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Processing Emotional Expressions Under Fear of Rejection: Findings From Diffusion Model Analyses

Veronika Lerche, Alica Bucher, and Andreas Voss
Heidelberg University

In the mood-of-the-crowd task, participants have to classify crowds of emotional faces according to the predominant emotions. We examined 2 possible moderators of a previously found positivity bias in this task: fear of rejection and threat of social exclusion. Participants (Study 1: $N = 84$, Study 2: $N = 126$) received bogus feedback on their future social relationships that was either negative (frustration group) or positive (satisfaction group). By means of diffusion model analyses (Ratcliff, 1978), we examined the cognitive processes involved in the task. Our main findings are that more fearful individuals accumulated negative facial information more quickly than their less fearful counterparts (drift rate of the diffusion model; dynamic bias). Furthermore, individuals with a lower fear of rejection who were frustrated showed a prior bias (i.e., shifted starting point of the diffusion model) for positive rather than negative faces in contrast to the more fearful individuals. This suggests that the less fearful individuals tried to restore the thwarted motive by shifting a criterion, so that ambiguous situations are perceived more positively. The present studies demonstrate that diffusion modeling supplies important information about underlying cognitive processes in the domain of the affiliation motive.

Keywords: diffusion model, affiliation motive, fear of rejection, eye-tracking, future-alone manipulation

Many individuals regularly stand in front of a crowd of people, for example, when giving a presentation, during a job meeting, or when performing as an artist in a theater. In such situations, the verbal and nonverbal behavior of the audience (e.g., smiling, frowning, acclamations, or laughing) serves as feedback to the presenting person and affects the way how the presenting person feels and behaves. A paradigm that simulates such a situation is the recently developed mood-of-the-crowd task (MoC; Bucher & Voss, 2018). In this PC-based response time task, the overall mood of a crowd of faces has to be assessed. Bucher and Voss (2018) examined both response and eye-tracking data, revealing a happy-superiority effect.

It is sometimes argued that a positivity bias is useful as it serves emotion-regulation goals to retain a person's well-being (e.g., Balcetis & Dunning, 2006). Others claim that a negativity bias constitutes an evolutionary advantage as attention is directed to cues that indicate a potential threat (e.g., Pratto & John, 1991). In summary, both theoretical accounts as well as empirical findings regarding the prevalence of a positivity or negativity bias are not consistent. For example, even for one and the same type of task such as the face-in-the-crowd task (Hansen & Hansen, 1988), divergent results have been found. Some studies revealed a happy-superiority effect (e.g., Calvo & Nummenmaa, 2008) and some studies report a threat-superiority effect (e.g., Öhman, Lundqvist, & Esteves, 2001). Such contradictory results suggest that it is important to consider moderator variables of emotional biases. One important moderator in this domain might be age: Tottenham, Phuong, Flannery, Gabard-Durnam, and Goff (2013), for example, showed that children perceive ambiguous facial expressions (surprise) as negative, whereas there was no negativity bias for adolescents. Neta and Whalen (2010) examined temporal influences on biases on the fine-grained time level of trials in a response time task. Their results suggest that negative interpretations come first, but can be overridden by more positive interpretations. Other studies demonstrate that there are important interindividual differences in the processing of the valence of facial expressions (e.g., Neta et al., 2017).

One trait variable that we consider likely to affect how people react in the MoC task is the affiliation motive. According to motive disposition theory (MDT; e.g., McClelland, 1985), the affiliation motive is a fundamental psychological motive that energizes and drives behavior. Several studies examined the effects of this motive on cognitive processes. For example, Nikitin and Freund (2015), in line with Bucher and Voss (2018), also found a general positivity bias in a mood classification task. This effect was, however, reduced for individuals with increased implicit fear of rejection (FR)—one component of the affiliation motive: Individuals with high FR more often interpreted strongly masked facial expressions as negative in comparison with individuals with a lower motive score.

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Veronika Lerche, Alica Bucher, and Andreas Voss, Institute of Psychology, Heidelberg University.
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Correspondence concerning this article should be addressed to Veronika Lerche, Institute of Psychology, Heidelberg University, Hauptstrasse 47-51, D-69117 Heidelberg, Germany. E-mail: veronika.lerche@psychologie.uni-heidelberg.de

In the present article, we report data from two studies in which we examined the moderating influence of FR on the processing of facial expressions in the MoC task (Bucher & Voss, 2018). Specifically, we were interested in the cognitive processes underlying potential biases. Imagine again the situation in which a person is standing in front of a crowd of people, for example giving a presentation: If the presenter has high FR, this could trigger the expectation of negative feedback in her or him. Thus, when evaluating the mood of the crowd, her or his judgment might be biased a priori. Therefore, negative judgments have a higher probability, even if an equal number of positive (smiling) and negative (frowning) faces are processed. This kind of *prior bias* is similar to a response bias according to signal detection theory (Macmillan & Creelman, 2005). However, even without any a priori negative expectations, the judgment of the crowd will still be biased if the fearful person focuses her or his attention primarily on negative sources (e.g., on negative faces in the crowd with mixed emotions), thus, collecting overall more negative information. In the following, we denote a biased information uptake as *dynamic bias*.

Prior research did not yet shed light on the question which of these biases are associated with high FR. Previous studies that examined the relation of biases to FR based their conclusions on the analysis of behavioral variables such as error rates or mean RTs. By means of an analysis of these behavioral variables it is, however, not possible to disentangle prior and dynamic biases because both types of biases go along with a reduction in error rates and mean RTs for one class of stimuli (here, the negative facial expressions). In the present studies, we use the diffusion model (Ratcliff, 1978) to get independent measures for prior and dynamic biases in the perception of emotional expressions (see Voss, Rothermund, & Brandtstädter, 2008, for another application of the diffusion model to disentangle these biases).

In our studies, we further examine a possible situational moderator, that is, the *threat of social exclusion*. Imagine that before giving a talk, the speaker is told by her or his partner that "there is something serious we need to talk about later," which might incite the fear of being abandoned. In such a possibly threatening situation, focusing on positive information, that is, on positive social feedback provided by smiling people from the audience, might help the presenter to counteract negative feelings triggered by the anticipated rejection. In our studies, we simulate such a situation by utilizing an adapted version of the future-alone manipulation (Twenge, Baumeister, Tice, & Stucke, 2001) to induce threat of social exclusion. In the future-alone manipulation, participants get false feedback about probabilities of their future belongingness with significant other persons. Previous research has demonstrated the validity of this manipulation, showing, for example, that social exclusion makes individuals more aggressive (Twenge et al., 2001) and reduces prosocial behavior (Twenge, Baumeister, DeWall, Ciarocco, & Bartels, 2007). Whereas most studies focused on behavioral effects of the future-alone manipulation, a study by DeWall, Maner, and Rouby (2009) examined cognitive processes. In their experiments, the authors investigated the influence of threat of social exclusion on selective attention to emotional expressions. Individuals who experienced threat of exclusion were faster at identifying happy faces in a crowd of distractor faces. Moreover, they showed higher fixation rates on happy faces and were slower at disengaging from happy faces compared with participants who did not experience social exclusion. DeWall et al. (2009) concluded that the threat of social exclusion fosters a motivation to restore this need, which, in turn, directs attention to positive social stimuli. Also in line with this interpretation is a study by Maner, DeWall, Baumeister, and Schaller (2007) who found that social exclusion increased the preference for working together with others rather than solving a task alone.

In the following chapters, we first give a brief introduction to the diffusion model that is used for data analyses in both studies. Then, we present the design and results of our studies. In Study 1, like in Bucher and Voss (2018), we assessed eye-tracking data to establish comparability with their studies, and to test whether predicted biases can also be observed in overt attentional processes. In Study 2, we increased the number of trials of the MoC task to examine how biases develop over the time. In summary, our studies aim at replicating the overall positivity bias reported by Bucher and Voss (2018) and at testing the hypothesis that such a bias is moderated by FR (as a trait) and by a situationally induced threat of social exclusion. To get a deeper understanding of the underlying cognitive mechanisms, we use the diffusion model methodology to disentangle prior from dynamic biases.

Introduction to Diffusion Modeling

In this section, we give a short introduction to diffusion modeling. Readers interested in further details are referred to review articles by Wagenmakers (2009), Voss, Nagler, and Lerche (2013), or Ratcliff, Smith, Brown, and McKoon (2016).

The diffusion model (Ratcliff, 1978) is a stochastic model that disentangles processes involved in the execution of binary choices. The model relies on the assumption that relevant information is accumulated continuously (e.g., orange vs. blue pixels in a color discrimination task; Voss, Rothermund, & Voss, 2004). The process of information accumulation runs until an upper or lower threshold is reached. Then, the corresponding response is initiated (see Figure 1). In the present application, the upper and lower thresholds are associated with classifications of crowds as "angry" versus "happy."

Several parameters influence the responses time distributions predicted by the model. First, the distance between thresholds (*a*)

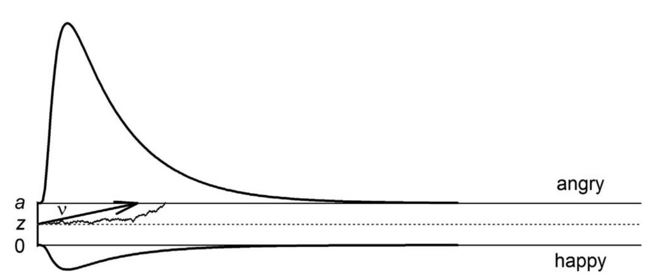

Figure 1. Illustration of the decision process of the diffusion model for a task with the response options angry and happy. Angry is associated with the upper threshold and happy with the lower threshold. The information accumulation initiates at starting point *z* and moves in the corridor delimited by the two thresholds, the so-termed threshold separation *a*. Information are accumulated with drift rate *ν* until one of the two thresholds has been reached. Subsequently, the corresponding response (e.g., a key press) will be executed (not depicted in the figure; neither depicted is the encoding of information preceding the decision process).

is a measure for the adopted speed-accuracy settings. The larger the threshold separation, the longer it takes on average for the accumulation process to reach a threshold. As more information is considered, it becomes at the same time less likely that processes erroneously end at the wrong threshold.

The second parameter, the drift rate (v), measures the average speed of information accumulation. The higher the drift rate, the faster information are collected, resulting in a higher percentage of correct responses and faster responses. In addition to the systematic influence of the drift, the diffusion process is also affected by random Gaussian noise. Therefore, processes can differ in duration and outcome, even if the same information is presented (i.e., even if the drift is identical).

A third diffusion model parameter is the starting point (z, or the relative starting point $z_r = z/a$). An unbiased decision maker will locate the starting point centered between thresholds ($z_r = .5$). If, however, the starting point is closer to one of the two thresholds, fewer information is required to reach this threshold and the corresponding decision will be reached more often and with shorter decision times. For example, if the starting point is positioned closer to the "negative" threshold, negative responses will occur more often and mean RTs will be reduced for this response.

