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Final Dissertation

Impact of the emotional states of anger versus sadness in social categorization of partners in a trust game task.

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ABSTRACT

The main goal of this project is to examine whether the emotional states of anger and sadness differentially impact the use of individuation and social categorization strategies when making inferences about unknown individuals using the Trust Game. After interacting with different black and white individuals in a multi-round Trust Game (those from one ethnic group being cooperative in 75% of the times, and those from the other ethnic group only in 25% of the times), this design displayed opposite patterns of cooperation between the two ethnic groups. Then, participants interacted with new individual from both ethnic groups in an induced emotional state of either anger, sadness or neutral, all individuals were cooperative 50% of the time. We expected anger to facilitate categorical processing of new individuals (i.e., participants cooperating or not with them according to whether their group was cooperative or not as a whole in the learning phase), whereas sadness was expected to facilitate individuation (i.e., participants cooperating or not with the new individuals independently of the cooperation rate of their groups in the learning phase). Our data did not confirm these hypotheses suggesting that negative emotions may not impact our behaviors in an interpersonal context.

Keywords: social perception, impression formation, categorization, individuation

1. INTRODUCTION

Humans are born and grow up in a dynamic and changing environment, characterized by events that interact in a complex manner. These events, which are sometimes perceived as chaotic, are integrated and processed through our neurocognitive systems, some beyond our conscious reasoning, and some of them not; converting noise-filled data into useful information that will shape our minds and behaviors becomes critical to adapt to this dynamic and changing environment.

For this purpose, humans have developed specialized systems of perception and interpretation, whose final purposes would be the categorization of new information, and in some cases, the updating of previous knowledge by integrating new data in our memory systems (Kawakami, Amodio, Hugenberg, 2017). These processes would allow the generation of patterns, through which we create a representation of the surrounding world. This representation facilitates the organization and classification of the events that occur around us, as well as the people and things that compose them.

In the context of social cognition, the ability to recognize and process new information from the environment is essential for developing and maintaining interpersonal relationships in different social contexts. For instance, a work context would be different from a less formal one like meeting up with friends. The information to be integrated in each context would include different social rules, perceived hierarchies, specific codes of behavior, etc.; and those variables would affect the way we generate first impressions about the people we just meet.

These mechanisms, opposite to individuation, are often referred to as social categorization processes, and have been explained from a continuum (Fiske, Lin, & Neuberg, 1999): on one end, a category-based strategy would be activated, based on the use of heuristics; whereas in the other end, with enough subjective motivation, a detail-oriented individuation strategy would be used.

1.1. Categorization and Individuation as social perception strategies in interpersonal contexts

The continuum model represents a series of possible events that would be carried out according to specific circumstances. Fiske et al. (1999) explains it as an algorithm, in which the process begins with the encounter between the perceiver and a target. At which point, the initial categorization takes place, and, depending on the purposes of the interaction and perceiver's motivation the algorithm's steps could change.

This first categorization consists of making inferences by using information about a target, regarding the social groups they might belong to. Gender, age and ethnicity are

some of the parameters people use to classify targets into groups, to a large extent because those particular features are perceptually obvious (Fiske & Neuberg, 1990). Then, this information is compared with the one that has been previously stored in our memory, based on previous experiences or information with people from that social group (Stangor et al., 1992). In general, these processes have been described under the label of "implicit social cognition" (Greenwald & Lai, 2020), because they occur outside the awareness of the perceiver, and are usually activated by default during first impressions, at least in cases where there is no more information to use.

This mechanism integrates bottom-up and top-down processes. The first type encodes sensory information, it would be skin color, facial expressions, tone of voice or body posture (Stangor et al., 1992). These data are quickly encoded, but most of the time the bottom-up processes occurs in interaction with individual expectations and personal experiences, i.e., top-down type process (Kunda & Thagard, 1996). Then, the person would be identified according to social categories, for example: young or adult, white or black, male or female, etc. To carry out this last step, the activation of associations between the different groups is required (Kawakami et al., 2017), through the use of stereotypes and prejudices.

Our expectations could be modified as a result of incorporating new information, resulting in a recategorization of the target. This would depend on the relevance of the situation, and the person with whom we are interacting; in this case, the individual will need more attentional resources (Fiske & Neuberg, 1990). This occurs when the initial categorization is considered insufficient and the perceiver redirects their attention in order to focus on more specific details. At first, during the categorization processes, it is established whether the newly obtained information is consistent with the first impressions. When it is not the case, this new information is integrated to form subcategories, or new social categories. If necessary, when the formation of subcategories or new categories is unsuccessful a complete individuation is facilitated (Fiske et al., 1999). It is important to highlight that these steps do not follow a serial process, instead the whole event is a dynamic integrating process that could stop at any stage of the continuum if the result is satisfactory (Fiske & Neuberg, 1990).

An important aspect that facilitates the use of additional attentional resources, especially necessary during detail-oriented individuation strategy, is the perceiver's motivation (Fiske et al., 1999; Hugenberg et al., 2010). This aspect would influence impression formations when a given situation and the target characteristics have personal relevance for the perceiver (Fiske & Neuberg, 1990; Riley & Fiske, 1991). In addition, if we include discrete emotions in this interaction, we will find that these two variables are crucial for social perception (Hugenberg et al., 2010; Telga et al., 2019),

they could facilitate either a category-based strategy or a detail-oriented individuation strategy during impression formations.

1.2. Emotional States as modulators of social perception strategy

Considering discrete emotions from an evolutionary point of view each one of them has developed different coping mechanisms (Angie et al., 2011), which would influence the perceiver's motivation, and the cognitive and behavioral responses. In general, emotions could be defined as processes focused on immediate events, which elicit specific mechanisms based on the relevance of the stimulus. These mechanisms involve physiological and motivational changes, changes in facial expression, and of course changes in subjective feelings (Brosch et al., 2013). In turn, these mechanisms interact with the continuous evaluation of the situation, a process that is influenced by subjective aspects such as individual needs, social values acquired during development, personal beliefs, etc. This process is known as *appraisal*.

Specifically, when we talk about appraisal, we refer to the interpretation that underlies the elicitation of an emotion (Brosch, et al., 2013). It should be emphasized that, generating an interpretation would require the activation of cognitive processes such as attentional and memory systems. In this sense, there would be interdependence between emotional states and cognitive functions (Forgas, 1995), i.e., if an event is relevant to the individual, and elicits a specific emotion, attention is likely to be drawn to the particular characteristics of the event (Siemer et al., 2007). This in turn, would activate the information stored in our memory related to that particular event; also depending on the arousal increase, described as the intensity in terms of autonomic responses (McGaugh, 2000). This possibility of directing and facilitating cognitive resources would be in relation to the valence attributed to the emotional state, i.e., whether an emotion is considered positive or negative.

Additionally, and in the specific framework that concerns us, it has been observed that there is a dependence between the certainty or uncertainty appraisal of the situation that elicits the emotional state and the choice between a strategy based on heuristics or a more individualized one (Tiedens & Linton, 2001). Specifically, when there is greater certainty about the event, the need to reassess the situation is reduced and strategies based on categorization rather than individuation would be used. Otherwise, in situations that are considered uncertain, the feeling of lack of control in the individual would increase, generating a detail-oriented individuation strategy (Telga, 2019).

