: Conceptualization, measurement, and relation to prosocial behavior. **Motivation and Emotion**, v. 14, n. 2, p. 131-149, 1990.

EISENBERG, Nancy et al. The relations of emotionality and regulation to dispositional and situational empathy-related responding. **Journal of personality and social psychology**, v. 66, n. 4, p. 776, 1994.

EISENBERG, Nancy; FABES, Richard A.; MURPHY, Bridget C. Parents' reactions to children's negative emotions: Relations to children's social competence and comforting behavior. **Child development**, v. 67, n. 5, p. 2227-2247, 1996.

EISENBERG, Nancy; SPINRAD, Tracy L.; SADOVSKY, Adrienne. Empathy-related responding in children. **Handbook of moral development**, v. 517, p. 549, 2006.

Eisenberg, N., Spinrad, T. L., & Knafo-Noam, A. (2015). Prosocial development. In M. E. Lamb, R. M. Lerner, M. E. Lamb, & R. M. Lerner (Eds.), *Handbook of child psychology and developmental science: Vol. 3. Socioemotional processes* (7th ed., pp. 610–656). Hoboken, NJ: Wiley

EKMAN, Paul. **Emotions revealed: Recognizing faces and feelings to improve communication and emotional life**. Macmillan, 2007.

EKMAN, Paul; CORDARO, Daniel. What is meant by calling emotions basic. **Emotion review**, v. 3, n. 4, p. 364-370, 2011.

EKMAN, Paul; FRIESEN, Wallace V. **Manual for the facial action coding system**. Consulting Psychologists Press, 1978.

EKMAN, P.; FRIESEN, W. V.; HAGER, J. C. Facs manual. **A Human Face**, 2002a.

EKMAN, Paul; FRIESEN, Wallace V.; HAGER, Joseph C. FACS investigator's guide. **A human face**, p. 96, 2002b.

EKMAN, Paul; ROSENBERG, Erika L. (Ed.). **What the face reveals: Basic and applied studies of spontaneous expression using the Facial Action Coding System (FACS)**. Oxford University Press, USA, 1997.

EPSTEIN, Ronald M. et al. Measuring patient-centered communication in patient–physician consultations: theoretical and practical issues. **Social science & medicine**, v. 61, n. 7, p. 1516-1528, 2005.

FELDMAN, Stanley et al. When Empathy Succeeds and Fails: Public Support for Social Welfare Policies. In: **New York Area Political Psychology Workshop, New York, NY May**. 2015.

GOBBINI, M. Ida; HAXBY, James V. Neural systems for recognition of familiar faces. **Neuropsychologia**, v. 45, n. 1, p. 32-41, 2007.

GOETZ, Jennifer L.; KELTNER, Dacher; SIMON-THOMAS, Emiliana. Compassion: an evolutionary analysis and empirical review. **Psychological bulletin**, v. 136, n. 3, p. 351, 2010.

GROSS, James J. Emotion regulation: Conceptual and empirical foundations. 2014.

HAIDT, Jonathan et al. The moral emotions. **Handbook of affective sciences**, v. 11, n. 2003, p. 852-870, 2003.

HOCHBERG, Yosef. A sharper Bonferroni procedure for multiple tests of significance. **Biometrika**, v. 75, n. 4, p. 800-802, 1988.

HOFFMAN, Martin L. **Empathy and moral development: Implications for caring and justice**. Cambridge University Press, 2000.

KHALIL, Elias L. Similarity versus familiarity: When empathy becomes selfish. **Behavioral and Brain Sciences**, v. 25, n. 1, p. 41-41, 2002.

KROENKE, Kurt; SPITZER, Robert L.; WILLIAMS, Janet BW. The phq-9. **Journal of general internal medicine**, v. 16, n. 9, p. 606-613, 2001.

LAMM, Claus; BATSON, C. Daniel; DECETY, Jean. The neural substrate of human empathy: effects of perspective-taking and cognitive appraisal. **Journal of cognitive neuroscience**, v. 19, n. 1, p. 42-58, 2007.

LEACH, Colin Wayne; IYER, Aarti; PEDERSEN, Anne. Anger and guilt about ingroup advantage explain the willingness for political action. **Personality and Social Psychology Bulletin**, v. 32, n. 9, p. 1232-1245, 2006.

LOCKWOOD, Patricia L.; SEARA-CARDOSO, Ana; VIDING, Essi. Emotion regulation moderates the association between empathy and prosocial behavior. **PloS one**, v. 9, n. 5, p. e96555, 2014.

LOTZ, Sebastian et al. Punitive versus compensatory reactions to injustice: Emotional antecedents to third-party interventions. **Journal of Experimental Social Psychology**, v. 47, n. 2, p. 477-480, 2011.

MASCARO, Jennifer S. et al. The neural mediators of kindness-based meditation: a theoretical model. **Frontiers in psychology**, v. 6, p. 109, 2015.

MCCALL, Cade et al. Compassion meditators show less anger, less punishment, and more compensation of victims in response to fairness violations. **Frontiers in behavioral neuroscience**, v. 8, p. 424, 2014.

NAJJAR, Nadine et al. Compassion fatigue: A review of the research to date and relevance to cancer-care providers. **Journal of Health Psychology**, v. 14, n. 2, p. 267-277, 2009.

PRESTON, Stephanie D.; DE WAAL, Frans BM. Empathy: Its ultimate and proximate bases. **Behavioral and brain sciences**, v. 25, n. 1, p. 1-20, 2002a.

REDELMEIER, Donald A.; MOLIN, Jean-Pierre; TIBSHIRANI, Robert J. A randomised trial of compassionate care for the homeless in an emergency department. **The Lancet**, v. 345, n. 8958, p. 1131-1134, 1995.

SANGHAVI, Darshak M. What makes for a compassionate patient-caregiver relationship?. **Joint Commission journal on quality and patient safety**, v. 32, n. 5, p. 283-292, 2006.

SAYETTE, Michael A. et al. A psychometric evaluation of the facial action coding system for assessing spontaneous expression. **Journal of Nonverbal Behavior**, v. 25, n. 3, p. 167-185, 2001.

SMITH, Craig A. et al. Emotion and adaptation. **Handbook of personality: Theory and research**, p. 609-637, 1990.

SCHERER, Klaus R. On the nature and function of emotion: A component process approach. **Approaches to emotion**, v. 2293, p. 317, 1984.

SCHERER, Klaus R. Studying the emotion-antecedent appraisal process: An expert system approach. **Cognition & Emotion**, v. 7, n. 3-4, p. 325-355, 1993.

STRAYER, Janet; ROBERTS, William. Empathy and observed anger and aggression in five-year-olds. **Social Development**, v. 13, n. 1, p. 1-13, 2004.

STRAUSS, Clara et al. What is compassion and how can we measure it? A review of definitions and measures. **Clinical psychology review**, v. 47, p. 15-27, 2016.

SPITZER, Robert L. et al. A brief measure for assessing generalized anxiety disorder: the GAD-7. **Archives of internal medicine**, v. 166, n. 10, p. 1092-1097, 2006.

STILLWELL, Arlene M.; BAUMEISTER, Roy F.; DEL PRIORE, Regan E. We're all victims here: Toward a psychology of revenge. **Basic and Applied Social Psychology**, v. 30, n. 3, p. 253-263, 2008.

STOTLAND, Ezra. Exploratory Investigations of Empathy1. In: **Advances in experimental social psychology**. Academic Press, 1969. p. 271-314.

VAISH, Amrisha; CARPENTER, Malinda; TOMASELLO, Michael. Sympathy through affective perspective taking and its relation to prosocial behavior in toddlers. **Developmental psychology**, v. 45, n. 2, p. 534, 2009.

VAN DOORN, Janne; ZEELENBERG, Marcel; BREUGELMANS, Seger M. Anger and prosocial behavior. **Emotion Review**, v. 6, n. 3, p. 261-268, 2014.

VERBOSKY, Sandra Janashak; RYAN, Deborah A. Female partners of Vietnam veterans: Stress by proximity. **Issues in Mental Health Nursing**, v. 9, n. 1, p. 95-104, 1988.

VISTED, Endre et al. The association between self-reported difficulties in emotion regulation and heart rate variability: the salient role of not accepting negative emotions. **Frontiers in psychology**, v. 8, p. 328, 2017.WONDRA, Joshua D.; ELLSWORTH, Phoebe C. An appraisal theory of empathy and other vicarious emotional experiences. **Psychological Review**, v. 122, n. 3, p. 411, 2015.

WONDRA, Joshua D.; ELLSWORTH, Phoebe C. An appraisal theory of empathy and other vicarious emotional experiences. **Psychological Review**, v. 122, n. 3, p. 411, 2015.

ARTICLE 2

Salles, B. M., Fadel, J. V., Mograbi, D. C. Responses to Social Cues in Emotional Displays Within a Competitive Context. (Manuscript in preparation)

Responses to social cues in emotional displays within a competitive context

Abstract

Background: Classical emotional contagion theory claims that people mimic emotional expressions as a motor reflex. However, more recent findings suggest that social cues may moderate convergent responses and even produce divergent reactions to emotional displays produced by others. The current study investigated if convergent and divergent responses depend on group membership, gaze direction, and the emotion showed by the displayer. **Methods:** 48 participants watched videoclips of ingroup and outgroup members displaying anger, fear, sadness, and happiness in two gaze directions: averted and direct. In addition to self-reported measures, facial responses were analyzed. **Results:** Participants tended to match the emotions being displayed. In addition, gaze direction influenced reactions to fear displays, with averted-fear provoking more fearful facial reactions than direct-fear expressions. Additionally, group membership led to more frequent convergent happiness and sadness responses, and outgroup-happiness elicited more sadness and contempt, while outgroup-fear provoked aversive facial reactions. **Discussion:** The findings suggest that aversive feelings toward other groups may be the cause or consequence of prejudice and negative attitudes toward dissimilar people. Also, the results highlight the role of social cues on contagion, clarifying predictions of primitive contagion and social appraisal theories.