The fourth diffusion model parameter is the nondecision time (t_0). This parameter subsumes the time required for all extradecisional processes (e.g., encoding of information and motoric response). The nondecision time only affects response time but not accuracy.

The reliability (Lerche & Voss, 2017b; Yap, Balota, Sibley, & Ratcliff, 2012) and validity (e.g., Arnold, Bröder, & Bayen, 2015; Lerche & Voss, 2017a; Voss et al., 2004) of the diffusion model parameters have been secured in several studies. In addition to the four main diffusion model parameters described above, often intertrial variabilities of drift rate (s_v), starting point (s_{zr}), and nondecision time (s_{t0}) are included additionally. Both s_v and s_{zr}, however, cannot really be estimated reliably and fixing these parameters to zero can lead to improved estimation of the main diffusion model parameters (Lerche & Voss, 2016; see also van Ravenzwaaij, Donkin, & Vandekerckhove, 2017).

In the diffusion model framework, biases in favor of one response can manifest in two different ways (Voss et al., 2008). On the one hand, a bias can arise from a shift of starting point. This bias is similar to a response bias in the sense of signal detection theory (Macmillan & Creelman, 2005). However, we will use the term prior bias in this article because one of the two response options has an advantage independent of the presented information. On the other hand, a bias in information accumulation (i.e., drift rates) is possible: In this case, information supporting one response alternative is collected faster than information supporting the alternative decision. We call this a dynamic bias, because it operates during information accumulation. Several studies focus on the disentangling of these two types of biases (e.g., Leite & Ratcliff, 2011; Lerche, Christmann, & Voss, 2018; Voss et al., 2008).

To the best of our knowledge, the diffusion model was utilized previously only in one study to examine effects of satisfaction versus frustration of psychological motives: Lerche, Neubauer, and Voss (2018) investigated effects of the frustration of the achievement motive. They found that speed of information accumulation (drift) was reduced for individuals with high implicit fear of failure, when they received negative performance feedback. However, individuals with high fear of failure did not differ from their less fearful counterparts in terms of how carefully they executed the task (threshold separation). The authors assumed that negative performance feedback activated ruminatory processes for fearful individuals, which in turn led to a distraction from the actual task.

Study 1

With Study 1, we investigate two possible moderators of the positivity bias found in the MoC task by Bucher and Voss (2018): These moderators are the trait variable *fear of rejection* and the situational variable *threat of social exclusion*. We analyze effects of both variables on a prior bias and on a dynamic bias. Furthermore, we also examine interactions of FR and the experimental manipulation, hypothesizing that (only) individuals with low fear of rejection are able to counteract the negative manipulation by showing an increased positivity bias after frustration.

Our analyses are mainly based on diffusion model analyses of the MoC task. Additionally, we examine gaze movements. Before we conducted the study, we obtained approval of the ethics committee of the Faculty of Behavioral and Cultural Studies of Heidelberg University (Protocol Number: Ler 2017/1–2). The data of our studies are available on the open science framework project page: https://osf.io/qzeyg/.

Method

Participants. Sample size was based on a power analysis with GPower 3.1.9.2 (Faul, Erdfelder, Lang, & Buchner, 2007), which resulted in a required sample size of 77 participants for the detection of a medium-sized effect ($f^2 = .15$, linear multiple regression with three predictors, power = .80, $\alpha = .05$). Based on the software hroot (Hamburg Registration and Organization Online Tool; Bock, Baetge, & Nicklisch, 2014), we recruited a total of 90 participants from the participants' pool of the Psychological Institute of Heidelberg University. Six participants did not complete the study because the eye-tracker could not assess their gaze position reliably. Thus, our final sample consisted of 84 participants. All participants signed an informed consent before the beginning of the study and declared at the end of the study that their data could be used for analyses. Participants received either course credit or 5 € (approx. 6 US dollars). Most of the participants were students (93%); among them, 38% studied psychology. The percentage of female participants was 75%. On average, participants were 23.0 years old (range = 18–43, $SD = 4.2$).

Future-alone manipulation. For the arousal of threat of social exclusion, we used the so-called future-alone manipulation. This manipulation has been introduced by Twenge et al. (2001) and has also been used in many subsequent studies to frustrate the need for relatedness (e.g., Baumeister, DeWall, Ciarocco, & Twenge, 2005; DeWall et al., 2009; Hames et al., 2018; Twenge et al., 2007). To increase credibility of the manipulation, we adapted the original procedure in a few aspects. First, participants completed a short version of the Big Five Inventory (BFI-K; Rammstedt & John, 2005) and received accurate feedback on all five personality dimensions; thus, not only on the extraversion dimension. We expect that the false feedback regarding future social interactions is more trustworthy when ostensibly computed from a combination of these different dimensions. Specifically, participants got the following instruction (translated from German):

> Now you will work on a short personality questionnaire. In a longtime study by Brody et al. (2011) it was examined which components of personality have the greatest influence on well-being. From these personality components personality profiles can be derived. These also allow predictions about the further development of the person. In our investigation, we want to validate the applied questionnaires on a German sample. In the following, we ask you to answer to some questions on your personality. Please try to respond as spontaneously as possible to the statements. If you are not sure, please choose the value that matches best with how you see yourself. At the end of the personality test you will receive an individual feedback about your personality profile.

After the participants filled in the questionnaire items, a loading bar appeared (for a duration of 8 s) accompanied by the following text: "Please wait a moment until the evaluation of your personality profile has been completed." Then, participants received scores on the five personality dimensions. Next, they saw the manipulated feedback. In our translation of the original texts by Twenge et al. (2001) to German, we modified some passages, attenuating them to increase the credibility. In the *frustration condition* (future-alone condition), the following statement was presented:

> The data that you entered in the preceding questionnaires indicate that you probably belong to people who will be lonely later in life. You may have friendships and relationships now, but already in the next years most of them might dissolve. It is very probable that during your live you will become more and more lonely.

In the *satisfaction condition* (future belonging condition) participants were told:

> The data that you entered in the preceding questionnaires indicate that you probably belong to people who have good relationships throughout their lives. You are likely to have a long and stable partnership and friendships that will last well into old age. It is very probable that you will always have friends and other people you are important to.

The adapted manipulation was tested in an online pilot study with 39 participants, who were randomly assigned to the two conditions. After receiving the false feedback about their personality profile, they had to fill in the Positive and Negative Affect Schedule (PANAS; Krohne, Egloff, Kohlmann, & Tausch, 1996; Watson, Clark, & Tellegen, 1988). They were instructed to rate their feelings with respect to the present moment. Furthermore, participants answered to the need-threat items by Schoel, Eck, and Greifeneder (2014) referring to the moment when they read the feedback regarding their personality profile. These items are informative about participants' need of belonging, self-esteem, meaningful existence, and control.

Results of the pilot study indicate that individuals in the frustration condition experience higher levels of negative affect (M = 2.11, SD = 0.75) than individuals in the satisfaction condition (M = 1.51, SD = 0.82), $t(37)$ = 2.41, p = .021, d = 0.78. In addition, positive affect in the frustration condition (M = 2.92, SD = 0.83) was numerically lower than in the satisfaction condition (M = 3.15, SD = 0.63), although the effect was not statistically significant, $t(37) = -0.97$, p = .338, $d = -0.31$. Participants from the two groups also differed in the perceived fulfillment of the need for belonging, with lower assessments of belonging in the frustration (M = 3.82, SD = 1.55) than in the satisfaction condition (M = 6.00, SD = 0.69), $t(37) = -5.39$, $p < .001$, $d = -1.74$. Participants in the frustration condition further reported lower levels of satisfaction of the need for self-esteem (M = 3.45, SD = 1.54) than in the satisfaction condition (M = 5.24, SD = 1.23), $t(37) = -3.89$, $p < .001$, $d = -1.25$. They also indicated lower values with regard to the need for a meaningful life (M = 4.42, SD = 1.35) compared with the satisfaction condition (M = 5.86, SD = 0.65), $t(37) = -4.04$, $p < .001$, $d = -1.30$, but did not report significantly lower feelings of control (M = 2.22, SD = 1.54) compared with participants in the satisfaction condition (M = 2.92, SD = 1.19), $t(37) = -1.53$, p = .133, $d = -0.50$.

Design, material, and procedure. The experiment was run in a windowless laboratory to ensure constant lighting conditions. All participants were assessed in individual sessions. Participants were seated in front of a laptop with a screen resolution of 1920 × 1080 pixels. An iView RED250 mobile eye-tracker (SensoMotoric Instruments; temporal resolution: 250 Hz) was mounted below the monitor.

Instructions, questionnaires, and the MoC task were all computerized. First, participants worked on 16 practice trials of the MoC task. Then, demographic data were collected. Next, the implicit and explicit affiliation motives were assessed. This was followed by the frustration or satisfaction of the affiliation motive. After the false feedback, participants worked on the test trials of the MoC task. Following the binary task, they had to answer to a number of open-framed questions ("What do you think that this study is about?"; "How might the feedback about your personality profile be related to the other questions?"). Furthermore, they had to indicate on a 5-point Likert scale whether they had any doubts during the study (1 = *no doubts*, 5 = *strong doubts*). If they answered with at least 2, they were further asked why and when they had these doubts. Finally, participants were fully debriefed about all aspects of the study.

Motive measures. Previous studies have shown that implicit motives are predictive of spontaneous behavior, whereas explicit motives are predictive of deliberate choices (e.g., Brunstein & Hoyer, 2002; Brunstein & Maier, 2005; see also McClelland, Koestner, & Weinberger, 1989). For example, Wegner, Bohnacker, Mempel, Teubel, and Schüler (2014) report correlations between the strength of the implicit affiliation motive and the extent of pleasant, nonverbal communication with opponents during sport activities, whereas the explicit motive correlated with the extent of verbal communication with team-mates (see also Hagemeyer, Dufner, & Denissen, 2016). As we did not measure deliberate choices but task processing, we expected effects for the implicit affiliation motive. However—in contrast to many previous studies—we assessed both the implicit and explicit motive to test whether any effects are specific to the implicit motive.