Thus, it has been found that sadness facilitates a detail-oriented strategy during social perception, mainly because this emotional state motivates the perceiver to slowly

reanalyze the situation, in order to recategorize the events by updating the information (Wenzlaff, Wegner, & Roper, 1988), while anger would evoke behaviors and decisions to be executed quickly, based on the urgency it motivates (Scott, 1980), therefore, the responses would be based on a category-based strategy.

Now, in an interpersonal context, in addition to the aforementioned factors underlying the emotional state of individuals, another variable would come into play: trust (Telga et al., 2019). Trust has been considered an important feature in the social domain (Dunning et al, 2014), and several studies have investigated the processes of categorization and individuation in the context of trust (e.g., Cañadas et al., 2015; Telga et al., 2019). It is also important to note that different emotions could modulate the level of trust or rejection (Keltner & Haidt, 1999).

1.3. Interaction between Trust and Emotional States

Trust has been described under two differentiated dimensions: affective trust and cognitive trust (Lee & Selart, 2011). In the first case, emotional states would be directly involved, while in the second, two routes of interaction between emotional and cognitive aspects have been proposed (Forgas, 1995). On the one hand, the information coming from emotional states would serve as a heuristic cue on whether or not to trust the other person; there would be no need for more detailed information (Clore & Gasper, 2001). Alternatively, there would be another route by which the individual activates systems of selective attention, encoding, and retrieval of the information associated with the target and the situation in order to make the trust decision (Forgas, 1995; Forgas, 2001).

Both routes would be important in a situation where there is zero acquaintance with the target. In such a scenario, the level of certainty would be low, which, as we have mentioned, would influence the behavioral and cognitive responses. This proposal is similar to the continuum model proposed by Fiske et al. (1999), since both highlight two opposites dimensions as the foundations of information processing: on the one hand an implicit processing, based on heuristics, and on the other, a more analytical detail-oriented processing. What is more, as the emotional valence could influence how the individual assesses the situation, this would affect the trust decisions they could make (Dunn & Schweitzer, 2005). On this basis, it could be suggested that different emotions influence in different ways trust decisions depending on the appraisal process. Following this argument, it has been proposed that by complementing emotional induction procedures with trust-based decision-making tasks it could be analyzed whether there would be differences between different emotional states and the strategies used in social

perception processes (e.g., Cañadas et al., 2015; Telga, et al., 2019) during first impressions.

One of the tasks that has been extensively used to investigate trust decisions is the Trust Game (e.g., Telga, et al., 2019). This economic game involves two players (Telga et al. 2018): the trustor and the trustee. In a first stage, the trustor, i.e., the participant in the experiment, has a certain amount of money, and must decide whether or not to share it with the trustee, i.e., the shown face in the screen. Three outcomes are possible: a) the participant does not cooperate, thus receiving the minimal amount, b) the participant decides to cooperate, and the partner too, the participant receiving the maximum amount, and c) the participant cooperates but the partner is not reciprocal, therefore the participant receiving nothing and the partner keeping the maximum amount.

Based on this framework, we proposed this research project, which aims to examine whether the emotional states of anger and sadness differentially impact the use of individuation and social categorization strategies when making inferences about unknown individuals using the Trust Game. For this purpose, we will replicate the experimental series conducted by Telga et al. (2019), in which, the impact of sadness and anger on first impressions was explored. The researchers used social categories based on ethnicity, Blacks vs. Whites, and associated each one of them with a particular cooperation tendency. One group sometimes showed cooperative and the other non-cooperative behavior in a learning phase. This cooperative behavior produced specific expectations in the participants, which were examined through the level of trust that motivates the participants to cooperate or not to cooperate with new individuals of the same groups after an emotional induction procedure.

To accomplish this, we proposed two specific aims: 1) to analyze how the strategies of categorization and individuation influence the generation and updating of information during the process of social perception in the context of interpersonal decisions; and 2) to examine the impact of induced transient emotional states over the use of learned interpersonal categories on social perception of unknown individuals in a context of interpersonal decisions. Similar to the experiment to be replicated, this one will be divided into 4 phases: baseline, learning, induction and transfer. There will be three experimental groups, who will only differ in the last two phases: anger, sadness and neutral (control group).

Finally, we had the following pre-registered hypotheses (https://osf.io/8ry5a): a) Anger-induced participants will use a categorization strategy using heuristics, based on previously learned categories, therefore they will show a higher rate of cooperation in the transfer phase with partners of the ethnic group categorized as cooperative, as

compared to non-cooperative, in the learning phase, and b) Participants induced with sadness will use an analytical, detail-focused strategy, by adapting their strategy and focus on new behaviors, therefore, they will not show a significant difference in cooperation rate between the two ethnic groups in the transfer phase.

2. METHOD AND DESIGN

2.1. Participants

The participants were students of the University of Granada. The call was made through the university e-mail. They received an economic compensation according to their accuracy in the task, between 3 and 8 euros (€ 5.39 on average). The project was approved by the local ethical committee, code: 2442/CEIH/2021, as part of a larger research project.

To obtain the sample size, we used the effect size of the difference between the groups induced with sadness vs. anger on the categorization index (obtained from the difference between the cooperation rate of the equitable group and the non-equitable group) in the transfer phase, from the experiment to be replicated. Subsequently, the size was calculated with the following parameters: Cohen's d = 0.446 (small), $\alpha = 0.05$, Power = 0.80. The results were: total sample size = 126 (63 per group), critical t = 1.657, df = 124.

Therefore, it was decided to work with a total of 200 participants, 64 for each experimental group (sadness, anger and neutral condition) so that a counterbalanced design can be maintained during the task. Eight additional individuals will be called to anticipate data loss. Given that data collection has not finished by the moment in which this report needs to be handed, data from 168 subjects are reported, 56 per condition, 122 female (mean age: 22.24, sd: 3.46).

2.2. Stimuli and Materials

For the data collection and stimuli presentation we used E-Prime software, and for data analysis the development environment RStudio. The packages used were: “rstatix”, “ggpubr”, “tidyverse”, and “rptfm” this last one was developed specifically for this project[1]. For the Trust Game we used 64 images, 32 white and 32 black individuals, with neutral expressions, 16 were women in each ethnic group. The images were obtained from the Chicago Database (Ma, Correl, & Wittehnbrink, 2015).

[1] https://github.com/ezrp/R

For the induction phase we used images obtained from the International Affective Pictures System database (IAPS, Lang, Bradley, & Cuthbert, 2005). As in Telga et al. (2019), we used the same 10 pictures of negative valence for anger and sadness conditions, and 10 different pictures for the neutral induction. Each image was presented with a short description of its content, to facilitate the contextualization of the specific emotion we wanted to induce, therefore anger and sadness conditions had different descriptions for the same pictures (see one example in Annex A). In addition, we also included auditory stimuli, for the anger group, the piece by composer Igor Stravinsky, Sacrificial Dance, from *Rite of Spring* (Stravinsky, 1913); for the sadness group the piece Adagio by composer Johann Sebastian Bach, from Piano Concerto No 1, BWV 1052 (Bach, 1734); and for the control group (neutral emotion), the sound of a forest (FreeAudioMusic, n.d.).