Keywords: emotional contagion, social appraisal, group membership, gaze direction, FACS

Introduction

Social interactions are often considered one of the main sources of emotional induction (PARKINSON, FISCHER, & MANSTEAD, 2005; TIEDENS & LEACH, 2004). For instance, group contexts are inherently conducive to affective correspondence among their members (VAN KLEEF & FISCHER, 2016), with emotions spreading among close individuals (PARKINSON, 2011). Therefore, investigating processes that underlie emotional convergence between people is crucial to understanding not only social interactions (SPOOR & KELLY, 2004), but also their effects on each individual person (BRUDER et al., 2012).

Two main accounts seek to explain interpersonal emotion transfer: emotional contagion and social appraisal. Emotional contagion theory suggests a motor matching process in which others' emotional behavior is automatically mimicked (HATFIELD, CACIOPPO, & RAPSON, 1994). Through afferent feedback (mostly facial feedback), it is assumed that the imitated emotional behavior induces subjective experiences in the perceiver. However, despite being considered an influential theory (PARKINSON, 2011), some researchers fail to find a correlation between the supposed behavioral mimicry and subjective feeling (e.g., BLAIRY, HERRERA, & HESS, 1999; HESS & BLAIRY, 2001; LISHNER, COOTER, & ZALD, 2008; VAN DER SCHALK et al., 2011a). For this reason, this "motor resonance" explanation to emotional convergence has been questioned by studies. For example, TAMIETTO et al. (2009) noted that motor matching was not necessary to emotional convergence, since their participants reacted with facial expressions in response to bodily (not facial) cues.

An alternative to explain contextual influences in both convergence and divergence of emotions between people is social appraisal theory. According to this theory, the individual integrates his/her own appraisal with the information derived from the emotional expressions of other people in the situation (BRUDER et al., 2014). Emotional contagion and social appraisal theories make distinct predictions about whether social cues may

influence reactions, with emotional contagion privileging motor cues and appraisal theory considering factors such as group membership and gaze direction as essential in determining emotional convergence or divergence.

It has been shown that cues of group membership may not only influence the perception of emotions, with higher recognition accuracy between ingroup members (ELFENBEIN & AMBADY, 2002), but also affect reactions to emotional displays produced by others. Whereas ingroup members tend to converge emotionally (EPSTUDE & MUSSWEILER, 2009), outgroup displays tend to induce divergent emotional responses (e.g., outgroup fear evoking aversion; VAN DER SCHALK et al., 2011a). The influence between gaze direction and facial expressions of emotion has also been of interest in more recent studies. For instance, it has been found that reactions to fear display are highly affected by gaze direction, in which convergent responses occurred more to averted fear expressions than to those toward the observer (SOUSSIGNAN et al., 2013).

One limitation of previous studies has been the use of *single-muscle* measurement to assess convergence of emotion in facial expressions (e.g., SACHISTHAL, SAUTER, & FISCHER, 2017; HESS, PHILIPPOT, & BLAIRY, 1998). It has been shown that the same muscle can be responsible to display two or more distinct emotions (e.g., *corrugator* is present in anger, fear, and sadness; PUTMAN, HERMANS & VAN HONK, 2006; WEYERS et al., 2009; VAN DER SCHALK et al., 2011a). In addition, facial expressions are typically composed by the combination of different muscles acting together (EKMAN, FRIESEN, & HAGER, 2002b). Therefore, instead of using this classical *single-muscle* measurement, it has been suggested that a *theoretically-based prediction* of facial actions, in which a list of criteria of muscle activity is followed to determine the presence (or not) of an emotion, should be preferred (ROSENBERG & EKMAN, 1994; SAYETTE, COHN, WERTZ, PERROTT, & PARROTT, 2001; EKMAN, FRIESEN, & HAGER, 2002b).

In the current study, the influence of variables such as group membership and gaze direction on emotional contagion was explored. It was

hypothesized that participants would show more convergent responses to ingroup displays than to outgroup members. Effects of emotional divergence were also investigated. It was hypothesized that: (1) outgroup anger would evoke fear; (2) outgroup fear would evoke both disgust and contempt; (3) outgroup sadness would evoke happiness; (4) outgroup happiness would evoke both sadness and contempt. In relation to gaze direction, the prediction was that participants would show more convergent responses to approach-oriented emotions (anger and happiness) when expressed directed to the observer, and more convergent responses to fear when displayed averted from the observer; whereas sadness would evoke equal levels of convergent responses regardless of eye direction.

Methods

Participants

Participants with normal or corrected-to-normal vision and with no previous history of neurological or psychiatric disorders were recruited at the Pontifical Catholic University of Rio de Janeiro. Forty-eight undergraduate students participated in the experiment, thirty-three women and fifteen men, aged from 18 to 29 years (M_{age} = 21.4, SD_{age} = 2.46). The sample size was determined using other studies investigating emotional responses as a function of group membership (VAN DER SCHALK et al., 2011a; SACHISTHAL, SAUTER, & FISCHER, 2017). Also, the sample size was calculated to ensure counterbalancing of experimental conditions.

Procedures

After providing informed consent, participants were seated in front of a computer, with the experiment being administered individually. To create a competitive context, participants were informed that they would compete with students from a different university, with some of the stimuli

representing students from their own (ingroup) or a different university (outgroup). This competition would be accomplished by challenges that (supposedly) would measure different abilities such as linguistics, spatiality, reaction time and memory. Pictures of the models in the stimuli with a neutral expression were shown indicating the university to which they belonged. Following this, it was announced to the participants that they would be shown those competitors of both institutions displaying emotions and, when requested, they should answer what emotion had been demonstrated. After two practice trials, the actual task started. Following the sequence of procedures described below.

Sequence of procedures

First a fixation cross appeared in the center of the screen for 500 ms. This was followed by information about group membership (same/other university), which was presented for 500 ms. The stimulus was then presented for 20 s. Stimuli were shown in two blocks based on group membership, and two blocks based on gaze direction. The order of group membership blocks was counterbalanced, with the order of the gaze direction blocks counterbalanced within group membership blocks. Negative emotional stimuli (anger, fear, and sadness displays) were presented in random order, with happiness displays being always the last stimulus for ethical reasons. During stimulus presentation, facial activity was unobtrusively recorded with a camera above the screen. The order of procedures can be seen in Figure 1.

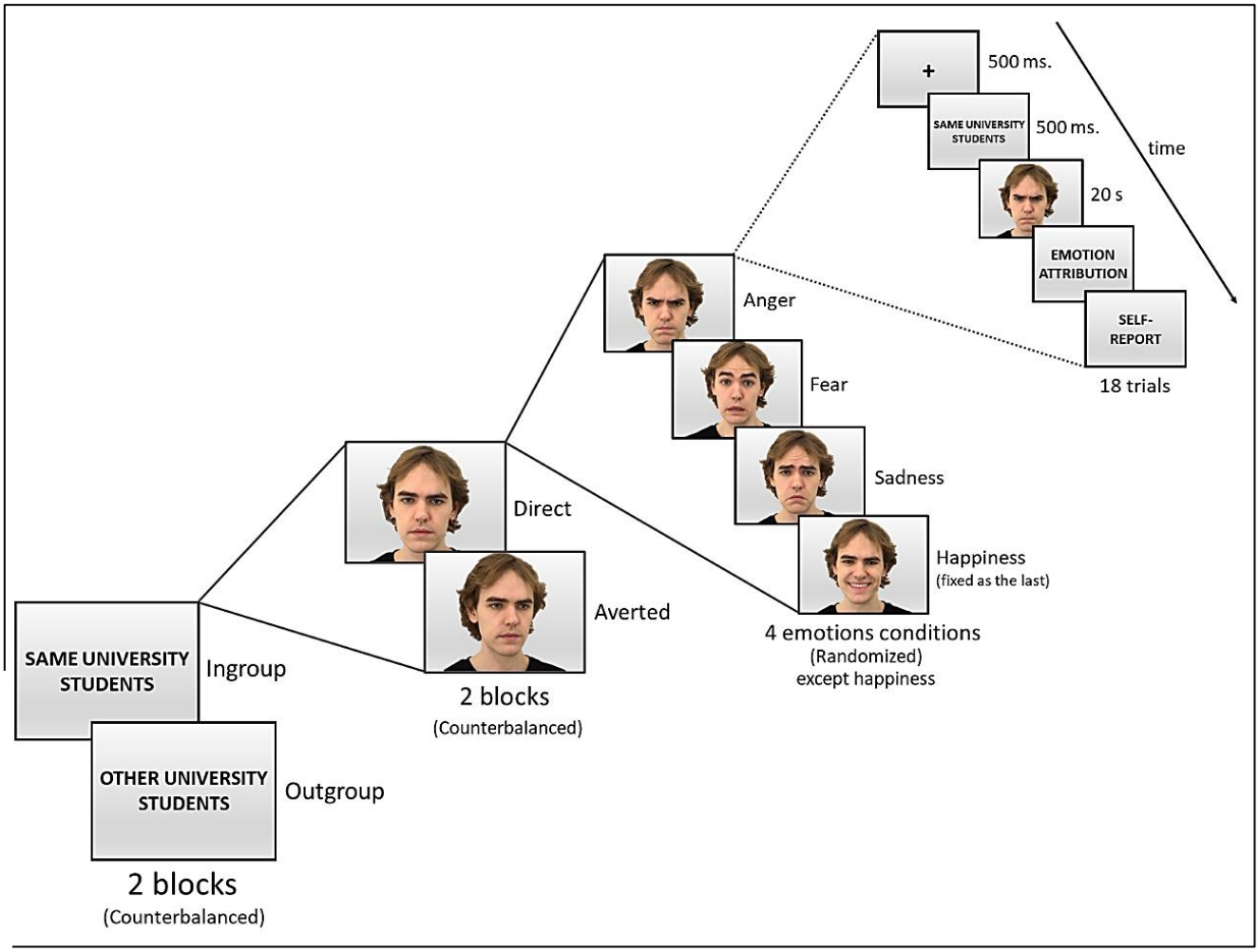

Figure 1. Counterbalancing of stimuli and sequence of procedures

Stimuli

Participants were shown video clips of male and female models displaying anger, fear, sadness, and happiness. All clips were taken from the Amsterdam Dynamic Facial Expression Set (ADFES; VAN DER SCHALK, HAWK, FISCHER, & DOOSJE, 2011b). Videos of 10 different models were used (6 males and 4 females). Participants saw sequences of videos of ingroup and outgroup members expressing all four emotions in two distinct directions (averted and direct). Each sequence contained 5 clips with one model each displaying the same emotion. Each sequence was approximately 20 s long (4 s to each clip), starting with a neutral expression, and reaching the apex of the emotional display after approximately 1 s.