For the assessment of the implicit affiliation motive, we used a short version of the Multi-Motive Grid (MMG; Schmalt, Sokolowski, & Langens, 2010; Sokolowski, Schmalt, Langens, & Puca, 2000). The MMG is a semiprojective measure that has been frequently applied for the assessment of implicit motives (e.g., Gable, 2006; Langens & Schmalt, 2002; Müller & Rothermund, 2017; Nikitin & Freund, 2015; Puca & Schmalt, 1999). Note that there is some debate on the question of whether the MMG is an implicit (e.g., Langens & Schmalt, 2008, see also Baumann, Kazén, & Kuhl, 2010) or rather a "semi-implicit" motive measure (Schüler, Brandstätter, Wegner, & Baumann, 2015, p. 852). In the MMG, each motive component is assessed by means of 12 statements (binary items measuring the agreement/disagreement). Accordingly, a maximum sum score of 12 can be reached. The MMG measures both hope and fear components of the affiliation, achievement, and power motive. Our central interest was in the FR component of the affiliation motive, which we aimed to arouse by our manipulation. In the MMG, FR is measured with the items "Being afraid of being rejected by others" and "Being afraid of being boring to others," hope of affiliation (HA) with the items "Feeling good about meeting other people" and "Hoping to get in touch with other people." The fear values of our sample ranged from 1 to 11 ($M = 6.33$, $SD = 2.36$), the hope values from 2 to 10 ($M = 5.82$, $SD = 1.98$) and the internal consistency (Cronbach's α) was .60 and .52 for the fear and hope components, respectively. Note that the internal consistency of FR (the motive variable which is in the center of our analyses) despite being rather low is still comparable with values observed in other MMG studies (e.g., $\alpha =$ .63 in the study by Nikitin & Freund, 2015).

The hope and fear components of the explicit affiliation motive were assessed with the Mehrabian Affiliative Tendency Questionnaire (MAFF) and the Mehrabian Sensitivity to Rejection Scale (MSR; Mehrabian, 1970; German items as in Engeser & Langens, 2010). Each scale consists of 25 items. Participants rated their agreement to the items on a 5-point Likert scale. We computed the mean MAFF score (in the following, explicit HA) and the mean MSR score (explicit FR). The fear values of our sample ranged from 2.08 to 4.40 ($M = 3.23$, $SD = 0.52$) and the hope values from 1.40 to 4.60 ($M = 3.50$, $SD = 0.53$) and the internal consistency (Cronbach's α) was .83 and .84 for the fear and hope components, respectively.

Mood-of-the-crowd task (MoC). To assess potential biases in emotion perception, we used the MoC task (Bucher & Voss, 2018). In the MoC task the overall mood of a crowd of faces has to be assessed. The task is complex, as it requires the processing of several stimuli and it has a high ecological validity as in every-day situations typically crowds with more than one target are prevalent.

Similar tasks were used to examine processes of *ensemble coding*. In these studies participants have to assess the average mood of a number of faces (Elias, Dyer, & Sweeny, 2017; Haberman & Whitney, 2009). Haberman and Whitney (2009) showed that participants were capable of estimating the average emotion of a set of facial expressions, but had difficulties in remembering the individual expressions. Elias et al. (2017) further revealed that the average emotion intensity of happy dynamic faces could be estimated more accurately than the intensity of angry or fearful faces. In contrast to these studies, we do not only analyze responses but also response times to be able to apply the diffusion model and to get information about the processes underlying potential emotional biases.

Our task was based on the MoC task variant of Study 3 in Bucher and Voss (2018). In each trial, 20 computer-generated faces (adopted from Becker, Anderson, Mortensen, Neufeld, & Neel, 2011) were presented randomly distributed across the screen (see Figure 2, for an example trial). Each face showed a happy or an angry expression. Participants had to indicate the overall mood of the crowd. They were instructed to assess whether the majority of the faces was happy or angry. The assignment of the two responses to the keys ("A" and "L") was counterbalanced across participants. We varied the dominant mood (happy vs. angry) and the difficulty of the task (easy vs. difficult). In easy trials 7 or 13

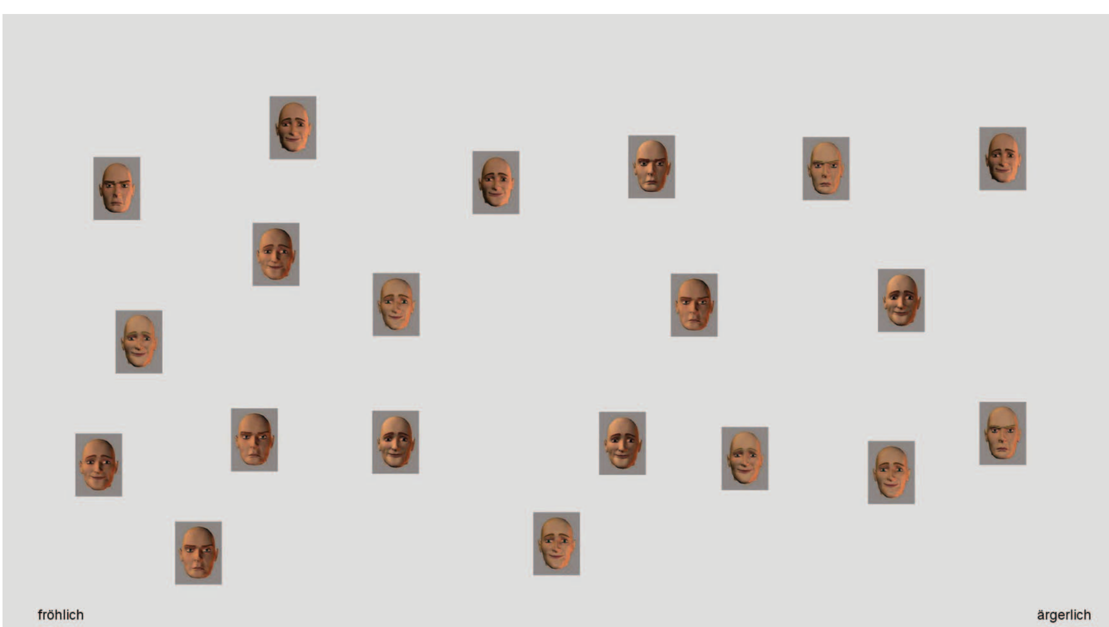

Figure 2. Example trial of the mood-of-the-crowd task ("fröhlich" = "happy"; "ärgerlich" = "angry"). In this trial, "happy" is the correct response. The stimulus material is adopted from Becker et al. (2011). See the online article for the color version of this figure.

and in difficult trials 9 or 11 faces out of the 20 faces showed a happy expression. Furthermore, in half of the trials only female faces were presented and in the other half only male faces. Thus, we used a 2 (dominant mood) × 2 (difficulty) × 2 (gender of presented faces) within-subject design. Each combination of factors was presented 12 times, resulting in a total number of 96 test trials. In the 16 practice trials, each factorial combination appeared twice. The test block was split up in two subblocks of 48 trials each. Each subblock started with two additional warm-up trials that were excluded from analyses.

Both the practice and test block were preceded by a 9-point calibration of the eye tracker, followed by a 4-point validation procedure. Only if the validation was successful (participants' gaze was within 1° visual angle of the presented points), the test block was started. If the validation failed, a new calibration and validation round started. Each trial started with the presentation of a fixation cross that remained on the screen until the participant's gaze position remained on the cross for 500 ms. In cases in which the recorded gaze position deviated from the fixation cross for more than 5 s, a recalibration was performed. After the fixation cross, the facial stimuli were presented and remained on the screen until the participant responded. Participants were instructed to respond accurately and at the same time as fast as possible. If the response of the participants exceeded 10 s, a warning message ("please respond faster") was shown. The words "happy" and "angry" appeared on the appropriate sides at the bottom of the screen to remind participants of the response assignment. Following an intertrial interval of 500 ms the next trial started.

Estimation of diffusion model parameters. For parameter estimation, we used the program fast-dm-30 (Voss & Voss, 2007, 2008; Voss, Voss, & Lerche, 2015), using maximum likelihood as optimization criterion.[1] Parameters were estimated independently for each participant. The thresholds of the model were associated with the responses "angry" (upper threshold) and "happy" (lower threshold). We fixed the intertrial variabilities of starting point and drift rate to zero because these parameters cannot be estimated reliably and fixation of these parameters can lead to improved estimates of the other, more meaningful parameters (Lerche & Voss, 2016; see also van Ravenzwaaij, Donkin, & Vandekerckhove, 2017). Separate drift rates were estimated for the easy versus difficulty trials. Thus, in total, our model comprised the following parameters: threshold separation (a), starting point (z_r), nondecision time (t_0), drift rates for happy- ($\nu_{\text{happy, easy}}$ and $\nu_{\text{happy, difficult}}$) and for angry-dominated trials ($\nu_{\text{angry, easy}}$ and $\nu_{\text{angry, difficult}}$) and intertrial variability of nondecision time (s_{t0}).[2]

Results

Responses with logarithmized latencies being more than three interquartile ranges above the third quartile or more than three interquartile ranges below the first quartile of the individual logarithmized RT distributions were removed from all analyses (Tukey, 1977). This resulted in an exclusion of 0.34% of data. One participant with more than 20% of fast outliers was excluded from the further analyses (including the participant did not alter the pattern of results). The diffusion model fit the data reasonably well (see Figure 3). In this scatter plot, observed (x-axis) and predicted statistics (y-axis) are juxtaposed. Each participant is illustrated by one symbol and perfect model fit is given if observed and predicted statistics are identical (i.e., the points lie exactly on the diagonal).

From the eye-tracking data, the relative duration of fixations on angry facial stimuli compared with the overall duration of fixations on any face stimuli (percent duration of angry fixations) and the proportion of the number of angry faces fixated at least once compared with the total number of all fixated faces (% number of angry fixations) were computed. For fixations on faces a tolerance of 30 pixel (0.5 cm) was allowed. In case of multiple fixations on the same face, only one fixation was counted (thus, the maximum possible number of fixations on angry expressions is 13 fixations in one trial).

For each dependent variable, we conducted hierarchical regression analyses (see Table 1 for the eye-tracking and behavioral variables and Table 2 for the diffusion model parameters): In a first step, the criterion was regressed on group (1 = frustration, 0 = satisfaction) and implicit FR (centered on the sample mean).[3] Then, in a second step, we included the Group × FR interaction term. If the interaction effect was not significant, we interpret the main effects of the first step.

As a one-sample t test revealed, the proportion of fixation durations on angry stimuli (M = 49.41%, SD = 1.77%) deviated significantly from 50%, $t(82) = -3.05$, $p = .003$, $d = -0.34$, indicating that, as expected, positive faces were fixated longer than negative faces. This effect was further moderated by the condition: The positivity bias was reduced after frustrating the affiliation motive (49.81%), and increased in the satisfaction condition (49.01%), $b = 0.80$, 95% confidence interval (CI) [0.06, 1.54], $\beta = .23$, $p = .035$. Furthermore, there was a significant main effect of FR, $b = 0.18$, 95% CI [0.02, 0.34], $\beta = .24$, $p = .025$, suggesting that high FR is associated with an increased duration of fixations on angry faces. There was no significant Group × FR interaction ($b = 0.02$, 95% CI [−0.30, 0.34], $\beta = .02$, $p = .917$). For the proportion of the number of fixations on angry versus happy faces, the direction of effects was identical, but no statistically significant effects emerged (all ps ≥ .053).