To determine whether the induction was successful, we used the Mood Rating Scale (Escala de Valoración de Estados de Ánimo, EVEA, Sanz, Gutiérrez, & García-Vera, 2014), which measures transient emotional states in induction procedures using 16 Likert type items. Also the Self-Assessment Mannequin questionnaire (SAM, Bradley & Lang, 1994) was used, which assesses two dimensions of emotional states, arousal and valence. Participants filled both questionnaires at three points in time, before and after induction, and at the end of the experiment. After the experiment, participants also completed the State-Trait Anxiety Inventory (STAI, Spielberg, Gorsuch, & Lushene, 2008), the Beck Depression Inventory II (BDI II, Sanz, Navarro, & Vázquez, 2003), and the State-Trait Anger Expression Inventory 2 (STAXI-II, Spielberger, 1999). With these scales it was possible to analyze the variability between experimental groups regarding depressive, anxious and anger-related traits. The Social Desirability Scale (SDS, Ferrando & Chico, 2000) was also used, to determine whether the participants were aware of the objectives of this study.

We also included two scales to measure the variability of racism prejudice that could be between the experimental groups, the Spanish version of the Modern Racism Scale (MRS, Navas, 1998), and the Spanish version of the Symbolic Racism Scale (SRS, Martínez & Vera, 1994). These scales were sent by email, after the experimental tasks.

2.3. Procedure

As mentioned above, the experiment was divided into four phases: baseline, learning, induction and transfer, organized as shown in Figure 1. In the baseline all game partners showed cooperative behaviors 50% of the time. They were divided according

to ethnicity: 16 Black, 16 White. Within each ethnic group, 50% of the partners were female.

Subsequently, in the learning phase, the same game partners presented during the baseline were again presented, but in this case we manipulated the partners' tendency to cooperate at the group and the individual levels. The two ethnic groups were associated with opposite behaviors, sometimes the Whites cooperated most of the time, and sometimes the Blacks. For instance, 12 black partners (75%) displayed a cooperative behavior, while the other 4 (25%) displayed a non-cooperative behavior, thus showing a consistent and inconsistent pattern of cooperation, respectively; and, following the same example, white partners displayed the opposite cooperation tendency, 12 of them being non-cooperative (consistent), and 4 of them being cooperative (inconsistent). This was done to analyze the strategies used by the participants to make impressions of their partners. Thus, participants using a strategy based on categorization would be expected to cooperate similarly with consistent and inconsistent partners. Whereas those using an individualized strategy should update their knowledge and cooperate according to the partner's individual consistency, not in function of their ethnicity. Group behavior, i.e., whether Whites or Blacks associated with the cooperative behavior, and the specific faces associated with the consistent vs. inconsistent condition were counterbalanced across participants.

In the induction phase we induced anger, sadness and neutral emotional states using photographs with descriptions of their content that helped participants to contextualize the relevant information, according to their induction group. For the conditions of anger and sadness, we used the same photographs but with different descriptions, and accompanied by different music previously tested as appropriate to induce the corresponding mood state (Telga, 2019). These are proven induction resources (see Siedlecka & Denson, 2019), used in different studies, for example: using visual stimuli like pictures with emotional or neutral content (e.g., Lobbestael, Arntz, & Wiers, 2008), and auditory stimuli such as songs and sounds (e.g., Seidel & Prinz, 2013). Another feature of emotions that has been studied is the incidental characteristic which refers to the possibility of transferring the emotional state from one situation to another (Siedlecka & Denson, 2019), in this case from the induction to the transfer phase.

This phase was preceded by an assessment of participants' emotional states using the EVEA and SAM questionnaires. At the end of this phase, participants answered again the questionnaires.

The last phase was the transfer phase, similar to the baseline, with all partners showing a cooperation rate of 50%. However, and importantly only new partners (of the same social categories) will be shown, with whom the participants have no previous

experience: 16 whites and 16 blacks, of which half of each group was female. Each partner was presented twice, once being cooperative and once not cooperative. It is important to take into account that participants of each experimental group performed the task of this phase in the induced emotional state, using the category learned in the learning phase as a reference to make the decision. Therefore, the aim of the transfer phase is to determine whether the anger- and sadness-induced participants differ according to cooperation rate with the new partners of the cooperative vs. non-cooperative category of the learning phase. If participants categorize the new partners, they should cooperate with them according to the learned associations during the learning phase. However, if they individuate their partners, they should show no difference in their cooperation between the two categories. We expected that the anger group used a categorization strategy, so a statistically significant difference in cooperation rate should have been observed between the groups that were set as cooperative and non-cooperative during the learning phase. On the other hand, the sadness-induced group is should have used an individualized strategy, therefore showing no difference in their cooperation with the aforementioned groups.

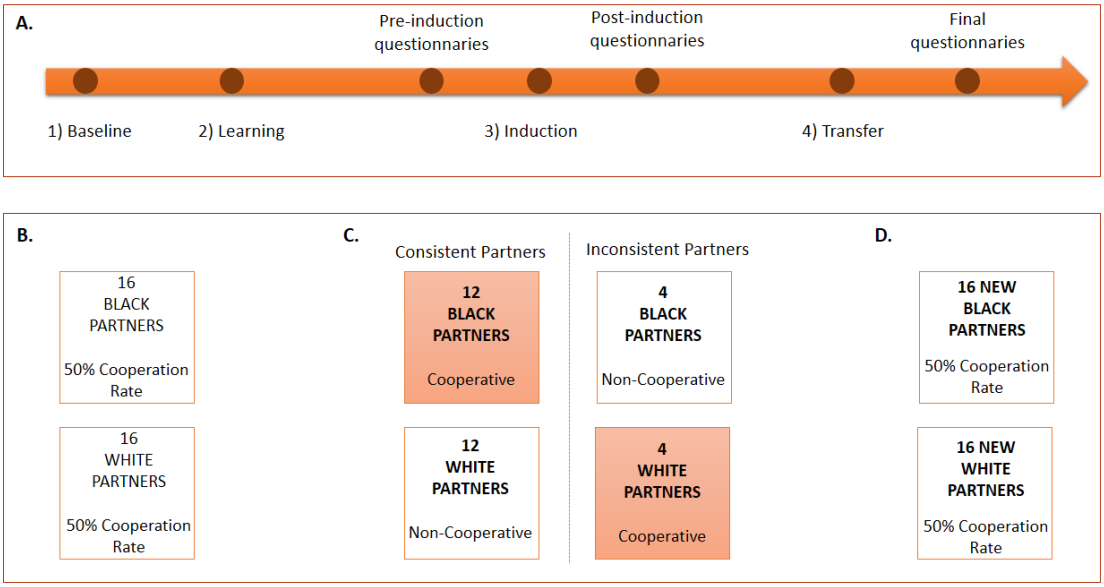

Figure 1. Experimental procedure and examples of experimental conditions. General procedure (A), example baseline phase (B), learning phase with examples of conditions if Black partners were cooperative most of the time (C), and example transfer phase (D). Based on Telga (2019, p. 252, Fig. 7.1).

Figure 2 represents the timeline of one Trust Game trial, they had to press “1” to cooperate or press “0” to not cooperate. The possible outcomes displayed in the feedback slide were: a) “You have cooperated and your partner has also cooperated.

You have €2.50", b) "You have cooperated and your partner has not cooperated. You have €0, and c) "You have not cooperated. You have €1".