Measures

Self-Reported Emotion

A self-report scale was used to assess each of the following emotions: anger, fear, sadness, happiness, disgust, and contempt. These labels are commonly used to denote six emotional categories considered universal (Ekman, 2001). After the presentation of each set of stimuli, participants were asked: "At this moment, how much _____ are you feeling?". Participants indicated the extent to which they felt these emotions on a scale from 0 (“not at all”) to 5 (“extremely”).

Facial Behavior

During the whole procedure, participants were recorded using a digital video camera positioned above the computer screen. Facial behavior was scored using Ekman & Friesen’s (1978; EKMAN, FRIESEN, & HAGER, 2002a) Facial Action Coding System (FACS). This is a comprehensive, anatomically based system for measuring all visually discernible facial movement in terms of 44 unique action units (AUs), as well as several categories of head and eye positions and movements (EKMAN & ROSENBERG, 1997).

Because information about emotion may not be fully conveyed by a single muscle, a theoretically-based prediction of AUs (and combinations of AUs) to assess emotions was used. The frequency of each emotion was calculated by measuring "core units" (and their combinations), which are considered essential in the composition of an emotional facial display. Each emotional stimulus model displayed the same core units that were measured in the participants. The coding was carried out by B.M.S., a certified FACS coder with 100 h of training. Inter-rater reliability was assessed by J.V.F., an equally trained coder, rating 50% of the material and producing 87.9% agreement (Cohen’s kappa coefficient = 0.70). The emotions assessed by facial behavior were anger, fear, sadness, happiness, disgust and contempt.

Manipulation checks

As a manipulation check for emotion recognition, we measured the attribution of emotions to the facial stimuli. Participants were asked “Which emotion have these people just displayed?”, and could choose from one of the following labels: “anger”, “fear”, “sadness”, “happiness”, “disgust”, “surprise”, and “contempt”. As a manipulation check for group membership, participants were asked “How do you feel belonging to (same/other university)?”, and responded on a scale from 0 (“not at all”) to 5 (“totally”).

Ethical Issues

The project was approved by the Rio de Janeiro State University Ethics Committee (Research Ethics Committee number 65456316.0.0000.5282). All participants provided informed consent.

Statistical Analysis

A 2 (group membership: ingroup vs. outgroup) X 2 (directedness: averted vs. directed) X 4 (emotional stimulus: anger, fear, sadness and happiness) within-subjects repeated measures ANOVA was calculated for each outcome measure. Because a within-subjects design was used, the assumption of sphericity was tested. When the assumption was violated, results were considered significant only when indicated by both multivariate tests and Greenhouse-Geisser corrections (GREENHOUSE & GEISSER, 1959). The extent to which participants categorized themselves as belonging to their own and other university was assessed with a paired sample *t* test.

Results

Group membership manipulation checks

On average, participants felt a significantly higher sense of belonging to their own (*M* = 5.19, *SE* = 0.12) than to the other university (*M* = 1.21, *SE* = 0.09), *t* (47) = 25.04, *p* < .001.

Emotional responses

Results for self-reported emotion and facial expressions can be seen in Figures 2 and 3, respectively.

Anger - *Self-report*

There was a significant main effect of emotional condition, *F* (1.84, 77.21) = 5.98, *p* = .005, η^2_p = .125. Anger was reported more frequently in the anger condition than in the other conditions (fear, *F* (1, 42) = 11.93, *p* = .001, η^2_p = .221; sadness, *F* (1, 42) = 7.08, p = .01, η^2_p = .144; happiness, *F* (1, 42) = 6.29, *p* = .02, η^2_p = .130.

There were no significant 3-way (*F* (2.38, 99.90) = .28, *p* = .79, η^2_p = .007) or 2-way interactions (group membership x gaze direction, *F* (1, 42) = .56, *p* = .46, η^2_p = .013; group membership and emotional condition, *F* (2.22, 93.31) = .49, *p* = .63, η^2_p = .012; gaze direction and emotional condition, *F* (2.24, 94.11) = 1.03, *p* = .37, η^2_p = .024). There were no significant main effects of group membership (*F* (1, 42) = .53, *p* = .47, η^2_p = .472) or; gaze direction (*F* (1, 42) = .48, *p* = .48, η^2_p = .011).

Figure 2. Self-reported emotions per Emotional Conditions. * p < .05

Anger **-** *Facial Behavior*

There was a significant main effect of emotional condition, *F* (1.47, 69.15) = 31.31, *p* < .001, η^2_p = .400. Anger was expressed more frequently in the anger condition than in the other conditions (fear, *F* (1, 47) = 31.14, *p* < .001, η^2_p = .399, sadness, *F* (1, 47) = 34.76, *p* < .001, η^2_p = .425, and happiness, *F* (1, 47) = 45.46, *p* < .001, η^2_p = .492).

There were no significant 3-way (*F* (1.69, 79.31) = .51, *p* = .57, η^2_p = .011) or 2-way interactions (group membership x gaze direction, *F* (1, 47) = 1.60, *p* = .21, η^2_p = .033; group membership and emotional condition, *F* (1.61, 75.55) = 0.88, *p* = .40, η^2_p = .018; gaze direction and emotional condition, *F* (2.48, 116.51) = 1.49, *p* = .22, η^2_p = .031). There were no significant main

effects of group membership (F (1, 47) = .38, p = .54, η^2_p = .008) or; gaze direction (F (1, 47) = .36, p = .55, η^2_p = .008).

Fear - *Self-report*

There was a significant main effect of emotional condition, F (1.75, 71.89) = 3.97, p = .03, η^2_p = .088. Fear was reported more frequently in the fear condition than in the anger condition, F (1, 41) = 5.08, p = .03, η^2_p = .110 and happiness condition, F (1, 41) = 2.32, p = .02, η^2_p = .130, but was not in sadness condition, F (1, 41) = 2.32, p = .14, η^2_p = .054.

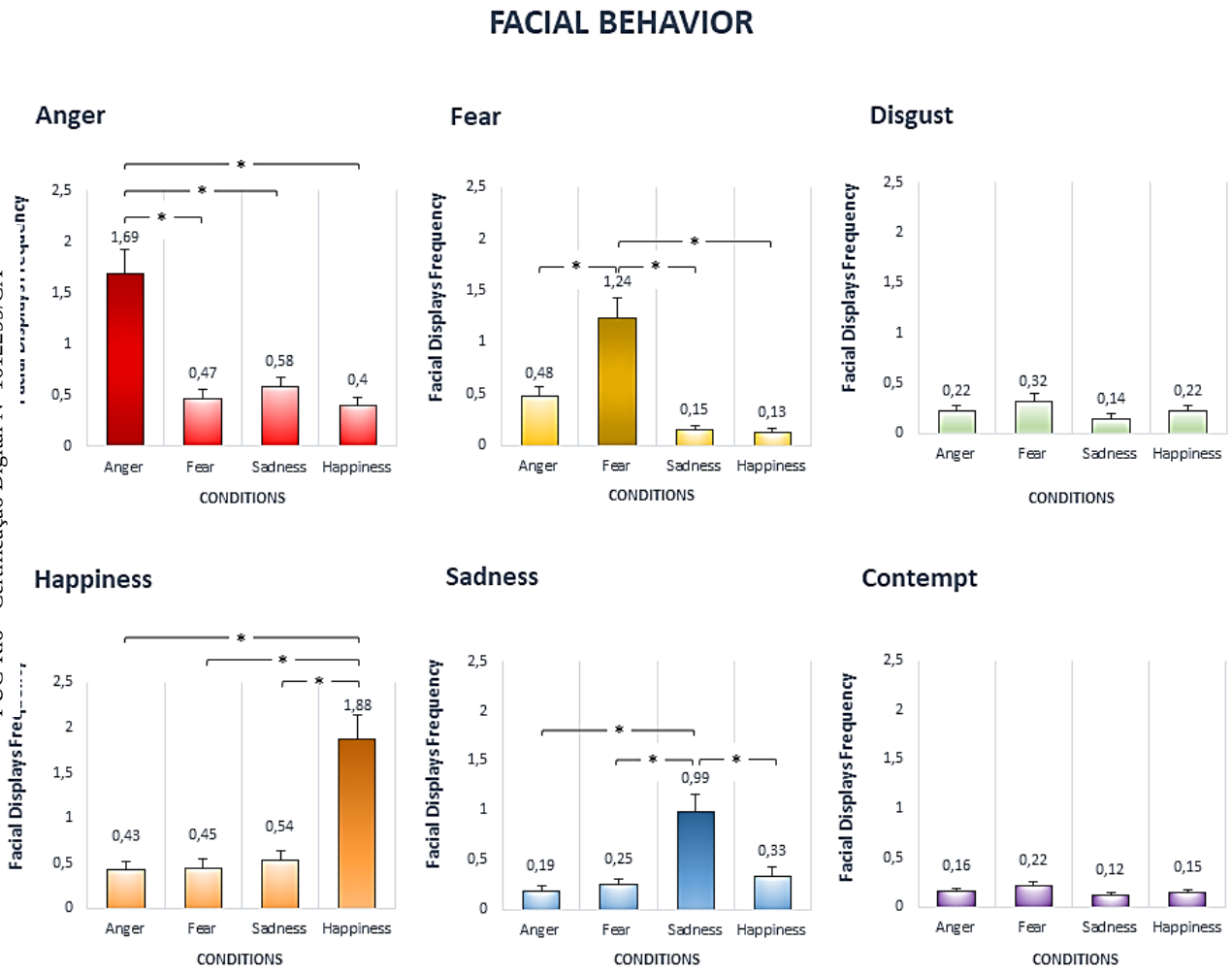

Figure 3. Facial behavior of emotions per Emotional Conditions. * p < .05

There were no significant 3-way (F (2.76, 113.33) = 2.31, p = .09, η^2_p = .053) or 2-way interactions (group membership x gaze direction, F (1, 41) = 3.75, p = .06, η^2_p = 084; group membership and emotional condition, F (1.94,

79.48) = 2.38, p = .10, η^2_p = .055; gaze direction and emotional condition, F (2.30, 94.35) = 1.66, p = .19, η^2_p = .039). There were no significant main effects of group membership (F (1, 41) = 1.94, p = .17, η^2_p = .045) or; gaze direction (F (1, 41) = .80, p = .38, η^2_p = .019).