Next, we examined the proportion of angry responses. This proportion (M = 49.34%, SD = 6.57%) did not deviate significantly from 50%, $t(82) = -0.92$, $p = .362$, $d = -0.10$. Interestingly, the overall proportion of angry responses depended on the condition, $b = 3.30$, 95% CI [0.46, 6.14], $\beta = .25$, $p = .024$. In the satisfaction condition, individuals had a positivity bias, selecting the negative response in 47.71%. In the frustration condition, on the other hand, participants had a bias for the negative response (51.01%). FR did not affect the response rate ($b = 0.19$, 95% CI

[1] The program can be freely downloaded from https://www.psychologie.uni-heidelberg.de/ae/meth/fast-dm/index-en.html. A command line version and, additionally, since recently a graphical user interface, developed by Stefan Radev, are available.

[2] We did not include the gender of the faces as further factor because we did not have any expectations about an influence of this factor. Furthermore, given that the trial number of our task was only moderate, the estimation procedure would become unstable with the inclusion of a further factor.

[3] Our research questions were based on the fear component of the affiliation motive. However, for readers interested in the hope component, we also conducted additional analyses based on hope of affiliation (HA) and report the tables with the results of the regression analyses in the Appendix.

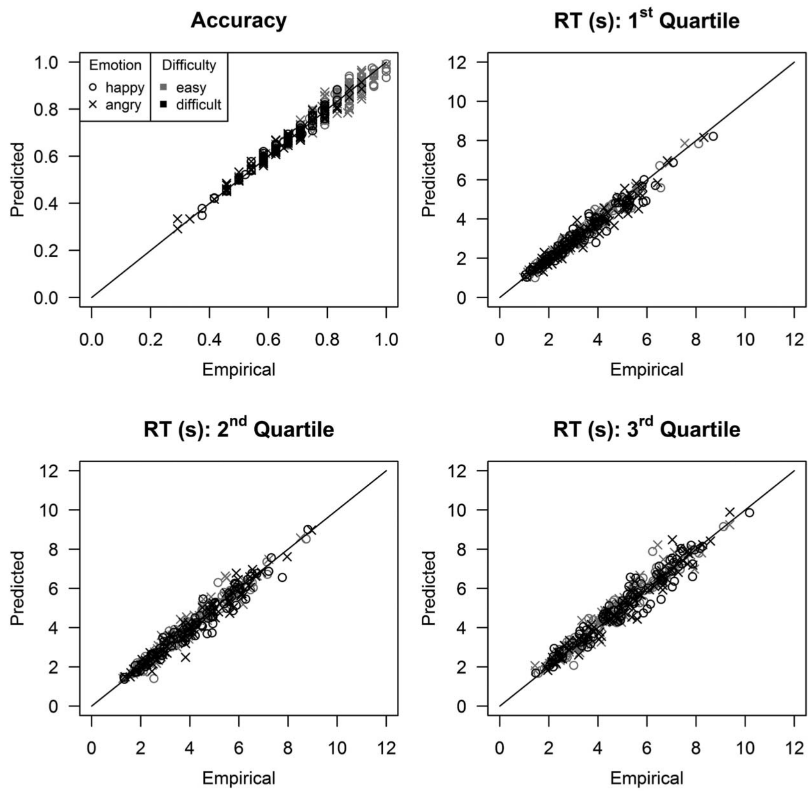

Figure 3. Graphical examination of model fit for Study 1.

[−0.42, 0.80], β = .07, p = .543), neither did the interaction of condition and FR (b = 0.24, 95% CI [−0.99, 1.47], β = .06, p = .701). We also examined the variables mean RT of correct responses (the RTs were logarithmized before the mean was computed) and accuracy, split up for happy- and angry-dominated trials. In these analyses, there were no significant main effects or interactions (all ps ≥ .124).

Next, we analyzed the diffusion model parameters (see Table 2). First, we examined whether there was a general positivity bias in starting point; thus, whether the starting point was shifted toward the lower threshold of the model associated with the response "happy." The mean relative starting point z_r (M = .50, SD = .09) did not deviate significantly from the center between the thresholds (i.e., z_r = .50), t(82) = −0.39, p = .701, d = −0.04. However, a significant Group × FR interaction effect emerged, b = 0.02, 95% CI [0.00, 0.04], β = .38, p = .018. This effect is visualized in Figure 4 (left plot in the upper row). In the satisfaction group, individuals with low FR (M −1 SD) had a starting point closer to the angry threshold (z_r = .52) and individuals with high FR (M +1 SD) a starting point that is closer to the happy threshold (z_r = .46). In the frustration group, on the other hand, the opposite pattern emerged: For individuals with low FR starting point was shifted toward the happy threshold (z_r = .47), whereas the starting point of individuals with high FR was closer to the angry threshold (z_r = .51). These results indicate that individuals with low but not high FR counterregulated a threat of the affiliation motive by shifting starting point toward the happy threshold.

For information accumulation, we computed the mean drift rates across easy and difficult trials to facilitate interpretations. Furthermore, we recoded drift rates directed to the lower (i.e., happy) threshold, multiplying them by −1. Accordingly, higher drift rates always imply higher speed of information accumulation for the correct response.

We first tested whether there is a general positivity bias, that is, whether drift was higher for happy-dominated trials than for angry-dominated trials. The paired-samples t test revealed no significant difference between the mean drift for angry-dominated (M = 0.46, SD = 0.33) and happy-dominated trials (M = 0.47, SD = 0.31), t(82) = −0.36, p = .721, d = −0.04. Then, we analyzed drift for angry-dominated trials and found a significant main effect of FR on ν_{angry}, b = 0.04, 95% CI [0.00, 0.09], β = .32, p = .047, indicating that higher FR is related to faster accumulation of negative information. This effect was moderated by a significant Group × FR interaction, b = −0.08, 95% CI [−0.14, −0.02], β = −.39, p = .014: In the satisfaction group, individuals with low FR (M −1 SD) accumulated negative information slower (ν = 0.34) than their fearful counterparts (M +1 SD, ν = 0.55). In the frustration group, on the other hand, the fearless individuals accumulated the negative information faster (ν = 0.58) than the fearful individuals (ν = 0.42; see also Figure 4, left plot in the middle row). There was no significant main effect of condition (b = 0.06, 95% CI [−0.09, 0.20], β = .08, p = .443). For ν_{happy} (see Figure 4, left plot in the bottom row), there was no significant main effect of FR (b = −0.01, 95% CI [−0.04, 0.02], β = −.05, p = .632), nor a main effect of condition (b = −0.10, 95% CI [−0.23, 0.04], β = −.16, p = .154), nor a condition by FR interaction effect (b = 0.02, 95% CI [−0.04, 0.08], β = .11, p = .487).

Table 1
Study 1: Hierarchical Regression of the Eye-Tracking Variables and Behavioral Variables on Group, Fear of Rejection (FR), and the Interaction Thereof

Step	Variable	% Duration of angry fixations	% Number of angry fixations	% Angry responses	MeanRT_{angry}	MeanRT_{happy}	Accuracy_{angry}	Accuracy_{happy}
				Implicit motive				
1	Intercept	49.01*** (0.26)	49.69*** (0.18)	47.71*** (1.00)	3.58*** (0.03)	3.57*** (0.03)	69.77*** (1.61)	74.35*** (1.42)
	Group[a]	0.80* (0.37)	0.49† (0.25)	3.30* (1.43)	−0.01 (0.04)	−0.01 (0.04)	3.58 (2.31)	−2.97 (2.03)
	FR	0.18* (0.08)	0.06 (0.05)	0.19 (0.31)	−0.00 (0.01)	−0.00 (0.01)	0.23 (0.50)	−0.15 (0.44)
	R^2 (adjusted)	.11	.05	.05	−.02	−.02	.01	.01
2	Intercept	49.01*** (0.26)	49.72*** (0.18)	47.66*** (1.01)	3.58*** (0.03)	3.57*** (0.03)	69.91*** (1.63)	74.59*** (1.42)
	Group[a]	0.80* (0.37)	0.49† (0.25)	3.30* (1.44)	−0.01 (0.04)	−0.01 (0.04)	3.58 (2.31)	−2.98 (2.02)
	FR	0.17 (0.12)	0.13† (0.08)	0.07 (0.44)	0.01 (0.01)	0.01 (0.01)	0.56 (0.71)	0.43 (0.62)
	Group × FR	0.02 (0.16)	−0.14 (0.11)	0.24 (0.62)	−0.03 (0.02)	−0.02 (0.02)	−0.65 (0.99)	−1.13 (0.87)
	R^2 (adjusted)	.10	.06	.04	−.00	−.01	.00	.01
				Explicit motive				
1	Intercept	48.92*** (0.26)	49.67*** (0.18)	47.55*** (0.97)	3.58*** (0.03)	3.57*** (0.03)	69.54*** (1.55)	74.43*** (1.41)
	Group[a]	0.98* (0.37)	0.54* (0.25)	3.62* (1.38)	−0.01 (0.04)	−0.01 (0.04)	4.05† (2.21)	−3.14 (2.00)
	FR	0.49 (0.37)	−0.01 (0.25)	2.73* (1.36)	0.03 (0.04)	0.05 (0.04)	4.78* (2.18)	−0.65 (1.98)
	R^2 (adjusted)	.07	.03	.09	−.02	−.00	.07	.01
2	Intercept	48.93*** (0.26)	49.66*** (0.18)	47.56*** (0.97)	3.58*** (0.03)	3.57*** (0.03)	69.58*** (1.56)	74.46*** (1.41)
	Group[a]	0.98* (0.38)	0.54* (0.25)	3.61* (1.38)	−0.01 (0.04)	−0.01 (0.04)	4.04† (2.22)	−3.14 (2.01)
	FR	0.30 (0.55)	0.16 (0.36)	2.54 (2.02)	0.04 (0.06)	0.05 (0.06)	3.29 (3.23)	−1.73 (2.93)
	Group × FR	0.35 (0.75)	−0.32 (0.50)	0.35 (2.74)	−0.02 (0.08)	−0.00 (0.08)	2.76 (4.39)	2.00 (3.98)
	R^2 (adjusted)	.06	.03	.08	−.03	−.01	.06	−.00

Note. The table contains unstandardized regression coefficients with standard errors in parentheses. FR was centered on the sample mean before the analyses. The analyses for mean RT are based on the logarithmized values.
[a] 1 = frustration; 0 = satisfaction.
† $p < .10$. * $p < .05$. *** $p < .001$.

We also computed a bias as the difference in drift rates between angry and happy trials ($v_{angry\text{-}happy}$) and found a significant Condition × FR interaction effect on $v_{angry\text{-}happy}$, $b = -0.10$, 95% CI [−0.19, −0.01], β = −.34, $p = .033$. Additionally, we computed all analyses for drift rates split up for easy versus difficult trials. In these analyses, the same pattern of results emerged for both the drift rates for easy and difficult stimuli.