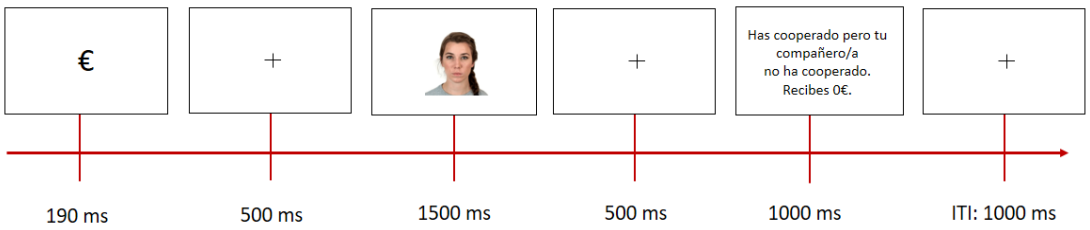

Figure 2. Timeline of one Trust Game trial. Example of feedback in case the partner does not reciprocate sending half of the money back to the participant. Based on the task used in Telga et al., (2019).

Finally, after transfer phase, participants filled the EVEA, SAM, STAIR, STAXI-II, BDS, MRS, SRS questionnaires. The method and plan of analyses were pre-registered at https://osf.io/8ry5a.

3. RESULTS

3.1. Baseline Phase

We performed a univariate mixed-design analysis of variance (ANOVA) on cooperation rate. No significant main effect regarding Partner Ethnicity (black vs. white) was observed, $F(1, 167) = 0.78$, $p = .379$, $\eta^2_p = .005$. Also, there were not significant between-group differences, neither regarding the main effect of induction $F(2, 165) = 1.56$, $p = .212$, $\eta^2_p = .002$, nor in the Partner Ethnicity x Induction interaction, $F(2, 165) = .005$, $p = .995$, $\eta^2_p < .001$. This indicated that at baseline, there was no bias on the cooperation rates regarding the partner's ethnic group. We also decided to perform a Bayesian ANOVA to evaluate the absence of effect (Annex H, Table 2), we found that is 5.79 more likely to have no effect than to have an effect.

3.2. Learning Phase

Similarly to Telga et al. (2019), data from the 4 blocks of 128 trials were used to analyze the learning. A repeated-measure ANOVA was performed on cooperation rates with group behavior (cooperative vs. non-cooperative), consistency (consistent vs. inconsistent), and blocks (2-5), as within-participants variables. The three way Group Behavior x Consistency x Block interaction was significant $F(3, 501) = 23.92$, $p < .001$, $\eta^2_p = .125$, indicating that participants changed their cooperation pattern across blocks

according to partners behavior and their consistency. In this phase we also checked for between-group differences. Neither the Induction x Group Behavior x Consistency x Block, *F(*6, 495*)* = 0.22, *p* = .97, η^2_p = .003, nor the Group Behavior x Consistency x Induction, *F(*2, 165*)* = 0.10, *p* = .90, η^2_p = .001, interactions were significant, suggesting that learning process was similar in the three experimental groups.

As can be observed in Figure 3, a clearly significant Group Behavior x Block interaction was observed for consistent partners, *F(3, 501)* = 51.20, *p* < .001, η^2_p = .235, with the difference between cooperative and non-cooperative partners growing across blocks. Although this difference did not revert for inconsistent partners, the differences did not grow across blocks as with consistent one (see Annex B). Thus, mixture between categorization and individuation seems to have occurred in the learning phase.

To verify this pattern was clear just before the induction, we examined the data in Block 5. A significant Group Behavior x Consistency interaction was observed, *F*(1, 167) = 104.41, *p* < .001, η^2_p = .385. In this case there was no difference between groups either, as the Group Behavior x Consistency x Induction interaction was not significant, *F*(2, 165) = 0.039, *p* = .961, η^2_p < .001. In the specific analysis of the last block we found a significant difference in cooperation between cooperative and non-cooperative partners when they were consistent, *F*(1, 167) = 175.70, *p* < .001, η^2_p = .513. In this case, participants cooperated more with cooperative (*M* = .71, *SD* = .20), than non-cooperative partners (*M* = .47, *SD* = .23), as we can observe in Figure 3. In addition, and differing from the results of Telga et al., (2019), we also found a significant effect of Group Behavior in the inconsistent condition, *F*(1, 167) = 4.62, *p* = .033, η^2_p = .027; also showing more cooperation with cooperative partners (*M* = .58, *SD* = .24) against non-cooperative partners (*M* = .54, *SD* = .23), that is, a clear categorization pattern. Nevertheless, the .04 difference observed for inconsistent partners was significantly smaller than the .24 difference observed for consistent ones, *F*(1, 167) = 104.41, *p* < .001, η^2_p = .385. This suggest that although participants learnt to cooperate more with partners that cooperated mostly of the time, the cooperation pattern varied depending on their consistency with a higher effect of the group behavior variable on cooperation rates in the consistent compared to the inconsistent condition, which indicates that there was also some individuation, as shown in Figure 3.

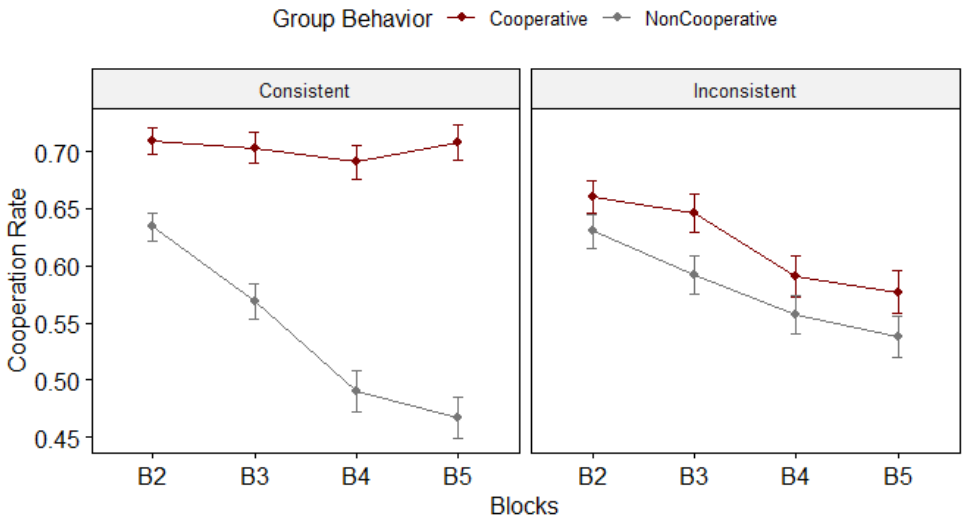

Figure 3. Cooperation rates across blocks with cooperative and non-cooperative partners as a function of consistency (consistent vs. inconsistent). Error bars represent the standard error of the mean.

3.3. Induction Phase

Before doing the analysis of the induction phase, we performed univariate ANOVAs, on each final questionnaire score: BDI, STAXI, STAIR, MRS, SRS, to determine if there were significant differences between experimental groups, we did not find any significant differences. The results are described in Annex E.

To determine whether the expected outcome of the induction phase was achieved, a mixed-design ANOVA was performed on EVEA and SAM questionnaires. For the analysis of EVEA data, we used time (pre vs. post vs. final), and emotion (anger vs. sadness) as within-subject variable, and induction (anger vs. neutral vs. sadness) as between participants variables. Showing the effectiveness and specificity of the induction procedure, the Time x Emotion x Induction interaction was significant $F(4, 330) = 17.84$, $p < .001$, $\eta^2_p = .178$.