Fear - *Facial Behavior*

There was a significant 2-way interaction between emotional condition x gaze direction, F (1.79, 84.26) = 7.15, p = .02, η^2_p = .132. The planned contrast comparing the averted-fear with direct-fear condition revealed, that participants expressed more fear to averted displays of fear than to direct displays of fear, t (47) = 2.91, p = .006, η^2_p = .152. This interaction can be seen in Figure 4.

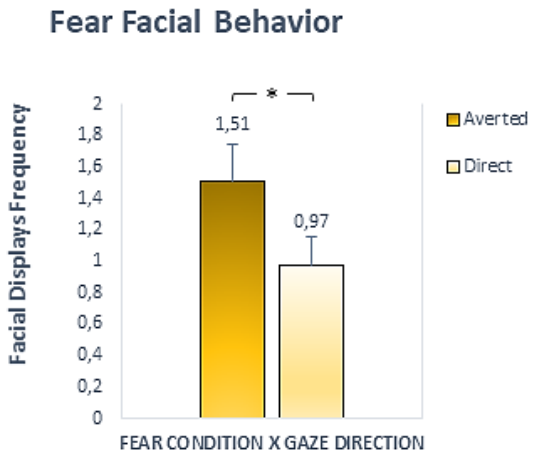

Figure 4. Fear-matching as a function of emotional condition and gaze direction. * p < .05

There was also a significant main effect of emotional condition, F (1.47, 69.16) = 25.03, p < .001. η^2_p = .347. Fear was expressed more frequently in the fear condition than in the other conditions (anger, F (1, 47) = 15.82, p < .001, η^2_p = .252, sadness, F (1, 47) = 33.03, p < .001, η^2_p = .413, and happiness, F (1, 47) = 32.48, p < .001, η^2_p = .409).

There were no significant 3-way (F (1.78, 83.58) = 1.54, p = .22, η^2_p = .032) or 2-way interactions between group membership x gaze direction, F (1, 47)

= 1.78, p = .19, η^2_p = .036; or group membership and emotional condition, F (2.16, 101.28) = 2.24, p = .11, η^2_p = .046. There were no significant main effects of group membership (F (1, 47) = .21, p = .65, η^2_p = .004) or; gaze direction (F (1, 47) = 2.52, p = .12, η^2_p = .051).

Sadness - *Self-report*

There was a significant main effect of emotional condition, F (1.40, 57.39) = 18.96, p < .001. Sadness was reported more frequently in the sadness condition than in the other conditions (anger, F (1, 41) = 20.41, p < .001, η^2_p = .332, fear, F (1, 41) = 20.31, p < .001, η^2_p = .331, and happiness, F (1, 41) = 22.79, p < .001, η^2_p = .357).

There were no significant 3-way (F (1.97, 80.77) = .84, p = .44, η^2_p = .020) or 2-way interactions (group membership x gaze direction, F (1, 41) = .05, p = .82, η^2_p = .001; group membership and emotional condition, F (1.76, 71.95) = .37, p = .67, η^2_p = .009; gaze direction and emotional condition, F(2.31, 94.76) = 1.19, p = .31, η^2_p = .028). There were no significant main effects of group membership (F (1, 41) = .02, p = .90, η^2_p = .001) or; gaze direction (F (1, 41) = .32, p = .58, η^2_p = .008).

Sadness - *Facial Behavior*

There was a significant 2-way interaction between group membership x emotional condition, F (2.16, 101.28) = 2.24, p = .11, η^2_p = .046. The planned contrast revealed that participants expressed more sadness to ingroup displays of sadness than to outgroup displays of sadness, t (47) = 2.36, p = .02, η^2_p = .106. In addition, the planned contrast revealed that participants expressed more sadness to outgroup displays of happiness than to ingroup displays of happiness, t (47) = -2.36, p = .02, η^2_p = .106.

There was also a significant main effect of emotional condition, F (1.58, 74.32) = 18.20, p < .001, η^2_p = .279. Sadness was expressed more frequently in the sadness condition than in the other conditions (anger, F (1, 47) = 25.35, p < .001, η^2_p = .350, fear, F (1, 47) = 20.71, p < .001, η^2_p = .306, and happiness, F (1, 47) = 18.26, p < .001, η^2_p = .280).

There were no significant 3-way (F (2.26, 106.32) = 1.14, p = .33, η^2_p = .024) or 2-way interactions between group membership x gaze direction, F (1, 47) = .48, p = .49, η^2_p = .010; or gaze direction and emotional condition, F (1.87, 88.08) = 2.01, p = .14, η^2_p = .041. There were no significant main effects of group membership (F (1, 47) = .03, p = .87, η^2_p = .001) or; gaze direction (F (1, 47) = 1.46, p = .23, η^2_p = .030).

Happiness - *Self-report*

There was a significant main effect of emotional condition, F (1.40, 57.39) = 18.96, p < .001. Happiness was reported more frequently in the happiness condition than in the other conditions [anger, F (1, 41) = 37.72, p < .001, η^2_p = .479, fear, F (1, 41) = 39.42, p < .001, η^2_p = .490, and sadness, F (1, 41) = 37.13, p < .001, η^2_p = .475)].

There were no significant 3-way (F (2.58, 105.85) = .52, p = .64, η^2_p = .01) or 2-way interactions (group membership x gaze direction, F (1, 41) = .96, p = .33, η^2_p = .023; group membership and emotional condition, F (2.46, 100.77) = .1.41, p = .25, η^2_p = .033; gaze direction and emotional condition, F (2.83, 116.13) = .68, p = .56, η^2_p = .016). There were no significant main effects of group membership (F (1, 41) = 1.25, p = .27) or; gaze direction (F (1, 41) = .42, p = .52).

Happiness - *Facial Behavior*

There was a significant 2-way interaction between group membership x emotional condition, F (2.30, 108.22) = 15.56 p < .001, η^2_p = .249.

The planned contrast comparing the ingroup-happiness with outgroup-happiness condition revealed that participants expressed more happiness to ingroup displays of happiness than to outgroup displays of happiness, t (47) = 5.19, p < .001, η^2_p = .365. The planned contrast revealed that participants did not express more happiness to outgroup displays of sadness than to ingroup displays of sadness, t (47) = -.83, p = .41, η^2_p = .014 (see Table 1).

Table 1. Means (M) and Standard Deviations (SD) of facial behavior per Emotional Condition by Group Membership

		EMOTIONAL CONDITION									
		Anger condition		Fear condition		Sadness condition		Happiness condition		Total	
FACIAL BEHAVIOR	GROUP MEMBERSHIP	*M*	(*SD*)	*M*	(*SD*)	*M*	(*SD*)	*M*	(*SD*)	*M*	(*SD*)
Anger response	Ingroup	1.82	(2.06)	0.44	(0.68)	0.65	(0.76)	0.34	(0.58)	0.81	(0.74)
	Outgroup	1.56	(1.76)	0.50	(0.83)	0.51	(0.69)	0.46	(0.71)	0.76	(0.80)
Fear response	Ingroup	0.39	(0.61)	1.32	(1.39)	0.15	(0.31)	0.10	(0.29)	0.49	(0.47)
	Outgroup	0.58	(0.92)	1.16	(1.42)	0.16	(0.31)	0.16	(0.42)	0.51	(0.49)
Sadness response	Ingroup	0.16	(0.42)	0.20	(0.56)	**1.26***	(1.77)	**0.17***	(0.31)	0.45	(0.58)
	Outgroup	0.22	(0.45)	0.29	(0.53)	**0.72***	(1.05)	**0.50***	(1.16)	0.43	(0.63)
Hap ss response	Ingroup	0.57*	(0.98)	0.44	(0.82)	0.49	(0.87)	**2.41***	(2.25)	**0.98***	(1.03)
	Outgroup	0.29*	(0.55)	0.46	(0.74)	0.59	(0.76)	**1.35***	(1.52)	**0.67***	(0.67)
Dis esponse	Ingroup	0.26	(0.49)	**0.17***	(0.43)	0.13	(0.35)	0.17	(0.40)	**0.18***	(0.32)
	Outgroup	0.18	(0.37)	**0.47***	(0.80)	0.15	(0.44)	0.27	(0.56)	**0.27***	(0.37)
Con t response	Ingroup	0.12	(0.24)	**0.12***	(0.28)	0.14	(0.28)	**0.09***	(0.24)	**0.12***	(0.16)
	Outgroup	0.21	(0.38)	**0.32***	(0.46)	0.09	(0.26)	**0.20***	(0.27)	**0.21***	(0.23)

Note. Means in bold represent measures of convergent and divergent behavior. * Differ at $\alpha = .05$.

There was also a significant main effect of emotional condition, F (1.31, 61.45) = 36.22, $p < .001$, $\eta^2_p = .497$. Happiness was expressed more frequently in the happiness condition than in the other conditions (anger, F (1, 47) = 44.73, $p = .001$, $\eta^2_p = .488$, fear condition, F (1, 47) = 41.06, $p < .001$, $\eta^2_p = .466$, and sadness condition, F (1, 47) = 34.83, $p < .001$, $\eta^2_p = .426$).

There was also a significant main effect of group membership, F (1, 47) = 11.23, $p = .002$, $\eta^2_p = .193$. Happiness was expressed more frequently toward ingroup than outgroup members, t (47) = 3.35, $p = .002$, $\eta^2_p = .193$.

There were no significant 3-way (F (3, 39) = 2.79, p = 0.53, η^2_p = .177) or 2-way interactions between group membership x gaze direction, F (1, 47) = .02, p = .88, η^2_p = .001; or gaze direction and emotional condition, F (2.19, 102.68) = 2.95, p = .052, η^2_p = .059. There was no significant main effect of gaze direction (F (1, 47) = .03, p = .85, η^2_p = .001).