No significant main or interaction effects were found for the other diffusion model parameters threshold separation (all $ps \geq .273$), nondecision time (all $ps \geq .198$) and intertrial variability of nondecision time (all $ps \geq .275$). Additionally, we conducted all analyses with explicit instead of implicit FR (see lower part of Table 1 and Table 2). No significant Group × FR interaction effects emerged (all $ps \geq .241$). However, as can be seen in Figure 5 (left column) the patterns for starting point and the drift rates are similar to the patterns found for the implicit measure. Furthermore, there were significant main effects of explicit FR on the percentage of angry responses ($b = 2.73$, 95% CI [0.03, 5.43], β = .21, $p = .048$) and the accuracy rate for angry responses ($b = 4.78$, 95% CI [0.44, 9.12], β = .23, $p = .031$): Individuals higher in explicit FR had a preference for responding angry and their accuracy rate for angry-dominated crowds was higher.

Finally, in a further set of analyses, we excluded all participants that expressed serious doubts about the correctness of the future belongingness feedback (4 or 5 on the Likert scale ranging from 1 to 5). An exclusion of these participants ($N = 21$) did not change the pattern of results.

Discussion

In Study 1, we could replicate the happy-superiority effect in attention reported by Bucher and Voss (2018, Study 3): The duration of fixations on happy faces was longer than the duration of fixations on angry faces. For responses, like Bucher and Voss (2018, Study 3), we did not find a significant positivity bias. Directions and sizes of biases in the MoC task were affected by implicit FR and by threat of social exclusion. The higher FR, the smaller was the positivity bias in the fixation duration. In addition, the positivity bias was reduced in the frustration compared with the satisfaction group. The condition also affected the proportion of angry responses: In the satisfaction group, participants had a positivity bias, whereas in the frustration group, they selected the response angry more often than the response happy.

Most important, there were two implicit FR by condition interaction effects for the diffusion model parameters starting point (prior bias) and drift rate (dynamic bias). As expected, fearless individuals counterregulated the threat of social exclusion by shifting their starting point in the direction of the happy threshold. The fearful individuals, on the other hand, shifted the starting point in the opposite direction. In addition, in the satisfaction condition, fearful individuals accumulated negative information faster than the less fearful individuals. Thus, the bias of the fearful individuals as reported by Nikitin and Freund (2015) can be traced back to a dynamic rather than a prior bias. Unexpectedly, this bias was moderated by the condition. Only in the satisfaction group the fearful individuals accumulated negative information faster whereas in the frustration group the less fearful individuals were faster in accu-

Table 2
Study 1: Hierarchical Regression of the Diffusion Model Parameters on Group, Fear of Rejection (FR), and the Interaction Thereof

Step	Variable	a	z_r	$v_{angry\text{-}happy}$	v_{angry}	v_{happy}	t_0	s_{t0}
				Implicit motive				
1	Intercept	2.46*** (0.08)	.49*** (.01)	−0.10 (0.08)	0.43*** (0.05)	0.52*** (0.05)	2.91*** (0.24)	2.49*** (0.22)
	Group[a]	0.12 (0.11)	.00 (.02)	0.15 (0.11)	0.06 (0.07)	−0.10 (0.07)	−0.26 (0.34)	−0.35 (0.32)
	FR	0.01 (0.02)	−.00 (0.00)	0.01 (0.02)	0.00 (0.02)	−0.01 (0.01)	−0.02 (0.07)	0.01 (0.07)
	R^2 (adjusted)	−.01	−.02	.01	−.02	.01	−.01	−.01
2	Intercept	2.46*** (0.08)	.49*** (.01)	−0.07 (0.07)	0.45*** (0.05)	0.52*** (0.05)	2.95*** (0.24)	2.52*** (0.22)
	Group[a]	0.12 (0.11)	.00 (.02)	0.15 (0.11)	0.06 (0.07)	−0.10 (0.07)	−0.26 (0.34)	−0.35 (0.32)
	FR	0.02 (0.03)	−.01† (0.01)	0.06† (0.03)	0.04* (0.02)	−0.02 (0.02)	0.07 (0.10)	0.08 (0.10)
	Group × FR	−0.02 (0.05)	.02* (.01)	−0.10* (0.05)	−0.08* (0.03)	0.02 (0.03)	−0.19 (0.14)	−0.14 (0.14)
	R^2 (adjusted)	−.02	.03	.05	.05	.00	−.01	−.01
				Explicit motive				
1	Intercept	2.46*** (0.08)	.49*** (.01)	−0.10 (0.07)	0.42*** (0.05)	0.53*** (0.05)	2.91*** (0.23)	2.47*** (0.22)
	Group[a]	0.13 (0.11)	.00 (.02)	0.16 (0.11)	0.06 (0.07)	−0.10 (0.07)	−0.25 (0.33)	−0.31 (0.31)
	FR	−0.05 (0.11)	.04† (.02)	0.01 (0.11)	0.06 (0.07)	0.05 (0.07)	0.42 (0.33)	0.55† (0.30)
	R^2 (adjusted)	−.00	.02	.00	−.01	.01	.00	.03
2	Intercept	2.46*** (0.08)	.49*** (.01)	−0.10 (0.07)	0.42*** (0.05)	0.53*** (0.05)	2.91*** (0.23)	2.47*** (0.22)
	Group[a]	0.13 (0.11)	.00 (.02)	0.16 (0.11)	0.06 (0.07)	−0.10 (0.07)	−0.25 (0.33)	−0.31 (0.31)
	FR	−0.05 (0.16)	.01 (.03)	0.11 (0.16)	0.08 (0.11)	−0.03 (0.10)	0.46 (0.48)	0.61 (0.45)
	Group × FR	−0.01 (0.22)	.05 (.04)	−0.20 (0.21)	−0.04 (0.15)	0.16 (0.13)	−0.07 (0.66)	−0.10 (0.61)
	R^2 (adjusted)	−.02	.02	.00	−.02	.02	−.01	.02

Note. The table contains unstandardized regression coefficients with standard errors in parentheses. FR was centered on the sample mean before the analyses.
[a] 1 = frustration; 0 = satisfaction.
† $p < .10$. * $p < .05$. *** $p < .001$.

mulating the negative information. In summary, for low-fear-participants, the manipulation simultaneously provoked an incongruent effect in starting point (prior bias), and a congruent effect in drift rate (dynamic bias).

Study 2

Study 2 was a replication of Study 1. We wanted to examine the reliability of our results. In contrast to Study 1, we did not collect eye-tracking data allowing us to collect a larger sample size. Furthermore, we also increased the number of test trials of the MoC task, using twice as many trials as in Study 1. Thereby, we could examine changes in biases over the time passed on the MoC task.

Method

Participants. In contrast to Study 1, we increased the sample size, recruiting a total of $N = 126$ participants. Like in Study 1, for recruiting we used the software hroot (Bock et al., 2014). All participants signed an informed consent before the beginning of the study and declared at the end of the study that their data could be used for analyses. Participants received either course credit or 8 € (approx. 9 US dollars). Most of the participants were students (94%); among them, only one participant studied psychology. The percentage of female participants was 81%. Mean age was 23.6 years (range = 18–54, $SD = 4.5$).

Design, material, and procedure. Almost all aspects of the study were identical to Study 1. There were only three differences: First, in Study 2, we used twice as many test trials for the MoC task as in Study 1. Thus, each factorial combination was realized 24 times, resulting in a total number of 192 trials. Second, we did not collect eye-tracking data. Accordingly, in contrast to Study 1, the fixation cross was always presented for 500 ms (not dependent on the gaze of the participant as in Study 1). Third, data collection was run in group sessions of up to seven participants that were seated in a laboratory with separated cubicles. The PCs had a screen resolution of 1920 × 1080 pixels.

Motive measures. The same measures as in Study 1 were used. The implicit fear values of our sample ranged from 0 to 11 ($M = 6.28$, $SD = 2.39$) and the hope values from 2 to 12 ($M = 5.83$, $SD = 2.06$). The internal consistency (Cronbach's α) was .65 and .57 for the fear and hope components, respectively. Explicit fear values ranged from 2.20 to 4.56 ($M = 3.30$, $SD = 0.43$) and hope values from 2.20 to 4.64 ($M = 3.39$, $SD = 0.51$). The internal consistency was .73 and .82 for the fear and hope components, respectively.

Results

First, we analyzed the first half of trials ($n = 96$), that is, the same block of trials as in Study 1. Accordingly, results between Study 1 and Study 2 are comparable. The results of the regression analyses are given in Table 3 (behavioral variables) and Table 4 (diffusion model parameters). Results of the analyses based on the second half of trials are presented in Table 5 (behavioral variables) and Table 6 (diffusion model parameters). Our intraindividual outlier criteria (see Study 1) resulted in an exclusion of 0.18% (Part 1) and 0.17% (Part 2) of the data. The diffusion model fit the data well (see Figure 6 and Figure 7).

Like in Study 1, we first tested for a general positivity bias. The proportion of angry responses ($M = 50.47\%$, $SD = 7.42\%$) did not deviate significantly from 50%, $t(125) = 0.71$, $p = .482$, $d = 0.06$. Furthermore, the proportion of angry classifications did not depend