Specifically, for the measures of anger, we found a significant Time x Induction interaction, $F(4, 330) = 45.08$, $p < .001$, $\eta^2_p = .353$, which remains significant after including SDS score as covariate, $F(4, 328) = 44.83$, $p < .001$, $\eta^2_p = .353$. As it was expected, we did not find significant between groups anger differences in the pre induction scores, $F(2, 165) = 1.37$, $p = .256$, $\eta^2_p = .016$, but, both the post induction, $F(2, 165) = 60.02$, $p < .001$, $\eta^2_p = .421$, and the final induction between groups differences, $F(2, 165) = 4.50$, $p = .013$, $\eta^2_p = .052$, were significant. The group induced with anger reported higher anger scores than the neutral group, $F(1, 110) = 137.262$, $p < .001$, $\eta^2_p = .555$, and the sadness group, $F(1, 110) = 21.86$, $p < .001$, $\eta^2_p = .166$. Also the sadness

group report higher anger scores than the neutral group, $F(1, 110) = 39.14$, $p < .001$, $\eta^2_p = .262$.

The Time x Induction interaction on EVEA scores of sadness were also significant, $F(4, 330) = 23.90$, $p < .001$, $\eta^2_p = .225$, and again remained significant after including SDS scores as covariate, $F(4, 328) = 23.60$, $p < .001$, $\eta^2_p = .223$. As expected, the three experimental groups did not differ on their pre-induction sadness scores, $F(2, 165) = 0.245$, $p < .780$, $\eta^2_p = .003$. In this case, significant between group differences were only observed on the post induction scores, $F(2, 165) = 29.87$, $p < .001$, $\eta^2_p = .266$. The group induced with sadness reported higher scores than the neutral group, $F(1, 110) = 56.61$, $p < .001$, $\eta^2_p = .340$, and the anger group, $F(1, 110) = 5.972$, $p = .016$, $\eta^2_p = .051$. Also, we found a significant difference between anger and neutral groups, $F(1, 110) = 27.97$, $p < .001$, $\eta^2_p = .203$, the first one showing higher scores.

SAM's results also showed the expected outcomes. In the case of valence, anger and sadness groups showed significantly more negative values than neutral group. Arousal increased for both groups, the anger group showing the highest increment, following by the sadness group. These differences were not observed in the pre-induction measures, but were significant in both the post-induction and final-induction measures. These results are specifically described in Annex F.

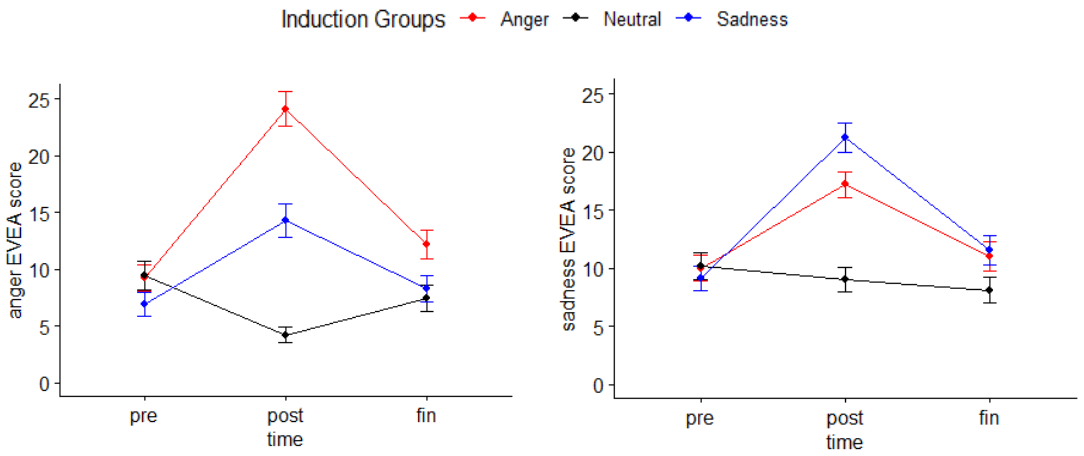

Figure 4. EVEA scores of anger (left) and sadness (right) of each experimental group, across time (pre vs. post vs. final). Error bars represent the mean standard error.

3.4. Transfer

Finally, to analyze the transfer phase we performed a mixed-design ANOVA on cooperation rates with group behavior (cooperative vs. non-cooperative; from the learning phase), as within-subjects variable, and induction group (anger vs. sadness vs. neutral), as between-participants variable. We found a significant effect of group

behavior, $F(1, 165) = 74.62$, $p < .001$, $\eta^2_p = .311$, indicating a higher cooperation rate with partners belonging to the cooperative group of the learning phase ($M = .70$, $SD = .20$), than with non-cooperative partners ($M = .59$, $SD = .23$).

Although, the Group Behavior x Induction interaction was not significant, $F(2, 165) = 0.75$, $p = .474$, $\eta^2_p = .009$, we decided to analyze the effect of main effect of group behavior in each experimental group. This effect was significant in all three of them, as shown in Figure 5. In the case of anger induction group, participants cooperated more with partners from the cooperative group ($M = .70$, $SD = .20$), than with partners from the non-cooperative group ($M = .58$, $SD = .24$), $F(1, 55) = 35.76$, $p < .001$, $\eta^2_p = .394$. The same happened with the sadness induced group, $F(1, 55) = 17.23$, $p < .001$, $\eta^2_p = .239$, with cooperation rates being higher for partners from the cooperative ($M = .67$, $SD = .20$), compared to the non-cooperative group ($M = .59$, $SD = .22$). The effect of group behavior in the neutral group was also significant, $F(1, 55) = 23.72$, $p < .001$, $\eta^2_p = .301$, the cooperation rates being higher with partners from the cooperative ($M = .71$, $SD = .21$) than the non-cooperative group ($M = .61$, $SD = .23$).

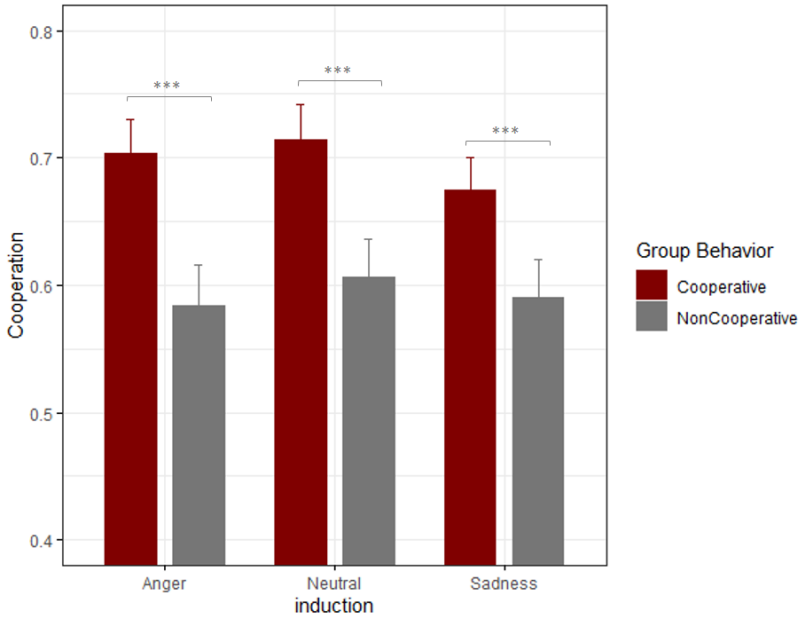

Figure 5. Cooperation rate in transfer phase of each experimental group in function of group behavior (cooperative vs. non-cooperative). Error bars represent the mean standard error.