Disgust - *Self-report*

There were no significant 3-way (F (2.12, 86.71) = 1.44, p = .24, η^2_p = .034) or 2-way interactions (group membership x gaze direction, F (1, 41) = 3.63, p = .06, η^2_p = .081; group membership and emotional condition, F (1.66, 68.10) = 1.52, p = .23, η^2_p = .036; gaze direction and emotional condition, F (1.68, 68.74) = 2.24, p = .12, η^2_p = .052). There were no significant main effects of group membership (F (1, 41) = .26, p = .61, η^2_p = .006); gaze direction (F (1, 41) = .06, p = .81, η^2_p = .001); or emotional condition (F (3, 39) = 2.79, p = 0.53, η^2_p = .177).

Disgust - *Facial Behavior*

There was a significant 2-way interaction between group membership x emotional condition, F (1.87, 87.96) = 4.64, p = .01, η^2_p = .090. The planned contrast revealed that participants expressed more disgust to outgroup displays of fear than to ingroup displays of fear, t (47) = -2.58, p = .01, η^2_p = .124.

There was also a significant main effect of group membership, F (1, 47) = 5.49, p = .02, η^2_p = .105. Disgust was expressed more frequently toward outgroup than ingroup members, t (47) = -2.34, p = .02, η^2_p = .023.

There were no significant 3-way (F (2.46, 115.74) = 1.00, p = .38, η^2_p = .021.) or 2-way interactions between group membership x gaze direction, F (1, 47) = .003, p = .95, η^2_p = .001; or gaze direction and emotional condition, F (2.31, 108.43) = .50, p = .64, η^2_p = .011. There was no significant main

effect of gaze direction (F (1, 47) = .21, p = .65, η^2_p = .004); or emotional condition (F (2.19, 103.06) = 2.48, p = .08, η^2_p = .050).

Contempt - *Self-report*

There were no significant 3-way (F (2.36, 96.54) = .22, p = .84, η^2_p = .005) or 2-way interactions (group membership x gaze direction, F (1, 41) = 1.65, p = .21, η^2_p = .039; group membership and emotional condition, F (2.34, 95.77) = .46, p = .67, η^2_p = .011; gaze direction and emotional condition, F (2.46, 100.90) = .54, p = .62, η^2_p = .013). There were no significant main effects of group membership (F (1, 41) = .15, p = .70, η^2_p = .004); gaze direction (F (1, 41) = .10, p = .76, η^2_p = .002); or emotional condition (F (2.43, 99.41) = 1.82, p = .16, η^2_p = .043).

Contempt - *Facial Behavior*

There was a significant 2-way interaction between group membership x emotional condition, F (2.86, 134.51) = 3.06, p = .03, η^2_p = .061. The planned contrast revealed that participants expressed more contempt to outgroup displays of fear than to ingroup displays of fear, t (47) = -2.81, p = .007, η^2_p = .144. The planned contrast revealed that participants expressed more contempt to outgroup displays of happiness than to ingroup displays of happiness, t (47) = -2.02, p = .05, η^2_p = .080.

There was also a significant main effect of group membership F (1, 47) = 6.91, p = .01, η^2_p = .128. Contempt was expressed more frequently toward outgroup than ingroup members, t (47) = -2.63, p = .01, η^2_p = .128.

There were no significant 3-way (F (2.91, 136.93) = .008, p > .999, η^2_p = .001) or 2-way interactions between group membership x gaze direction, F (1, 47) = .45, p = .50, η^2_p = .010; or gaze direction and emotional condition, F (2.70, 126.95) = .09, p = .96, η^2_p = .002. There was no significant main effect of gaze direction (F (1, 47) = .06, p = .81, η^2_p = .001); or emotional condition (F (2.86, 132.30) = 2.52, p = .06, η^2_p = .051).

Discussion

Results from both self-report and facial behavior measures indicated matching responses to all emotional conditions (i.e., anger, fear, sadness, happiness). Also, there was an interaction between gaze direction and emotional condition, in which averted fear provoked more fearful facial reactions than when fear was displayed toward the participant. Additionally, an interaction between group membership and emotional condition was observed, with more convergent happiness and sadness between ingroup than outgroup members. Also, outgroup happiness displays elicited more divergent sadness and contempt facial expressions; whereas outgroup fear displays provoked more divergent facial reactions of aversion, that is, disgust and contempt. Facial behavior was also influenced by group membership, regardless of the emotional condition. Participants displayed more happiness to ingroup members and showed more disgust and contempt facial expressions to outgroup members.

The current study replicates previous findings indicating emotional convergence (SEE HATFIELD, BENSMANA, THORNTONA, & RAPSON, 2014). When watching angry, fearful, sad, or happy faces, participants displayed and reported more these specific emotions than any other emotions. This discover supports emotional contagion as a whole, with some support for the primitive (or motor) contagion hypothesis.

However, contextual and social cues also influenced responses to emotional displays of others. Although there was no effect of gaze direction in approach-oriented emotions (i.e., anger and happiness; see ADAM & KLECK, 2003, 2005), as expected, reactions to fear displays depended on the direction where the displayer was looking to. Fear displayed avertedly resulted in more fearful reactions than when fear was showed direct to the observer. This finding supports the prediction that averted fear may signals threat in the environment, since the expresser is oriented away from the perceiver and is looking toward another object or person (see also HESS, ADAMS, & KLECK, 2007). The results also replicated findings that matching responses to sadness displays are not influenced by gaze direction of the

displayer (SOUSSIGNAN et al., 2013). This may reflect both possible signals of sadness: disengagement, shown by averted gaze (ADAMS & KLECK, 2005); and call for support or help, perceived by direct gaze toward the observer (FISCHER & MANSTEAD, 2008).

Additionally, it was found that group membership influences convergence of affiliative emotions. Happiness and sadness showed increased convergence between ingroup than outgroup members. Also, most of the expected divergent responses were found. Outgroup happiness displays elicited more sadness and contempt, and outgroup fear displays provoked aversive facial reactions of disgust and contempt. These results reproduce some of the earlier studies that found influence of group membership in responses to emotions displayed by others (YABAR et al., 2006; BOURGEOIS & HESS, 2008; VAN DER SCHALK et al., 2011a) and, moreover, support social appraisal theories of emotion. That is because appraisal theories highlight the role of group membership and gaze direction to detect self-relevance in facial expressions and then to account for distinct and adaptive responses to salient social events (SCHERER et al., 2001).

Other findings, not predicted, suggest that at least in competitive contexts people may show emotion toward group members regardless of the other's emotional display. It was found that happiness was shown more often to ingroup members, while disgust and contempt were more frequently displayed to outgroup members, regardless of the condition. Smiles have been considered as a strong affiliation signal (FRIDLUND, 1994), while aversive responses, such as disgust and contempt, may be considered as dominant responses and unfriendly signals (see VAN DER SCHALK et al., 2011a). These findings suggest that group membership not only influence emotional convergence and divergence, but also display of affiliative and non-affiliative emotions in general.

In sum, the present research suggests that, despite a general trend for emotional convergence, social and contextual cues such as group membership and eye direction of the displayer mediate this phenomenon, also producing divergent responses, especially within a competitive context.

Outgroup members may be elicitors of aversive feelings as disgust and contempt and this can be the cause and/or the consequence of prejudice and negative attitudes toward dissimilar people. Further studies may investigate whether these group membership effects would also be found in non-competitive and even affiliative contexts.

Acknowledgements

D.C.M. acknowledges funding from FAPERJ and CNPq. Also, B. M. S. acknowledges support from the CAPES foundation.

Conflict of interest

The authors declare no conflict of interests.

References

ADAMS JR, Reginald B.; KLECK, Robert E. Perceived gaze direction and the processing of facial displays of emotion. **Psychological science**, v. 14, n. 6, p. 644-647, 2003.

ADAMS JR, Reginald B.; KLECK, Robert E. Effects of direct and averted gaze on the perception of facially communicated emotion. **Emotion**, v. 5, n. 1, p. 3, 2005.

BLAIRY, Sylvie; HERRERA, Pedro; HESS, Ursula. Mimicry and the judgment of emotional facial expressions. **Journal of Nonverbal behavior**, v. 23, n. 1, p. 5-41, 1999.

BOURGEOIS, Patrick; HESS, Ursula. The impact of social context on mimicry. **Biological psychology**, v. 77, n. 3, p. 343-352, 2008.

BRUDER, Martin et al. Emotional signals in nonverbal interaction: Dyadic facilitation and convergence in expressions, appraisals, and feelings. **Cognition & emotion**, v. 26, n. 3, p. 480-502, 2012.

EKMAN, Paul; FRIESEN, Wallace V. **Manual for the facial action coding system**. Consulting Psychologists Press, 1978.

EKMAN, Paul; ROSENBERG, Erika L. (Ed.). **What the face reveals: Basic and applied studies of spontaneous expression using the Facial Action Coding System (FACS)**. Oxford University Press, USA, 1997.

EKMAN, P.; FRIESEN, W. V.; HAGER, J. C. Facs manual. **A Human Face**, 2002a.

EKMAN, Paul; FRIESEN, Wallace V.; HAGER, Joseph C. FACS investigator's guide. **A human face**, p. 96, 2002b.

ELFENBEIN, Hillary Anger; AMBADY, Nalini. Is there an in-group advantage in emotion recognition?. 2002.

EPSTUDE, Kai; MUSSWEILER, Thomas. What you feel is how you compare: How comparisons influence the social induction of affect. **Emotion**, v. 9, n. 1, p. 1, 2009.

GREENHOUSE, Samuel W.; GEISSER, Seymour. On methods in the analysis of profile data. **Psychometrika**, v. 24, n. 2, p. 95-112, 1959.

HATFIELD, Elaine; CACIOPPO, John T.; RAPSON, Richard L. Emotional contagion: Cambridge studies in emotion and social interaction. **Cambridge, UK: Cambridge University Press. errors-in-variables regression model when the variances of the measurement errors vary between the observations. Statistics in Medicine**, v. 21, p. 1089-1101, 1994.

HATFIELD, Elaine et al. New perspectives on emotional contagion: A review of classic and recent research on facial mimicry and contagion. **Interpersona**, v. 8, n. 2, p. 159, 2014.

HESS, Ursula; PHILIPPOT, Pierre; BLAIRY, Sylvie. Facial reactions to emotional facial expressions: affect or cognition?. **Cognition & Emotion**, v. 12, n. 4, p. 509-531, 1998.