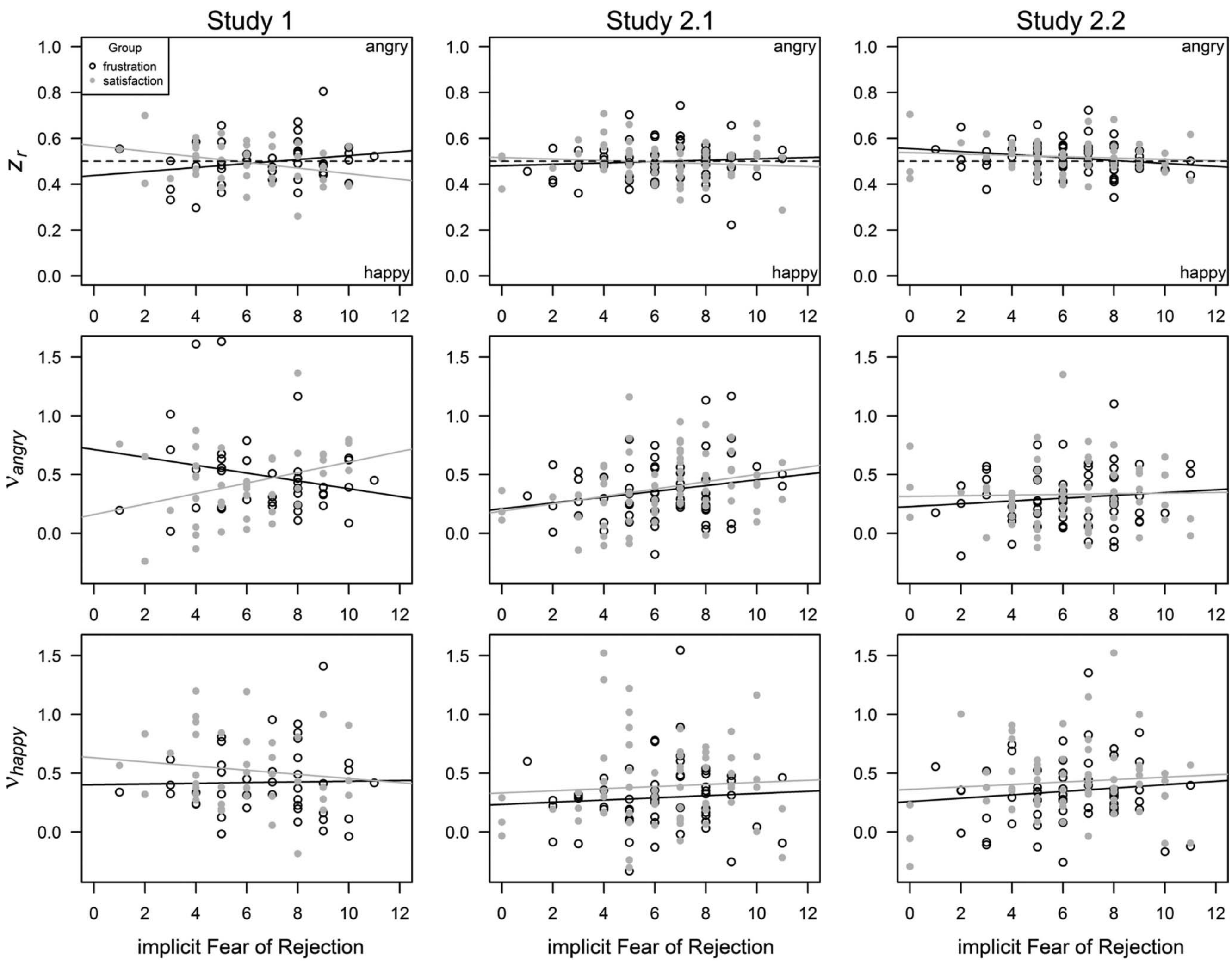

Figure 4. Effects of implicit fear of rejection (FR) and condition on starting point and drift rates for Study 1 (left column) and Study 2 (first part: middle column, second part: right column).

significantly on condition, $b = 1.71$, 95% CI [−0.91, 4.32], $\beta = .12$, $p = .198$, although, as in Study 1, in the frustration condition the number of angry classifications (51.36%) was larger than the number of happy classifications, whereas in the satisfaction condition, there was no clear bias (49.65%). Implicit FR did not affect the overall proportion of angry responses ($b = 0.27$, 95% CI [−0.28, 0.82], $\beta = .09$, $p = .332$), nor did the interaction of condition and FR ($b = 0.26$, 95% CI [−0.86, 1.37], $\beta = .05$, $p = .650$). However, in angry-dominated crowds, the proportion of angry responses was affected by FR. Specifically, the analysis of accuracy rates, conducted separately for angry- and happy-dominated crowds, revealed a significant effect of FR on the accuracy in angry-dominated crowds: The higher FR, the higher was the accuracy for these stimuli ($b = 0.87$, 95% CI [0.12, 1.62], $\beta = .20$, $p = .023$). There were no further significant effects for accuracy or mean RT (all ps $\geq .084$).

Then, we analyzed whether there was a general positivity bias regarding the diffusion model's starting point. Like in Study 1, the mean relative starting point z_r ($M = .50$, $SD = .08$) did not deviate from the center between the thresholds (i.e., $z_r = .50$), $t(125) = -0.38$, $p = .707$, $d = -0.03$. In contrast to Study 1, there was no significant Condition × FR interaction effect for starting point ($b = 0.01$, 95% CI [−0.01, 0.02], $\beta = .12$, $p = .322$). Note, however, that the pattern of results was similar to Study 1 (see Figure 4, middle panel in the upper row). In the satisfaction group, individuals with low FR ($M - 1$ SD) had an unbiased starting point ($z_r = .50$) and individuals with high FR ($M + 1$ SD) a starting point that is closer to the happy threshold ($z_r = .49$). In the frustration group, on the other hand, the opposite pattern emerged: For individuals with low FR starting point was shifted toward the happy threshold ($z_r = .49$), whereas the starting point of individuals with high FR was closer to the angry threshold ($z_r = .51$). Thus, as expected, individuals with low FR counterregulated the threat of social exclusion shifting their starting point toward the happy threshold.

In the analyses of drift rates, we first examined whether there is a general positivity bias. There was no significant difference between the drift for angry-dominated ($M = 0.38$, $SD = 0.27$) and

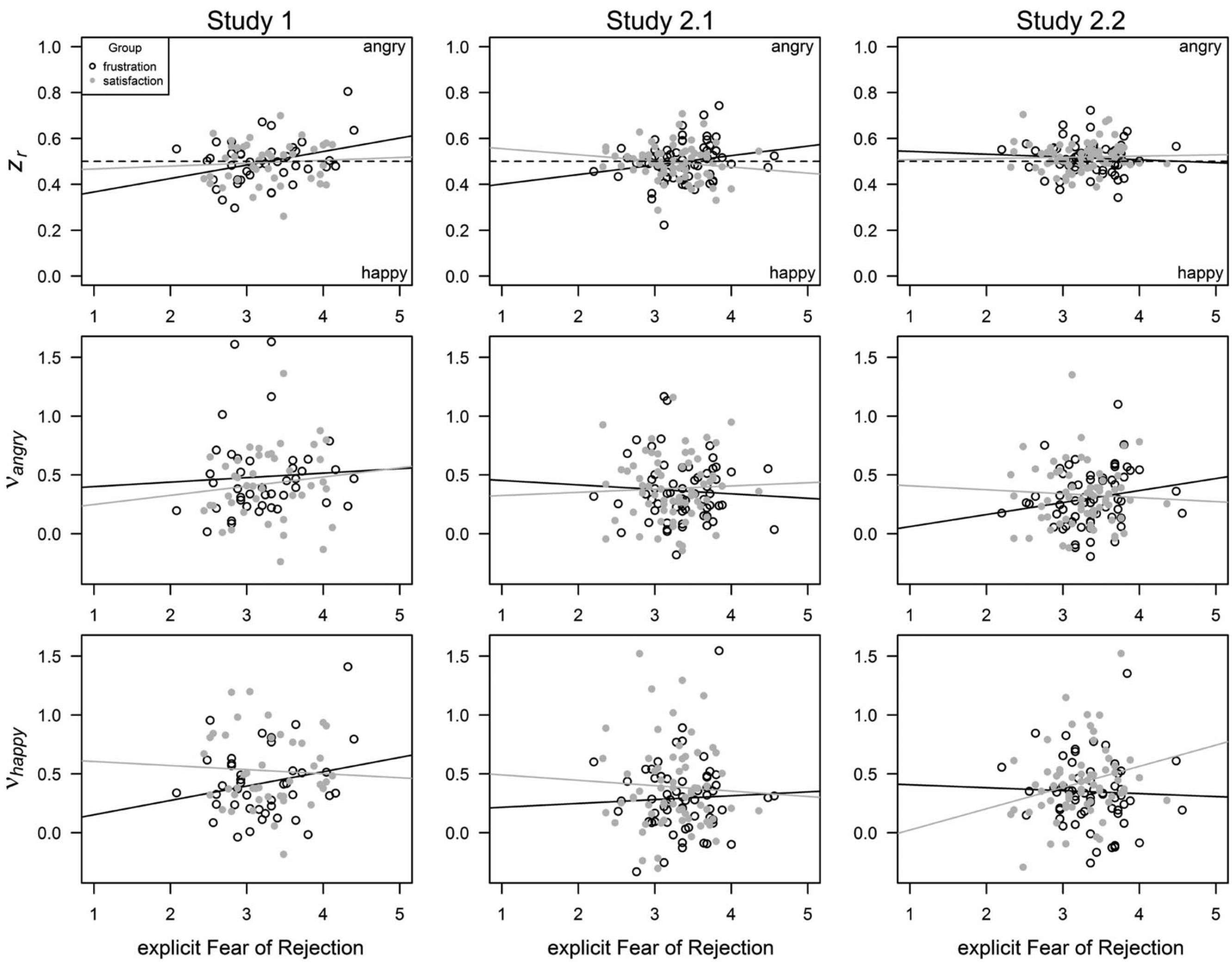

Figure 5. Effects of explicit fear of rejection (FR) and condition on starting point and drift rates for Study 1 (left column) and Study 2 (first part: middle column, second part: right column).

happy-dominated trials (M = 0.34, SD = 0.33), $t(125)$ = 0.82, p = .413, d = 0.07. In the regression analyses, like in Study 1, we found a significant main effect of FR on the drift rate in angry-dominated trials, b = 0.03, 95% CI [0.01, 0.05], β = .25, p = .004. More fearful individuals accumulated negative information faster than their less fearful counterparts (see also Figure 4, middle panel in the middle row). There was—like in Study 1—no significant main effect of condition, b = −0.02, 95% CI [−0.11, 0.07], β = −.04, p = .653. In contrast to Study 1, the effect of FR was not moderated by the condition, b = −0.01, 95% CI [−0.05, 0.03], β = −.04, p = .737. For ν_{happy} (see Figure 4, middle panel in the bottom row), there were—as in Study 1—no significant effects (main effect of FR: b = 0.01, 95% CI [−0.02, 0.03], β = .06, p = .467; main effect of condition: b = −0.10, 95% CI [−0.21, 0.02], β = −.14, p = .111; interaction effect: b = 0.00, 95% CI [−0.05, 0.05], β = .00, p = .991).

For the difference measure ($\nu_{angry\text{-}happy}$), there were no significant effects either (all $ps \geq .245$). The analyses in which we split up for easy versus difficult trials revealed the same pattern of results as for the measure averaged across the difficulty levels.

For the other diffusion model parameters nondecision time (all $ps \geq .227$) and intertrial variability of nondecision time (all $ps \geq .376$), there were no significant effects. There was only a tendency of a main effect of FR on threshold separation, b = −0.05, 95% CI [−0.10, 0.01], β = −.16, p = .084, suggesting that more fearful individuals had a lower threshold separation.