This results suggest that the groups did not change in a significant way the categorization strategy as a function of the induced emotional state, therefore the data did not support our hypotheses. To explore in a similar way as in Telga et al., (2019) did, we also examined the differences in the transfer phase depending on the emotional induction, calculating an induction index, and a categorization index, following the same

computations. For the induction index we subtracted the pre-induction from the post-induction scores in anger and sadness respectively, and then, subtracted the change in anger from the change in sadness. This was done in order to differentiated participants who were induced more anger or more sadness, therefore the positive values would indicate participants induced with more sadness than anger, and negative values indicate participants induced with more anger than sadness. Then, for the categorization index, we subtracted the cooperation rates values with new partners from the non-cooperative group from cooperation rates values with new partners from the cooperative group. This index represents the differential levels of categorization, higher values indicating that participants tended to categorize rather that use an individualize strategy.

We did not consider the data from the neutral group. We computed a bivariate correlation between the two indexes, we found no correlation $r(122) = -0.01$, $p = .914$. In addition, we conducted the same analysis considering only the participants who categorized their partners during the learning phase, that is, participants who, in the fifth block of the learning phase, cooperated more with inconsistent partners from the cooperative group as these participants would be more likely to show a tendency to categorize in the transfer phase. The correlation was again not significant, $r(67) = -0.01$, $p = .948$.

In addition, as in the baseline, we performed a Bayesian ANOVA analysis. We found a strong evidence for the main effect of Group Behavior, but against for that effect being modulated by the induction (Annex H, Table 4).

4. DISCUSSION

The present research project aimed to examine whether the emotional states of anger and sadness differentially impact the use of individuation and social categorization strategies when making inferences about unknown individuals. For this purpose, we replicated one of the experiments reported in Telga et al. (2019), in which, the impact of sadness and anger on first impressions was explored using an adaptation of the multi-round Trust Game (Telga et al., 2018), and dividing the partners according to their Black vs. White ethnicity.

The experimental design was divided into four phases: baseline, learning, induction and transfer. The aim of the first phase was to explore whether participants were biased to cooperate more with one of the two ethnic groups. In the second phase, the participants had to associate opposite patterns of cooperation to the two ethnic groups, one group being cooperative most of the time, the other being non-cooperative. To determine the use of categorization vs. individuation strategies, 25% of the individuals

within each group were inconsistent individuals, i.e., showed the cooperation pattern of the opposite group. Then, the induction phase aim was to induce participants into either an angry, sad, or neutral emotional state. Finally, in the transfer phase, we tested whether participants used the associations learned during the second phase while remaining in the induced emotional state, when making decision in a final round of the Trust Game with new partners. The aim of this phase was to analyze the cooperation rates between partners who belonged to the cooperative ethnic group and partners who belonged to the non-cooperative ethnic group of the learning phase in each experimental group.

Following our hypotheses, we tried to determine whether anger-induced participants would use a categorization strategy, based on previously learned categories, while the sadness induced participants would use a rather analytical, detail-oriented strategy, by focus on new behaviors. Therefore, the anger group was expected to show a higher cooperation rate with partners from the cooperative ethnic group, than with partners from the non-cooperative ethnic group. Whereas, the sadness group, was expected not to show a significant difference in cooperation rate between the two groups (cooperative vs. non-cooperative), in the transfer phase. However, contrary to our pre-registered hypotheses, we found significant differences in cooperation with partners from the cooperative vs. non-cooperative ethnic group in the three experimental groups, with no differences between them, suggesting that participants used principally a category-based strategy.

Interestingly, the baseline results did not show a tendency to cooperate more with one group or another, as it happened in previous studies, for example in Telga et al. (2019) and Tortosa et al, (2013), in which the participants showed a tendency to cooperate more with black partners. It might be due to the sample used, as the previous Telga et al., (2019) study was done with 77 individuals, undergraduate psychology students, and Tortosa et al., (2013), recollected data from 47 participants, all of them also psychology students from the University of Granada. In our case we used data from a larger and more varied sample. Participants were students from different departments of the University of Granada, and therefore our sample might have been more heterogeneous. Importantly, Psychology students might have been more aware of ethnicity stereotypes, and therefore more motivated to inhibit them by cooperating more with black individuals.

In the learning phase, the results suggested that participant learned the associations and cooperated more with partners belonging to the cooperative group than with those belonging to the non-cooperative group, although modulated by the consistency condition. In the case of consistent partners, the learning pattern was observed since

block 2 (Annex C), and the differences increased throughout the second phase, as shown in Figure 3. On the other hand, in the inconsistent condition, although participants also tended to cooperate more with cooperative partners, the effect was weaker, and there was a smaller increment of the differences between cooperative and non-cooperative partners, compared to the consistent condition. In this condition, we expected to find no significant or a smaller effect of group behavior on cooperation rate which suggest that participants used a mixture between categorization and individuation strategy. This pattern was also significant between Blocks 2 and 5 in the inconsistent condition (Annex D), i.e., participants cooperated less in Block 5 than in Block 2 with cooperative partners. In other words, participants perceived, to some extent, the inconsistency of those specific partners, indicating that after the initial categorization, they may have attended individual behaviors. However, if participants had a clear tendency to individuate, they would have reverted their cooperative behavior, cooperating more with non-cooperative partners in the inconsistent condition. Thus, the observed pattern is consistent with the expected mixed results showing a strategy between categorization and individuation.

The induction phase showed the expected results. Anger and sadness induced participants reported a significant differential increment in anger vs. sadness emotional states, in post-induction measures, respectively for the anger and sadness group. Also, we found a significant decrement in valence between pre-induction and post-induction measures, indicating that participants reported both emotional states as negative (Annex F). As observed in other studies (e.g., Lench et al., 2011), we found a simultaneous increment of both emotional states, common when induced negative valence emotions. The arousal measure, also changed in a significant way between pre-induction and post-induction measures, and it was higher for the angry group than the sadness group (Annex F), as it has reported in other studies (Clark et al., 1984). Importantly, the differences between the measures of anger and sadness in post-induction moment were significant, i.e., anger's self-reported measures were higher in anger-induced group, and sadness' self-reported measures were higher in sadness-induced group; the two emotions showed higher scores than those of the neutral group. Therefore, participants of the anger and sadness groups were likely to have performed the transfer phase task in the anticipated emotional state.

What is more, in an exploratory analysis using EVEA results (Annex G) we found an increment of fear, and a reduction of happiness. This changes also have been reported to have an effect in trust decisions (Lerner & Keltner, 2001; Dunn & Schweitze, 2005), and therefore they might have affected the results in the transfer phase as a collateral effects on non-target (Mislin et al., 2015). Myers and Tingley (2016), on the

other hand, explain that trust decisions are affected by emotion's control appraisal, that is, the interpretation that oneself or another person is in control of the situation, anger would lead to a sensation that another person is in control, while sadness leads to the lack of situational control (Dunn & Scweitzer, 2005). But, although we did not evaluate control appraisal, and in contrast with Myers and Tingley (2016) observations, we did not find a significant difference between the two emotional states on our experimental task, in both cases we found an equivalent category based strategy, at least on interpersonal decisions.