HESS, Ursula; BLAIRY, Sylvie. Facial mimicry and emotional contagion to dynamic emotional facial expressions and their influence on decoding accuracy. **International journal of psychophysiology**, v. 40, n. 2, p. 129-141, 2001.

HESS, Ursula; ADAMS, Reginald B.; KLECK, Robert E. Looking at you or looking elsewhere: The influence of head orientation on the signal value of emotional facial expressions. **Motivation and Emotion**, v. 31, n. 2, p. 137-144, 2007.

FISCHER, Agneta H. et al. Social functions of emotion. **Handbook of emotions**, v. 3, p. 456-468, 2008.

FRIDLUND, Alan J. **Human facial expression: An evolutionary view**. Academic Press, 2014.

LISHNER, David A.; COOTER, Amy B.; ZALD, David H. Rapid emotional contagion and expressive congruence under strong test conditions. **Journal of Nonverbal Behavior**, v. 32, n. 4, p. 225-239, 2008.

PARKINSON, Brian. Interpersonal emotion transfer: Contagion and social appraisal. **Social and Personality Psychology Compass**, v. 5, n. 7, p. 428-439, 2011.

PARKINSON, Brian et al. Emotion in social relations. **Cultural, group, and interpersonal processes**, 2005.

PUTMAN, Peter; HERMANS, Erno; VAN HONK, Jack. Anxiety meets fear in perception of dynamic expressive gaze. **Emotion**, v. 6, n. 1, p. 94, 2006.

ROSENBERG, Erika L.; EKMAN, Paul. Coherence between expressive and experiential systems in emotion. **Cognition & Emotion**, v. 8, n. 3, p. 201-229, 1994.

SAYETTE, Michael A. et al. A psychometric evaluation of the facial action coding system for assessing spontaneous expression. **Journal of Nonverbal Behavior**, v. 25, n. 3, p. 167-185, 2001.

SACHISTHAL, Maien SM; SAUTER, Disa A.; FISCHER, Agneta H. Mimicry of ingroup and outgroup emotional expressions. **Comprehensive Results in Social Psychology**, v. 1, n. 1-3, p. 86-105, 2016.

SCHERER, Klaus R.; SCHORR, Angela; JOHNSTONE, Tom (Ed.). **Appraisal processes in emotion: Theory, methods, research**. Oxford University Press, 2001.

SOUSSIGNAN, Robert et al. Self-relevance appraisal of gaze direction and dynamic facial expressions: Effects on facial electromyographic and autonomic reactions. **Emotion**, v. 13, n. 2, p. 330, 2013.

SPOOR, Jennifer R.; KELLY, Janice R. The evolutionary significance of affect in groups: Communication and group bonding. **Group processes & intergroup relations**, v. 7, n. 4, p. 398-412, 2004.

TAMIETTO, Marco et al. Unseen facial and bodily expressions trigger fast emotional reactions. **Proceedings of the National Academy of Sciences**, v. 106, n. 42, p. 17661-17666, 2009.

TIEDENS, Larissa Z.; LEACH, Colin Wayne (Ed.). **The social life of emotions**. Cambridge University Press, 2004.

VAN DER SCHALK, Job et al. Convergent and divergent responses to emotional displays of ingroup and outgroup. **Emotion**, v. 11, n. 2, p. 286, 2011a.

VAN DER SCHALK, Job et al. Moving faces, looking places: validation of the Amsterdam Dynamic Facial Expression Set (ADFES). **Emotion**, v. 11, n. 4, p. 907, 2011b.

VAN KLEEF, Gerben A.; FISCHER, Agneta H. Emotional collectives: How groups shape emotions and emotions shape groups. **Cognition and Emotion**, v. 30, n. 1, p. 3-19, 2016.

WEYERS, Peter et al. Modulation of facial reactions to avatar emotional faces by nonconscious competition priming. **Psychophysiology**, v. 46, n. 2, p. 328-335, 2009.

YABAR, Yanelia et al. Implicit behavioral mimicry: Investigating the impact of group membership. **Journal of Nonverbal Behavior**, v. 30, n. 3, p. 97-113, 2006.

IV. GENERAL DISCUSSION

The general objective of the present dissertation was to explore if social and contextual factors moderate distinct emotional vicarious responses. Therefore, our investigation aimed to contribute to a better understanding of empathy in its distinct facets.

Thus, the first article included focused on the influence of interpersonal factors on vicarious emotional reactions to the suffering of others. While studies suggest that familiarity and similarity are interpersonal factors that improve empathy (see PRESTON & DE WAAL, 2002a), the present work is the first, to the best of our knowledge, to explore experimentally distinct effects for these degrees of closeness in moderating experiences of personal distress and compassionate reactions.

Facial expression measures demonstrated a higher frequency of disgust in response to witnessing an unknown than a familiar injured person, with sadness being more displayed when the victim was known rather than a stranger. However, when the victim was similar, levels of disgust were as high as those shown in response to an unknown. In addition, self-reported sadness and concern were higher after seeing an acquainted person in suffering than a stranger, but not when the victim was similar to the observer. Furthermore, eye-tracking measurements showed that participants gazed more time to the face of a known than an unknown person in suffering; physiological responses (measured by pupil size) were higher when witnesses the suffering of a similar acquainted person. Therefore, our work showed that although people tend to respond more compassionately when they witness a similar person in suffering, they also react more aversively to this situation. By contrast, when the victim is just an acquaintance, this healthy distance may favor the evocation of compassionate states without the over arousal that causes experiences of personal distress.

These findings are in accordance with the empathy construct that presumes some level of self-other distinction (LAMM, BATSON, & DECETY, 2007),

which is positively correlated with compassion and prosocial behaviors (VAISH, CARPENTER, & TOMASELLO, 2009; LOCKWOOD, SEARA-CARDOSO, & VIDING, 2014). This mental flexibility (i.e., the capacity to maintain the distinction between self and other) is considered an essential aspect of compassion which depends on some level of emotion regulation (DECETY & MORIGUCHI, 2007). In support of our findings, Gilbert (2009) delineates distress tolerance as a component of compassion, which is defined as the capacity to tolerate negative disturbing emotions in oneself when confronted with someone else's suffering without becoming overwhelmed by them. To conclude, these findings have crucial salutary implications to healthcare professionals, for example, suggesting the need of keeping optimal distances between them and their patients to maintain an effective health service and avoid compassion fatigue.

The second study also explored the effects of contextual and interpersonal factors on reactions to the emotional state of others. However, in this case the focus was not on suffering, but rather on distinct emotions being displayed such as happiness, sadness, anger, and fear. To this end, in this work we investigated, within a competitive context, the influence of social cues (gaze direction and group membership) on responses to emotional displays produced by different persons.

Emotional matching was found both in self-report and facial behavior measures. For instance, participants tended to more frequently facially react with anger to anger displays than with any other emotion; similarly, they reported more fear than any other emotion after seeing fearful faces. However, the social cues included, namely gaze direction and group membership, influenced reactions to emotional displays of others. Displays of averted fear led to more fearful faces than when showed toward the participants' direction. Also, ingroup stimuli led to more convergent reactions to their displays of happiness and sadness than outgroup members. Conversely, displays of happiness were more divergently reacted by sadness and contempt when they were shown by outgroup members. In addition, aversive reactions of disgust and contempt tended to be more shown after seeing fear displayed by outgroup than ingroup members. Our

results also found that regardless of the emotion being displayed, participants tended to demonstrate more happiness to ingroup members and more aversion (contempt and disgust) to outgroup members.

Emotional matching is well documented in emotional contagion literature (see HATFIELD, BENSMANA, THORNTONA, & RAPSON, 2014), and our results replicate these findings. However, we found that social and contextual cues may interfere in convergence of emotions and even produce divergent responses to other's affective displays. These results reproduce some of the earlier studies that found influence of group membership in reaction to emotions displayed by others (YABAR et al., 2006; BOURGEOIS & HESS, 2008; VAN DER SCHALK et al., 2011a) and, therefore, also support social appraisal theories of emotion.

The present work highlights the complexity of processes that may be interconnected in vicarious emotional responses. Despite existing evidence that motor mimicry mechanisms may be involved in emotional convergence, our findings suggest that social and contextual cues also exert an essential influence on the reaction to others' emotional state. This reinforces the need for greater integration between emotional contagion theories, which privilege motor processes as responsible for affective matching, and recent findings suggesting greater cognitive processing underlining vicarious emotional responses. In addition, emotional contagion theorists should include explanations not only about convergence, but also of empirically demonstrated divergent responses to others' emotional displays.

To conclude, we would like to present some potential future research directions. In relation to the first study, research using different measurement types would be useful to better understand the multidimensionality of empathy. Empathy and emotions in general may not only be assessed by self-report, but also through behavioral (e.g., facial expression and gaze behavior), and physiological measures (e.g., heart rate, skin conductance responses, and change in pupil size). Although those components should act coherently in normal circumstances, each of them may better outline a specific aspect of the emotional (or empathic)

phenomenon. One limitation of our study, however, was the lack of a social behavior measure to complement our findings. Further studies should empirically investigate if degree of proximity moderate prosocial behavior as well. Regarding the second study, we propose that future research of emotional convergence may opt for theoretically-based predictions, instead of single-muscle measurements. This methodological choice would prevent loss of emotional data and provide more accurate assessments of emotion from facial expressions.

V. REFERENCES

AMERICAN PSYCHOLOGICAL ASSOCIATION. Ethical principles of psychologists and code of conduct. Retrieved from http://www.apa.org/ethics. 2010.

ADAMS JR, Reginald B.; KLECK, Robert E. Perceived gaze direction and the processing of facial displays of emotion. **Psychological science**, v. 14, n. 6, p. 644-647, 2003.

ADAMS JR, Reginald B.; KLECK, Robert E. Effects of direct and averted gaze on the perception of facially communicated emotion. **Emotion**, v. 5, n. 1, p. 3, 2005.

ANDERSON, Cameron; KELTNER, Dacher; JOHN, Oliver P. Emotional convergence between people over time. **Journal of personality and social psychology**, v. 84, n. 5, p. 1054, 2003.

BATSON, C. D. *The altruism question: Towards a social social–psychological answer.* Hillsdale, NJ: Erlbaum, 1991.

BATSON, C. Daniel. These things called empathy: eight related but distinct phenomena. 2011.