We additionally conducted all analyses with explicit instead of implicit FR. A marginally significant Group × FR interaction effect emerged for starting point, b = 0.07, 95% CI [0.00, 0.14], β = .25, p = .050. This effect is visualized in Figure 5 (middle panel in the upper row). In the satisfaction group, individuals with low FR (M −1 SD) had a starting point closer to the angry threshold (z_r = .51) and individuals with high FR (M +1 SD) a starting point that is closer to the happy threshold (z_r = .48). In the frustration group, on the other hand, the opposite pattern emerged: For individuals with low FR starting point was shifted toward the happy threshold (z_r = .48), whereas the starting point of individuals with high FR was closer to the angry threshold (z_r = .51). This pattern is the same as for the significant Group × Implicit FR interaction effect in Study 1. Thus, the less fearful individuals

Table 3
Study 2, First Part: Hierarchical Regression of the Behavioral Variables on Group, Fear of Rejection (FR), and the Interaction Thereof

Step	Variable	% Angry responses	MeanRT_{angry}	MeanRT_{happy}	Accuracy_{angry}	Accuracy_{happy}
			Implicit motive			
1	Intercept	49.65*** (0.91)	3.44*** (0.03)	3.44*** (0.03)	67.90*** (1.24)	68.57*** (1.44)
	Group[a]	1.71 (1.32)	−0.01 (0.04)	−0.02 (0.04)	−0.20 (1.80)	−3.62† (2.08)
	FR	0.27 (0.28)	−0.00 (0.01)	0.00 (0.01)	0.87* (0.38)	0.33 (0.44)
	R^2 (adjusted)	.00	−.02	−.01	.03	.01
2	Intercept	49.66*** (0.91)	3.44*** (0.03)	3.44*** (0.03)	67.90*** (1.25)	68.57*** (1.44)
	Group[a]	1.71 (1.32)	−0.01 (0.04)	−0.02 (0.04)	−0.20 (1.81)	−3.62† (2.09)
	FR	0.16 (0.36)	−0.00 (0.01)	−0.00 (0.01)	0.75 (0.50)	0.43 (0.57)
	Group × FR	0.26 (0.56)	0.00 (0.02)	0.01 (0.02)	0.28 (0.77)	−0.22 (0.89)
	R^2 (adjusted)	−.00	−.02	−.02	.02	.01
			Explicit motive			
1	Intercept	49.80*** (0.91)	3.44*** (0.03)	3.44*** (0.03)	68.09*** (1.27)	68.46*** (1.44)
	Group[a]	1.39 (1.32)	−0.01 (0.04)	−0.03 (0.04)	−0.61 (1.85)	−3.40 (2.10)
	FR	2.50 (1.56)	0.01 (0.05)	0.02 (0.05)	3.00 (2.17)	−1.98 (2.47)
	R^2 (adjusted)	.02	−.02	−.01	−.00	.01
2	Intercept	49.71*** (0.91)	3.44*** (0.03)	3.45*** (0.03)	68.06*** (1.28)	68.62*** (1.45)
	Group[a]	1.38 (1.32)	−0.01 (0.04)	−0.02 (0.04)	−0.61 (1.85)	−3.38 (2.10)
	FR	0.85 (2.19)	0.07 (0.07)	0.07 (0.07)	2.47 (3.07)	0.76 (3.47)
	Group × FR	3.32 (3.11)	−0.12 (0.10)	−0.10 (0.10)	1.08 (4.36)	−5.53 (4.93)
	R^2 (adjusted)	.02	−.01	−.01	−.01	.02

Note. The table contains unstandardized regression coefficients with standard errors in parentheses. FR was centered on the sample mean before the analyses. The analyses for mean RT are based on logarithmized RTs.
[a] 1 = frustration; 0 = satisfaction.
† $p < .10$. * $p < .05$. *** $p < .001$.

shifted their starting point toward the happy threshold if given negative feedback. All other Group × FR interaction effects were clearly not significant (all $ps \geq .203$), and there was no significant main effect of explicit FR either (all $ps \geq .112$). Note, however, that the pattern of results for the drift rates is similar to the pattern in Study 1 (Figure 5, middle and bottom row of left and middle column).

In our analyses for the second part of trials, no significant effects emerged (all $ps \geq .075$). In additional analyses, we also examined changes between the first and second part of trials subtracting the value in the first part from the value in the second part (see Table 7 for the behavioral variables and Table 8 for the diffusion model parameters). Several significant effects emerged. We found a significant explicit FR × Condition interaction effect, $b = -0.09$, 95% CI [−0.16, −0.01], $\beta = -.28$, $p = .025$. As can be seen in Figure 5 (panels in middle and right column of upper row), the interaction effect for the first part of trials disappeared in the second part. In the satisfaction group, individuals high in FR (M +1 SD) shifted their starting point over the time in the direction of the angry threshold ($z_{rdiff} = .10$) and individuals with low FR (M −1 SD) shifted it toward the happy threshold ($z_{rdiff} = -.05$). In the frustration group, on the other hand, the fearless individuals shifted the starting point toward the angry threshold ($z_{rdiff} = .15$), whereas the fearful individuals shifted it toward the happy threshold ($z_{rdiff} = -.11$).

Furthermore, for ν_{happy}, there was a significant effect of explicit FR ($b = 0.23$, 95% CI [0.03, 0.42], $\beta = .29$, $p = .025$): The higher explicit FR, the faster the participants got in accumulating positive information from the first to the second part of the task. This effect of FR was moderated by the condition, $b = -0.28$, 95% CI [−0.56, 0.00], $\beta = -.25$, $p = .047$. In the satisfaction group, individuals high in FR (M +1 SD) got faster in accumulating positive information ($\nu_{diff} = 0.15$) and individuals with low FR (M −1 SD) got more slowly ($\nu_{diff} = -0.04$). In the frustration group, on the other hand, both groups got faster, but the fearless individuals improved more ($\nu_{diff} = 0.08$) than the fearful individuals ($\nu_{diff} = 0.03$).

In further analyses, we excluded all participants that expressed serious doubts about the correctness of the future belongingness feedback (4 or 5 on the Likert scale ranging from 1 to 5). The exclusion of these participants ($N = 37$) did not change the pattern of results.

Discussion

In Study 2, like in Study 1, we did not find a general positivity bias in the proportion of responses. Also consistent with Study 1, the diffusion model analyses revealed that FR was related to a fast accumulation of negative information. Contrary to Study 1, this effect was present in both the satisfaction and frustration group.

Again, the fearless participants shifted their starting point in the direction of the happy threshold if they were frustrated. In contrast to Study 1, however, this interaction was driven by explicit FR. Thus, we found again support for a compensatory process. This effect in starting point was only present for the first part of trials. In the second part, the pattern was even reversed. Also effects in drift rate changed from the first to the second part. The effect of implicit FR on ν_{angry} was not significant any more for the second part of trials. Furthermore, the fearful individuals got faster in accumulating positive information. This effect was, however, re-

Table 4
Study 2, First Part: Hierarchical Regression of the Diffusion Model Parameters on Group, Fear of Rejection (FR), and the Interaction Thereof

Step	Variable	a	z_r	$v_{angry\text{-}happy}$	v_{angry}	v_{happy}	t_0	s_{t0}
				Implicit motive				
1	Intercept	2.43*** (0.09)	.50*** (.01)	−0.00 (0.05)	0.39*** (0.03)	0.39*** (0.04)	1.99*** (0.15)	1.76*** (0.17)
	Group[a]	0.02 (0.12)	.00 (.01)	0.07 (0.08)	−0.02 (0.05)	−0.10 (0.06)	−0.23 (0.22)	−0.03 (0.25)
	FR	−0.05† (0.03)	−.00 (.00)	0.02 (0.02)	0.03** (0.01)	0.01 (0.01)	0.06 (0.05)	0.02 (0.05)
	R^2 (adjusted)	.01	−.02	.00	.05	.01	.01	−.02
2	Intercept	2.43*** (0.09)	.50*** (.01)	−0.00 (0.05)	0.39*** (0.03)	0.39*** (0.04)	1.99*** (0.15)	1.76*** (0.17)
	Group[a]	0.02 (0.12)	.00 (.01)	0.07 (0.08)	−0.02 (0.05)	−0.10 (0.06)	−0.23 (0.22)	−0.03 (0.25)
	FR	−0.07† (0.03)	−.00 (.00)	0.02 (0.02)	0.03* (0.01)	0.01 (0.02)	0.09 (0.06)	0.06 (0.07)
	Group × FR	0.05 (0.05)	.01 (.01)	−0.01 (0.03)	−0.01 (0.02)	0.00 (0.03)	−0.08 (0.09)	−0.10 (0.11)
	R^2 (adjusted)	.01	−.02	−.01	.04	.00	.00	−.02
				Explicit motive				
1	Intercept	2.43*** (0.09)	.50*** (.01)	−0.00 (0.06)	0.39*** (0.03)	0.39*** (0.04)	1.99*** (0.15)	1.75*** (0.17)
	Group[a]	0.02 (0.13)	.00 (.01)	0.07 (0.08)	−0.02 (0.05)	−0.10 (0.06)	−0.22 (0.22)	0.01 (0.25)
	FR	0.05 (0.15)	.01 (.02)	0.00 (0.09)	−0.00 (0.06)	−0.01 (0.07)	−0.12 (0.26)	−0.31 (0.30)
	R^2 (adjusted)	−.02	−.01	−.01	−.01	.00	−.01	−.01
2	Intercept	2.44*** (0.09)	.49*** (.01)	0.00 (0.06)	0.39*** (0.03)	0.39*** (0.04)	2.00*** (0.15)	1.76*** (0.17)
	Group[a]	0.02 (0.13)	.00 (.01)	0.07 (0.08)	−0.02 (0.05)	−0.10 (0.06)	−0.22 (0.22)	0.01 (0.25)
	FR	0.16 (0.21)	−.03 (.02)	0.07 (0.13)	0.03 (0.08)	−0.05 (0.10)	0.16 (0.37)	−0.01 (0.42)
	Group × FR	−0.22 (0.30)	.07† (.03)	−0.14 (0.19)	−0.07 (0.11)	0.08 (0.14)	−0.56 (0.52)	−0.61 (0.59)
	R^2 (adjusted)	−.02	.01	−.01	−.02	−.00	−.00	−.01

Note. The table contains unstandardized regression coefficients with standard errors in parentheses. FR was centered on the sample mean before the analyses.
[a] 1 = frustration; 0 = satisfaction.
† $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$.

duced in the frustration group. These analyses demonstrate that the time passed on the MoC task plays an important role and should be considered further in future studies.

General Discussion

In the MoC task by Bucher and Voss (2018), participants have to assess the overall mood of a number of facial expressions as fast and accurately as possible. We used a variant of the task in which participants were presented with crowds consisting of both happy and angry facial expressions (i.e., design like in Study 3 by Bucher & Voss, 2018). Bucher and Voss (2018, Study 3) report a happy-superiority effect in eye-tracking data. We aimed at replicating the happy-superiority effect. Furthermore, we examined two potential moderators: the personality variable FR and the situational variable *threat of social exclusion*. Threat of social exclusion was varied using an adapted version of the future-alone manipulation by Twenge et al. (2001): Two groups received fictitious feedback about their future social relationships, which was either negative (frustration group) or positive (satisfaction group). After the feedback, participants worked on the MoC task. In both our studies, we used diffusion modeling (Ratcliff, 1978) to disentangle the processes involved in execution of the task. We separated prior biases (i.e., biases that are present already before the stimuli are shown) from dynamic biases (i.e., biases regarding the accumulation of information). In Study 1, we additionally collected eye-tracking data whereas in Study 2, we used a larger sample size (Study 1: $N = 84$, Study 2: $N = 126$) and a higher number of trials (Study 1: $n = 96$, Study 2: $n = 192$).