Indeed, the specific results in the transfer phase, show that the three experimental groups cooperated in a similar direction, i.e., participants cooperated more with partners that belong to the cooperative group from the learning phase than with partners who belong to the non-cooperative group. Therefore we did not find the pattern observed in previous studies in which sadness was associated with a detailed-oriented strategy (Bodenahusen et al., 1994; Telga et al., 2019). Also, we did not find a correlation between induction index and categorization index of sadness and anger groups, which could be explained as an effect of the poor learning process about the inconsistent individuals of the learning phase. Thus, it is possible that both groups (also the neutral group) maintained in general, the same strategy (category-based) during the whole transfer phase. Therefore, the effect previously observed by Telga et al., (2019) does not seems to be a robust general effect. Although future research seems necessary to clarify it, it might be that the effect is specific to putatively motivated and knowledgeable participants as psychology students.

We can highlight three aspects to take into account from the present study. The first, regarding the learning phase, in which there was a clear tendency to categorization, which could have facilitated the use of the same strategy throughout the experiment, without the emotional induction producing the desired effect in the transfer phase. The second would be individual motivation, a key aspect when the use of extra attentional resources is needed, especially required for individuation. Although our project was presented with the possibility of an economic benefit, the task duration (approximately 50 minutes before transfer phase) could have reduced both, the participant's motivation and their attentional resources, facilitating the use of categorization as the main strategy during the transfer phase. Finally, the emotional induction, which could have produced additional effects to those intended to be manipulated. These aspects taken together could have affected the results obtained, together with the use of a more heterogeneous sample, in comparison to the samples of psychology students used in previous studies.

To sum up, our simple size and its diversity was crucial to these findings, but also the experimental design, designed by Telga and colleagues, (2019), which allowed us to

separate the observations into well delimited phases. The first result to remark is the observation of no effect in the baseline on cooperation rate regarding Partner Ethnicity; the second was the use of a strategy between categorization and individuation in the learning phase. In addition, in the induction phase, although we observed the increment of the desired differential emotional state, we also observed changes in other reported emotional states, which might indicate that emotions work as a continuum rather than as discrete events. Finally, and more importantly, the results of the transfer phase, clearly showed that participants categorized the new partners. However, their strategy to perceive them (categorization vs. individuation) was not affected by the induced emotional state, neither when emotional induction was treated as a group variable, nor when considering the actual induced change in anger vs. sadness as a continuous variable. Therefore, we did not replicate the expected modulation of emotional induction on categorization (reduced by sadness and enhanced by anger), and thus it is likely that the previous observation by Telga et al. (2019) might be due to the use of psychology students as participants. These observations might be useful for future research, either by varying the characteristics of the sample (age, race, social group, etc.), changing the order of the experimental phases, or looking for ways to increase participant's motivation.

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ANNEXES

A. Example of images and phrases used in induction phase stimuli

Table 1.

Example of images used in anger, sadness and neutral groups in the induction phase

A)

B)

Note. Example of images used in induction phase, for anger and sadness groups, image A), and for neutral group, image B). The phrase used for A) in the anger condition was *"He could have let him live, but his cruelty had no boundaries. He intentionally killed him. He found it amusing to see other's reactions"*; the phrase used in the sadness condition: *"He lost his younger brother during that war. It was a terrible misfortune. They were very close. His loss filled him with grief"*. The phrase used for image B) (neutral condition) was: *"A towel can be used to dry hands. Cotton towels are especially effective"*.

B. Means and Standard Deviations of cooperation rates of the Learning Phase conditions across blocks

Table 2.

Means and Standard Deviations of Learning phase across blocks.

	Consistent		**Inconsistent**	
	Coop.	**Non-Coop.**	**Coop.**	**Non-Coop.**
Block 2	M = .71, SD = .15	M = .63, SD = .17	M = .66, SD = .18	M = .63, SD = .20

Block 3	M = .70, SD = .18	M = .57, SD = .20	M = .65, SD = .22	M = .59, SD = .22
Block 4	M = .69, SD = .20	M = .49, SD = .23	M = .59, SD = .23	M = .56, SD = .22
Block 5	M = .71, SD = .20	M = .47, SD = .23	M = .58, SD = .24	M = .54, SD = .23

Note. Means and standard deviations of cooperation rates across blocks of cooperative and non-cooperative partners divided as a function of consistency (consistent vs. inconsistent).

C. Comparisons per Block of the Learning Phase in function of the consistency condition

As shown in Figure 3, the cooperation rates on each block were higher with partners belonging to cooperative groups than with partners belonging to non-cooperative group, regardless if they were consistent or inconsistent. To explore the learning phase in detail we performed univariate ANOVAs on cooperation rates of each block in each level of consistency. The result in block 2 for consistent condition was, $F(1, 167) = 43.09$, $p < .001$, $\eta^2_p < .205$, and for inconsistent condition, $F(1, 167) = 3.607$, $p = .059$, $\eta^2_p < .021$. In block 3 for consistent condition the result was, $F(1, 167) = 86.50$, $p < .001$, $\eta^2_p < .341$, for inconsistent condition, $F(1, 167) = 11.12$, $p = .001$, $\eta^2_p < .062$. The result performed on cooperation rate of block 4 for consistent condition was, $F(1, 167) = 160.41$, $p < .001$, $\eta^2_p < .490$, and for inconsistent condition, $F(1, 167) = 4.15$, $p = .043$, $\eta^2_p < .024$. The results of block 5 were described in Results section.

D. Comparisons between block 2 and block 5 of learning phase in inconsistent condition.

To explore in a more specific detail we decided to compare between blocks 2 and 5, in the inconsistent condition. We found that the cooperation rate with partners that belong to cooperative group showed a significant reduction, $F(1, 167) = 20.01$, $p < .001$, $\eta^2_p < .107$, participants cooperate less in block 5 ($M = .58$, $SD = .24$), than in block 2 ($M = .66$, $SD = .18$) with cooperative partners.

E. Final Questionnaires Analysis

The univariate ANOVAs on the scores of final questionnaires shown no significant results. In the case of BDI, $F(2, 165) = 0.07$, $p = .935$, $\eta^2_p < .001$, the STAIR, $F(2, 165) = 0.002$, $p = .935$, $\eta^2_p < .001$, the STAXIR, $F(2, 165) = 0.80$, $p = .451$, $\eta^2_p = .01$, the MRS, $F(2, 165) = 2.70$, $p = .071$, $\eta^2_p = .032$, and the SRS scores, $F(2, 165) = 0.77$, $p = .467$,

η^2_p = .009. This indicate that there were no differences between experimental groups, regarding depressive traits, anxious traits, rage traits, and racism prejudices.