BATSON, C. Daniel et al. Is empathic emotion a source of altruistic motivation?. **Journal of personality and Social Psychology**, v. 40, n. 2, p. 290, 1981.

BERKOWITZ, Leonard; HARMON-JONES, Eddie. Toward an understanding of the determinants of anger. **Emotion**, v. 4, n. 2, p. 107, 2004.

BLAIRY, Sylvie; HERRERA, Pedro; HESS, Ursula. Mimicry and the judgment of emotional facial expressions. **Journal of Nonverbal behavior**, v. 23, n. 1, p. 5-41, 1999.

BOURGEOIS, Patrick; HESS, Ursula. The impact of social context on mimicry. **Biological psychology**, v. 77, n. 3, p. 343-352, 2008.

BRUDER, Martin et al. Emotional signals in nonverbal interaction: Dyadic facilitation and convergence in expressions, appraisals, and feelings. **Cognition & emotion**, v. 26, n. 3, p. 480-502, 2012.

BRUDER, M., FISCHER, A., MANSTEAD, A. S. R. Social appraisal as a cause of collective emotions. In C., von Scheve,M. Salmela, (Eds.), **Collective emotions** (pp. 141-155). New York, NY: Oxford University Press, 2014.

CHARTRAND, Tanya L.; BARGH, John A. The chameleon effect: the perception–behavior link and social interaction. **Journal of personality and social psychology**, v. 76, n. 6, p. 893, 1999.

CRAIG, Kenneth D.; LOWERY, H. Jane. Heart-rate components of conditioned vicarious autonomic responses. **Journal of Personality and Social Psychology**, v. 11, n. 4, p. 381, 1969.

CORDONI, Giada; PALAGI, Elisabetta; TARLI, Silvana Borgognini. Reconciliation and consolation in captive western gorillas. **International Journal of Primatology**, v. 27, n. 5, p. 1365-1382, 2006.

DAVIS, Mark H. et al. A multidimensional approach to individual differences in empathy. 1980.

DECETY, Jean. Introduction: Why Is Empathy So Important?. **Empathy: From bench to bedside**, 2012.

DECETY, Jean. The neural pathways, development and functions of empathy. **Current Opinion in Behavioral Sciences**, v. 3, p. 1-6, 2015.

DECETY, Jean; LAMM, Claus. Empathy versus personal distress: Recent evidence from social neuroscience. **The social neuroscience of empathy**, p. 199-213, 2009.

DECETY, Jean; MORIGUCHI, Yoshiya. The empathic brain and its dysfunction in psychiatric populations: Implications for intervention across different clinical conditions. **BioPsychoSocial Medicine**, v. 1, n. 1, p. 22, 2007.

DE WAAL, Frans BM. Putting the altruism back into altruism: the evolution of empathy. **Annu. Rev. Psychol.**, v. 59, p. 279-300, 2008.

EISENBERG, Nancy; MILLER, Paul A. The relation of empathy to prosocial and related behaviors. **Psychological bulletin**, v. 101, n. 1, p. 91, 1987.

EISENBERG, Nancy; MCCREATH, Heather; AHN, Randall. Vicarious emotional responsiveness and prosocial behavior: Their interrelations in young children. **Personality and Social Psychology Bulletin**, v. 14, n. 2, p. 298-311, 1988.

EISENBERG, Nancy et al. Relation of sympathy and personal distress to prosocial behavior: a multimethod study. **Journal of personality and social psychology**, v. 57, n. 1, p. 55, 1989.

EISENBERG, Nancy; FABES, Richard A. Empathy: Conceptualization, measurement, and relation to prosocial behavior. **Motivation and Emotion**, v. 14, n. 2, p. 131-149, 1990.

EISENBERG, Nancy et al. The relations of emotionality and regulation to dispositional and situational empathy-related responding. **Journal of personality and social psychology**, v. 66, n. 4, p. 776, 1994.

EISENBERG, Nancy; FABES, Richard A.; MURPHY, Bridget C. Parents' reactions to children's negative emotions: Relations to children's social competence and comforting behavior. **Child development**, v. 67, n. 5, p. 2227-2247, 1996.

EISENBERG, Nancy; SPINRAD, Tracy L.; SADOVSKY, Adrienne. Empathy-related responding in children. **Handbook of moral development**, v. 517, p. 549, 2006.

EISENBERG, Nancy; EGGUM, Natalie D. Empathic responding: Sympathy and personal distress. **The social neuroscience of empathy**, v. 6, p. 71-83, 2009.

Eisenberg, N., Spinrad, T. L., & Knafo-Noam, A. (2015). Prosocial development. In M. E. Lamb, R. M. Lerner, M. E. Lamb, & R. M. Lerner

(Eds.), *Handbook of child psychology and developmental science: Vol. 3. Socioemotional processes* (7th ed., pp. 610–656). Hoboken, NJ: Wiley

EKMAN, Paul; FRIESEN, Wallace V. **Manual for the facial action coding system**. Consulting Psychologists Press, 1978.

EKMAN, Paul; ROSENBERG, Erika L. (Ed.). **What the face reveals: Basic and applied studies of spontaneous expression using the Facial Action Coding System (FACS)**. Oxford University Press, USA, 1997.

EKMAN, P.; FRIESEN, W. V.; HAGER, J. C. Facs manual. **A Human Face**, 2002a.

EKMAN, Paul; FRIESEN, Wallace V.; HAGER, Joseph C. FACS investigator's guide. **A human face**, p. 96, 2002b.

EKMAN, Paul. **Emotions revealed: Recognizing faces and feelings to improve communication and emotional life**. Macmillan, 2007.

EKMAN, Paul; CORDARO, Daniel. What is meant by calling emotions basic. **Emotion review**, v. 3, n. 4, p. 364-370, 2011.

ELFENBEIN, Hillary Anger; AMBADY, Nalini. Is there an in-group advantage in emotion recognition?. 2002.

EPSTEIN, Ronald M. et al. Measuring patient-centered communication in patient–physician consultations: theoretical and practical issues. **Social science & medicine**, v. 61, n. 7, p. 1516-1528, 2005.

EPSTUDE, Kai; MUSSWEILER, Thomas. What you feel is how you compare: How comparisons influence the social induction of affect. **Emotion**, v. 9, n. 1, p. 1, 2009.

FELDMAN, Stanley et al. When Empathy Succeeds and Fails: Public Support for Social Welfare Policies. In: **New York Area Political Psychology Workshop, New York, NY May**. 2015.

FISCHER, Agneta H. et al. Social functions of emotion. **Handbook of emotions**, v. 3, p. 456-468, 2008.

GILBERT, P. The compassionate mind: A new approach to facing the challenges of life. **London: Constable Robinson**, 2009.

GOBBINI, M. Ida; HAXBY, James V. Neural systems for recognition of familiar faces. **Neuropsychologia**, v. 45, n. 1, p. 32-41, 2007.

GOETZ, Jennifer L.; KELTNER, Dacher; SIMON-THOMAS, Emiliana. Compassion: an evolutionary analysis and empirical review. **Psychological bulletin**, v. 136, n. 3, p. 351, 2010.

GREENHOUSE, Samuel W.; GEISSER, Seymour. On methods in the analysis of profile data. **Psychometrika**, v. 24, n. 2, p. 95-112, 1959.

GROSS, James J. Emotion regulation: Conceptual and empirical foundations. 2014.

HAIDT, Jonathan et al. The moral emotions. **Handbook of affective sciences**, v. 11, n. 2003, p. 852-870, 2003.

HATFIELD, Elaine; CACIOPPO, John T.; RAPSON, Richard L. Emotional contagion: Cambridge studies in emotion and social interaction. **Cambridge, UK: Cambridge University Press. errors-in-variables regression model when the variances of the measurement errors vary between the observations. Statistics in Medicine**, v. 21, p. 1089-1101, 1994.

HATFIELD, Elaine et al. New perspectives on emotional contagion: A review of classic and recent research on facial mimicry and contagion. **Interpersona**, v. 8, n. 2, p. 159, 2014.

HESS, U. et al. Do people mimic what they see or what they know? Facial mimicry revisited. In: **37th Annual Meeting of the Society for Psychophysiological Research, Cape Cod, MA, October**. 1997. p. 15-19.

HESS, Ursula; PHILIPPOT, Pierre; BLAIRY, Sylvie. Facial reactions to emotional facial expressions: affect or cognition?. **Cognition & Emotion**, v. 12, n. 4, p. 509-531, 1998.

HESS, Ursula; BLAIRY, Sylvie. Facial mimicry and emotional contagion to dynamic emotional facial expressions and their influence on decoding accuracy. **International journal of psychophysiology**, v. 40, n. 2, p. 129-141, 2001.

HESS, Ursula; ADAMS, Reginald B.; KLECK, Robert E. Looking at you or looking elsewhere: The influence of head orientation on the signal value of emotional facial expressions. **Motivation and Emotion**, v. 31, n. 2, p. 137-144, 2007.

HESS, Ursula; FISCHER, Agneta. Emotional mimicry: Why and when we mimic emotions. **Social and Personality Psychology Compass**, v. 8, n. 2, p. 45-57, 2014.

HOCHBERG, Yosef. A sharper Bonferroni procedure for multiple tests of significance. **Biometrika**, v. 75, n. 4, p. 800-802, 1988.

HOFFMAN, Martin L. **Empathy and moral development: Implications for caring and justice**. Cambridge University Press, 2000.

KHALIL, Elias L. Similarity versus familiarity: When empathy becomes selfish. **Behavioral and Brain Sciences**, v. 25, n. 1, p. 41-41, 2002.

KELLY, Janice R.; IANNONE, Nicole E.; MCCARTY, Megan K. The function of shared affect in groups. **Collective emotions. Perspectives from psychology, and sociology**, p. 175-188, 2014.

KELTNER, Dacher; GROSS, James J. Functional accounts of emotions. **Cognition & Emotion**, v. 13, n. 5, p. 467-480, 1999.

KITAYAMA, Shinobu; MASUDA, Takahiko. Reappraising cognitive appraisal from a cultural perspective. **Psychological Inquiry**, v. 6, n. 3, p. 217-223, 1995.

KOSKI, Sonja E.; STERCK, Elisabeth HM. Triadic postconflict affiliation in captive chimpanzees: does consolation console?. **Animal Behaviour**, v. 73, n. 1, p. 133-142, 2007.