F. SAM Scores Analysis

The interaction Time x Induction on valence in SAM questionnaire was significant, $F(4, 330) = 46.16$, $p < .001$, $\eta^2_p = .359$, it remains significant when the SDS scores were included as covariate, $F(4, 328) = 46.08$, $p < .001$, $\eta^2_p = .360$. The three experimental groups did not differ on the pre-induction scores, $F(2, 165) = 0.69$, $p = .50$, $\eta^2_p = .008$, but they did on the post-induction scores, $F(2, 165) = 88.62$, $p < .001$, $\eta^2_p = .518$, as shown in Figure 5. In this case the valence difference between sadness and anger groups was not significant, $F(1, 110) = 0.231$, $p = .631$, $\eta^2_p = .002$, but it was significant between sadness and neutral, $F(1, 110) = 129.47$, $p < .001$, $\eta^2_p = .541$, and anger and neutral, $F(1, 110) = 149.1$, $p < .001$, $\eta^2_p = .575$.

The same analysis was performed on arousal scores, the interaction Time x Induction was significant, $F(4, 330) = 23.15$, $p < .001$, $\eta^2_p = .219$, also with the SDS as covariate, $F(4, 328) = 23.48$, $p < .001$, $\eta^2_p = .223$. There were no differences between the three experimental groups on pre-induction measures, $F(2, 165) = 1.19$, $p < .306$, $\eta^2_p = .014$. On the other hand, the groups differed on the post-induction measures, $F(2, 165) = 34.87$, $p < .001$, $\eta^2_p = .297$. The group induced with anger showed a higher score of arousal than the neutral group, $F(1, 110) = 78.63$, $p < .001$, $\eta^2_p = .417$, the same was between sadness and neutral groups, $F(1, 110) = 21.39$, $p < .001$, $\eta^2_p = .163$. Also, the differences between anger and sadness groups were significant $F(1, 110) = 11.98$, $p < .001$, $\eta^2_p = .098$.

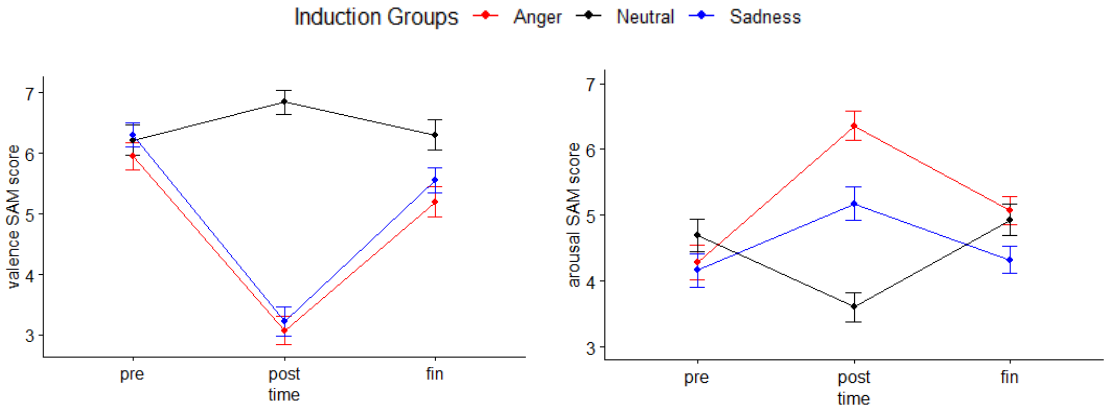

Figure 6. SAM scores of valence (left) and arousal (right) of each experimental group, across time. Error bars represent the mean standard error.

G. Analysis on EVEA scores of happiness and fear

The analysis on happiness EVEA scores, showed a significant effect on post-induction measures, $F(2, 165) = 35.33$, $p < .001$, $\eta^2_p = .300$, and in final-induction measures, $F(2, 165) = 5.10$, $p = .007$, $\eta^2_p = .058$. We also found a significant effect of fear on post-induction measures, $F(2, 165) = 34.56$, $p < .001$, $\eta^2_p = .295$, and final-induction measures, $F(2, 165) = 6.21$, $p = .003$, $\eta^2_p = .070$. The changes are shown in Figure 7.

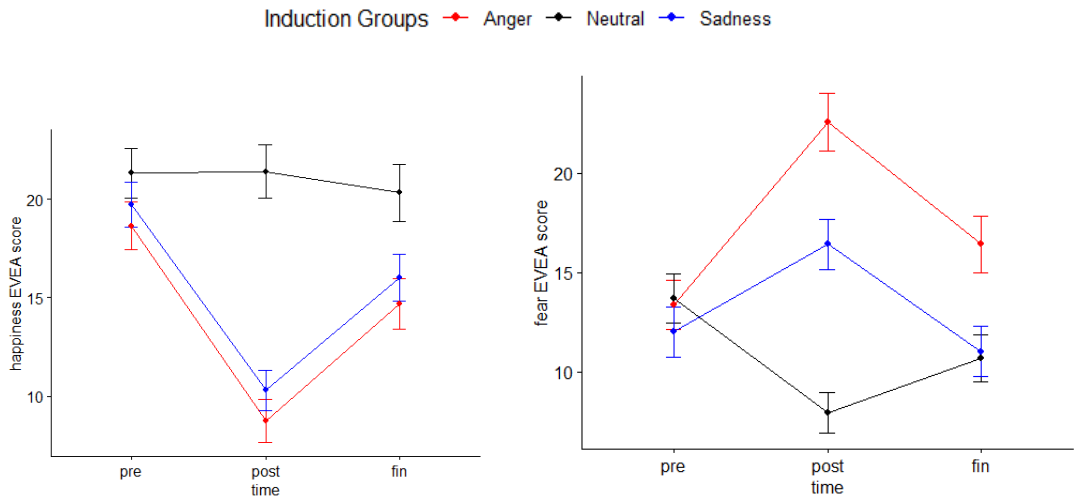

Figure 7. EVEA scores of happiness (left) and fear (right) of each experimental group, across time (pre vs. post. vs. fin). Error bars represent the mean standard error.

H. Bayesian ANOVAs in Baseline and Transfer Phase

We performed a Bayesian ANOVA analysis to evaluate our results on baseline and transfer phase.

Table 2.

Baseline Bayesian ANOVA

Models	P(M)	P(M|data)	BF_M	BF_{10}	error %
Null model (incl. subject)	0.500	0.853	5.787	1.000	
Partner Ethnicity	0.500	0.147	0.173	0.173	1.416

Note. All models include subject

Table 3.

Transfer Bayesian ANOVA

Models	P(M)	P(M|data)	BF_M	BF_{10}	error %
Group Behavior	0.200	0.838	20.683	1.000	
Group Behavior + induction	0.200	0.145	0.676	0.173	4.534

Group Behavior + induction + Group Behavior ✻ induction	0.200	0.017	0.071	0.021	7.485
Null model (incl. subject)	0.200	7.126e - 13	2.850e - 12	8.504e - 13	1.496
induction	0.200	9.795e - 14	3.918e - 13	1.169e - 13	3.673

Note. All models include subject.

Table 4.

Analysis of Effects in Transfer Phase

Effects	P(incl)	P(excl)	P(incl|data)	P(excl|data)	BF_{incl}
Group Behavior	0.400	0.400	0.983	8.106e - 13	1.212e +12
induction	0.400	0.400	0.145	0.838	0.173
Group Behavior ✻ induction	0.200	0.200	0.017	0.145	0.121

Note. Compares models that contain the effect to equivalent models stripped of the effect. Higher-order interactions are excluded. Analysis suggested by Sebastiaan Mathôt.