KROENKE, Kurt; SPITZER, Robert L.; WILLIAMS, Janet BW. The phq-9. **Journal of general internal medicine**, v. 16, n. 9, p. 606-613, 2001.

LAMM, Claus; BATSON, C. Daniel; DECETY, Jean. The neural substrate of human empathy: effects of perspective-taking and cognitive appraisal. **Journal of cognitive neuroscience**, v. 19, n. 1, p. 42-58, 2007.

LEACH, Colin Wayne; IYER, Aarti; PEDERSEN, Anne. Anger and guilt about ingroup advantage explain the willingness for political action. **Personality and Social Psychology Bulletin**, v. 32, n. 9, p. 1232-1245, 2006.

FRIDLUND, Alan J. **Human facial expression: An evolutionary view**. Academic Press, 2014.

LEVENSON, R. W. Human emotion: A functional view. In. P. Ekman & RJ Davidson (Eds.), The nature of emotion: Fundamental questions (pp. 123–126). **Hillsdale, NJ: Erlbaum. Levenson, RW (1999). Intrapersonal functions of emotion. Cognition and Emotion**, v. 13, p. 481504, 1994.

LISHNER, David A.; COOTER, Amy B.; ZALD, David H. Rapid emotional contagion and expressive congruence under strong test conditions. **Journal of Nonverbal Behavior**, v. 32, n. 4, p. 225-239, 2008.

LOCKWOOD, Patricia L.; SEARA-CARDOSO, Ana; VIDING, Essi. Emotion regulation moderates the association between empathy and prosocial behavior. **PloS one**, v. 9, n. 5, p. e96555, 2014.

LOTZ, Sebastian et al. Punitive versus compensatory reactions to injustice: Emotional antecedents to third-party interventions. **Journal of Experimental Social Psychology**, v. 47, n. 2, p. 477-480, 2011.

MCCALL, Cade et al. Compassion meditators show less anger, less punishment, and more compensation of victims in response to fairness violations. **Frontiers in behavioral neuroscience**, v. 8, p. 424, 2014.

MOODY, Eric J. et al. More than mere mimicry? The influence of emotion on rapid facial reactions to faces. **Emotion**, v. 7, n. 2, p. 447, 2007.

NAJJAR, Nadine et al. Compassion fatigue: A review of the research to date and relevance to cancer-care providers. **Journal of Health Psychology**, v. 14, n. 2, p. 267-277, 2009.

NUSSBAUM, Martha. Compassion: The basic social emotion. **Social Philosophy and Policy**, v. 13, n. 1, p. 27-58, 1996.

PARKINSON, Brian. Interpersonal emotion transfer: Contagion and social appraisal. **Social and Personality Psychology Compass**, v. 5, n. 7, p. 428-439, 2011.

PARKINSON, Brian et al. Emotion in social relations. **Cultural, group, and interpersonal processes**, 2005.

PARKINSON, Brian; MANSTEAD, Antony SR. Current emotion research in social psychology: Thinking about emotions and other people. **Emotion Review**, v. 7, n. 4, p. 371-380, 2015.

PARKINSON, Brian; SIMONS, Gwenda. Worry spreads: Interpersonal transfer of problem-related anxiety. **Cognition & emotion**, v. 26, n. 3, p. 462-479, 2012.,

PRESTON, Stephanie D.; DE WAAL, Frans BM. Empathy: Its ultimate and proximate bases. **Behavioral and brain sciences**, v. 25, n. 1, p. 1-20, 2002a.

PRESTON, Stephanie D.; DE WAAL, Frans BM. The communication of emotions and the possibility of empathy in animals. **Altruistic love: Science, philosophy, and religion in dialogue**, p. 284-308, 2002b.

PUTMAN, Peter; HERMANS, Erno; VAN HONK, Jack. Anxiety meets fear in perception of dynamic expressive gaze. **Emotion**, v. 6, n. 1, p. 94, 2006.

REDELMEIER, Donald A.; MOLIN, Jean-Pierre; TIBSHIRANI, Robert J. A randomised trial of compassionate care for the homeless in an emergency department. **The Lancet**, v. 345, n. 8958, p. 1131-1134, 1995.

ROSENBERG, Erika L. et al. Intensive meditation training influences emotional responses to suffering. **Emotion**, v. 15, n. 6, p. 775, 2015.

ROSENBERG, Erika L.; EKMAN, Paul. Coherence between expressive and experiential systems in emotion. **Cognition & Emotion**, v. 8, n. 3, p. 201-229, 1994.

SACHISTHAL, Maien SM; SAUTER, Disa A.; FISCHER, Agneta H. Mimicry of ingroup and outgroup emotional expressions. **Comprehensive Results in Social Psychology**, v. 1, n. 1-3, p. 86-105, 2016.

SANGHAVI, Darshak M. What makes for a compassionate patient-caregiver relationship?. **Joint Commission journal on quality and patient safety**, v. 32, n. 5, p. 283-292, 2006.

SAYETTE, Michael A. et al. A psychometric evaluation of the facial action coding system for assessing spontaneous expression. **Journal of Nonverbal Behavior**, v. 25, n. 3, p. 167-185, 2001.

SMITH, Craig A. et al. Emotion and adaptation. **Handbook of personality: Theory and research**, p. 609-637, 1990.

SACHISTHAL, Maien SM; SAUTER, Disa A.; FISCHER, Agneta H. Mimicry of ingroup and outgroup emotional expressions. **Comprehensive Results in Social Psychology**, v. 1, n. 1-3, p. 86-105, 2016.

SCHERER, Klaus R. On the nature and function of emotion: A component process approach. **Approaches to emotion**, v. 2293, p. 317, 1984.

SCHERER, Klaus R. Studying the emotion-antecedent appraisal process: An expert system approach. **Cognition & Emotion**, v. 7, n. 3-4, p. 325-355, 1993.

SCHERER, Klaus R.; SCHORR, Angela; JOHNSTONE, Tom (Ed.). **Appraisal processes in emotion: Theory, methods, research**. Oxford University Press, 2001.

SOUSSIGNAN, Robert et al. Self-relevance appraisal of gaze direction and dynamic facial expressions: Effects on facial electromyographic and autonomic reactions. **Emotion**, v. 13, n. 2, p. 330, 2013.

STRAYER, Janet; ROBERTS, William. Empathy and observed anger and aggression in five-year-olds. **Social Development**, v. 13, n. 1, p. 1-13, 2004.

STRAUSS, Clara et al. What is compassion and how can we measure it? A review of definitions and measures. **Clinical psychology review**, v. 47, p. 15-27, 2016.

SPITZER, Robert L. et al. A brief measure for assessing generalized anxiety disorder: the GAD-7. **Archives of internal medicine**, v. 166, n. 10, p. 1092-1097, 2006.

SPOOR, Jennifer R.; KELLY, Janice R. The evolutionary significance of affect in groups: Communication and group bonding. **Group processes & intergroup relations**, v. 7, n. 4, p. 398-412, 2004.

STILLWELL, Arlene M.; BAUMEISTER, Roy F.; DEL PRIORE, Regan E. We're all victims here: Toward a psychology of revenge. **Basic and Applied Social Psychology**, v. 30, n. 3, p. 253-263, 2008.

STRACK, Fritz; MARTIN, Leonard L.; STEPPER, Sabine. Inhibiting and facilitating conditions of the human smile: a nonobtrusive test of the facial feedback hypothesis. **Journal of personality and social psychology**, v. 54, n. 5, p. 768, 1988.

STRAUSS, Clara et al. What is compassion and how can we measure it? A review of definitions and measures. **Clinical psychology review**, v. 47, p. 15-27, 2016.

TAMIETTO, Marco et al. Unseen facial and bodily expressions trigger fast emotional reactions. **Proceedings of the National Academy of Sciences**, v. 106, n. 42, p. 17661-17666, 2009.

TIEDENS, Larissa Z.; LEACH, Colin Wayne (Ed.). **The social life of emotions**. Cambridge University Press, 2004.

VAISH, Amrisha; CARPENTER, Malinda; TOMASELLO, Michael. Sympathy through affective perspective taking and its relation to prosocial behavior in toddlers. **Developmental psychology**, v. 45, n. 2, p. 534, 2009.

VAN DER SCHALK, Job et al. Convergent and divergent responses to emotional displays of ingroup and outgroup. **Emotion**, v. 11, n. 2, p. 286, 2011a.

VAN DER SCHALK, Job et al. Moving faces, looking places: validation of the Amsterdam Dynamic Facial Expression Set (ADFES). **Emotion**, v. 11, n. 4, p. 907, 2011b.

VAN DOORN, Janne; ZEELENBERG, Marcel; BREUGELMANS, Seger M. Anger and prosocial behavior. **Emotion Review**, v. 6, n. 3, p. 261-268, 2014.

VAN KLEEF, Gerben A.; FISCHER, Agneta H. Emotional collectives: How groups shape emotions and emotions shape groups. **Cognition and Emotion**, v. 30, n. 1, p. 3-19, 2016.

VERBOSKY, Sandra Janashak; RYAN, Deborah A. Female partners of Vietnam veterans: Stress by proximity. **Issues in Mental Health Nursing**, v. 9, n. 1, p. 95-104, 1988.

VISTED, Endre et al. The association between self-reported difficulties in emotion regulation and heart rate variability: the salient role of not accepting negative emotions. **Frontiers in psychology**, v. 8, p. 328, 2017.WONDRA, Joshua D.; ELLSWORTH, Phoebe C. An appraisal theory of empathy and other vicarious emotional experiences. **Psychological Review**, v. 122, n. 3, p. 411, 2015.

WEYERS, Peter et al. Modulation of facial reactions to avatar emotional faces by nonconscious competition priming. **Psychophysiology**, v. 46, n. 2, p. 328-335, 2009.

WONDRA, Joshua D.; ELLSWORTH, Phoebe C. An appraisal theory of empathy and other vicarious emotional experiences. **Psychological Review**, v. 122, n. 3, p. 411, 2015.

YABAR, Yanelia et al. Implicit behavioral mimicry: Investigating the impact of group membership. **Journal of Nonverbal Behavior**, v. 30, n. 3, p. 97-113, 2006.