Summary and Interpretation of Main Findings

We found support for a general happy-superiority effect: Eye-tracking data showed preferred fixations on happy faces. In the response behavior, there was no significant preference for the response happy. These findings are in line with Bucher and Voss (2018) who in their Study 3—that used the same type of MoC task applied here—also found a positivity bias in the fixation data but not in classifications. Biases in the MoC task seem to be dependent on personality and situational variables as we will elaborate in the following.

Fear of rejection. Nikitin and Freund (2015) report that individuals with high FR are more likely to interpret poorly visible faces as negative than less fearful individuals. In our studies, we also observed a negativity bias among individuals high in FR. Specifically, we found that FR was positively related to the relative duration of fixations on angry faces. Because of the diffusion model analyses, we could get a deeper insight into how FR affected emotional judgments: In both studies, FR was positively related to the speed of information accumulation for negative information (drift rate of the diffusion model). Thus, the fearful individuals seem to accumulate negative information faster than their less fearful counterparts (i.e., a *dynamic* bias; in Study 1 only significant in the satisfaction group).

Threat of social exclusion. Our data indicate an increased preference for fixations on angry faces after the frustration manipulation. Furthermore, participants from the frustration group showed an increased probability for negative classifications, whereas in the satisfaction group, there was a preference

Table 5
Study 2, Second Part: Hierarchical Regression of the Behavioral Variables on Group, Fear of Rejection (FR), and the Interaction Thereof

Step	Variable	% Angry responses	$\text{MeanRT}_{\text{angry}}$	$\text{MeanRT}_{\text{happy}}$	$\text{Accuracy}_{\text{angry}}$	$\text{Accuracy}_{\text{happy}}$
			Implicit motive			
1	Intercept	49.70*** (0.99)	3.38*** (0.03)	3.39*** (0.03)	67.20*** (1.33)	67.80*** (1.51)
	Group[a]	1.00 (1.43)	−0.01 (0.04)	−0.01 (0.04)	−1.12 (1.93)	−3.13 (2.19)
	FR	−0.42 (0.30)	0.00 (0.01)	−0.00 (0.01)	−0.04 (0.40)	0.80[†] (0.46)
	R^2 (adjusted)	.00	−.02	−.02	−.01	.02
2	Intercept	49.70*** (0.99)	3.38*** (0.03)	3.39*** (0.03)	67.20*** (1.33)	67.80*** (1.51)
	Group[a]	1.00 (1.44)	−0.01 (0.04)	−0.01 (0.04)	−1.12 (1.93)	−3.13 (2.20)
	FR	−0.36 (0.40)	0.00 (0.01)	0.00 (0.01)	−0.05 (0.53)	0.67 (0.60)
	Group × FR	−0.14 (0.61)	0.00 (0.02)	−0.00 (0.02)	0.04 (0.82)	0.32 (0.93)
	R^2 (adjusted)	−.00	−.02	−.02	−.02	.02
			Explicit motive			
1	Intercept	49.63*** (1.00)	3.38*** (0.03)	3.39*** (0.03)	67.24*** (1.33)	67.99*** (1.53)
	Group[a]	1.15 (1.46)	−0.01 (0.04)	−0.01 (0.04)	−1.20 (1.94)	−3.52 (2.23)
	FR	−1.08 (1.71)	0.03 (0.05)	0.03 (0.05)	0.70 (2.29)	2.88 (2.62)
	R^2 (adjusted)	−.01	−.01	−.01	−.01	.01
2	Intercept	49.53*** (1.00)	3.38*** (0.03)	3.39*** (0.03)	67.27*** (1.35)	68.23*** (1.52)
	Group[a]	1.14 (1.45)	−0.01 (0.04)	−0.01 (0.04)	−1.20 (1.95)	−3.49 (2.21)
	FR	−2.96 (2.41)	0.07 (0.07)	0.07 (0.07)	1.16 (3.23)	7.12[†] (3.66)
	Group × FR	3.79 (3.42)	−0.08 (0.10)	−0.08 (0.10)	−0.93 (4.59)	−8.56 (5.20)
	R^2 (adjusted)	−.01	−.02	−.02	−.02	.02

Note. The table contains unstandardized regression coefficients with standard errors in parentheses. FR was centered on the sample mean before the analyses. The analyses for mean RT are based on logarithmized RTs.
[a] 1 = frustration; 0 = satisfaction.
[†] $p < .10$. *** $p < .001$.

for "positive" (Study 1) or no preference for either of the two response options (Study 2).

Fear of Rejection × Threat of Social Exclusion. DeWall et al. (2009), who also used the future-alone manipulation, found that individuals in the future-alone condition oriented their attention more toward positive stimuli than individuals in the future-belonging condition. They explained their findings in terms of a "desire for compensatory social acceptance" (p. 738). In our studies, we also found evidence for processes of a mood-restoration mechanism. This process was suggested by an increased *prior* bias for positive stimuli in the frustration condition. This bias was only present among individuals with low FR. The starting point of the more fearful individuals, on the other hand, was closer to the negative threshold. This interaction pattern was identical in Study 1 and Study 2 and showed up for both implicit and explicit FR. The effects were, however, rather small and not entirely statistically reliable. In Study 1, only the implicit FR × Condition interaction was significant, while in Study 2, the explicit FR × Condition interaction was marginally significant.

In Study 1, we further observed an unexpected implicit FR × Condition interaction for speed of accumulation in angry-dominated trials. Whereas in the satisfaction group, the fearful individuals accumulated negative information faster, this effect was reversed in the frustration group. In the frustration group, the fearless individuals accumulated negative information faster. Thus, for low-fear-participants, the manipulation simultaneously provoked an incongruent effect in starting point (prior bias), and a congruent effect in drift rate (dynamic bias). As we could not replicate the effect in drift rate in Study 2, which was the study with the higher number of participants, it needs to be interpreted with caution. Note, however, that for explicit FR a similar interaction pattern in drift rate was present consistently across the two studies (though not significant). Taken together, our findings suggest that even if fearless individuals tried to counteract their current motivational state ("top-down"), this state still ("bottom-up") influenced how they processed information.

Temporal stability of effects. In Study 2, we also examined the stability of biases, using twice as many trials as in Study 1, which allowed us to conduct separate analyses for the first and second half of trials. Notably, for the second half of trials the FR by condition interaction effect in starting point reversed. The prior bias of fearful individuals for negative facial information in the frustration group was not present any more in the second part. Thus, the repeated presentation of facial stimuli (with an equal number of positive- and negative-dominated crowds) might change the prior bias of fearful individuals.

MoC Versus Face-in-the-Crowd

DeWall et al. (2009, Studies 2 and 3) had participants look at arrays of faces with different emotional expressions for a period of 30 s each. Participants did not get performance instructions, as they were just told to "look naturally at the screen." The analyses revealed that socially excluded participants fixated the happy faces more than nonexcluded participants. Our studies lean further support for this compensatory process, showing that fearless individuals shift their starting point toward the happy threshold after having experienced threat of social exclusion.

However, there also seem to be discrepancies between our results and the results by DeWall et al. (2009). DeWall et al. (2009,

Table 6
Study 2, Second Part: Hierarchical Regression of the Diffusion Model Parameters on Group, Fear of Rejection (FR), and the Interaction Thereof

Step	Variable	a	z_r	$v_{angry\text{-}happy}$	v_{angry}	v_{happy}	t_0	s_{t0}
				Implicit motive				
1	Intercept	2.28*** (0.08)	.52*** (.01)	−0.10 (0.06)	0.33*** (0.04)	0.43*** (0.04)	1.77*** (0.14)	1.52*** (0.16)
	Group[a]	0.08 (0.11)	−.00 (.01)	0.05 (0.09)	−0.03 (0.05)	−0.08 (0.06)	−0.25 (0.21)	−0.11 (0.24)
	FR	0.00 (0.02)	−.00† (.00)	−0.01 (0.02)	0.01 (0.01)	0.01 (0.01)	0.00 (0.04)	−0.07 (0.05)
	R^2 (adjusted)	−.01	.01	−.01	−.01	.01	−.00	−.00
2	Intercept	2.28*** (0.08)	.52*** (.01)	−0.10 (0.06)	0.33*** (0.04)	0.43*** (0.04)	1.77*** (0.15)	1.52*** (0.16)
	Group[a]	0.08 (0.11)	−.00 (.01)	0.05 (0.09)	−0.03 (0.05)	−0.08 (0.06)	−0.25 (0.21)	−0.11 (0.24)
	FR	−0.01 (0.03)	−.00 (.00)	−0.01 (0.02)	0.00 (0.01)	0.01 (0.02)	0.03 (0.06)	−0.04 (0.07)
	Group × FR	0.03 (0.05)	−.00 (.00)	0.01 (0.04)	0.01 (0.02)	0.00 (0.03)	−0.07 (0.09)	−0.07 (0.10)
	R^2 (adjusted)	−.02	.01	−.02	−.02	−.00	−.01	−.00
				Explicit motive				
1	Intercept	2.28*** (0.08)	.52*** (.01)	−0.10 (0.06)	0.33*** (0.04)	0.43*** (0.04)	1.78*** (0.15)	1.52*** (0.17)
	Group[a]	0.08 (0.11)	−.00 (.01)	0.06 (0.09)	−0.03 (0.05)	−0.09 (0.06)	−0.27 (0.21)	−0.10 (0.24)
	FR	−0.05 (0.13)	−.00 (.01)	−0.04 (0.10)	0.03 (0.06)	0.08 (0.07)	0.17 (0.25)	−0.03 (0.28)
	R^2 (adjusted)	−.01	−.01	−.01	−.01	.01	−.00	−.01
2	Intercept	2.29*** (0.08)	.52*** (.01)	−0.11† (0.06)	0.33*** (0.04)	0.44*** (0.04)	1.79*** (0.15)	1.53*** (0.17)
	Group[a]	0.09 (0.11)	−.00 (.01)	0.05 (0.09)	−0.03 (0.05)	−0.09 (0.06)	−0.27 (0.21)	−0.10 (0.24)
	FR	0.10 (0.18)	.01 (.02)	−0.21 (0.14)	−0.03 (0.09)	0.18† (0.10)	0.34 (0.35)	0.08 (0.40)
	Group × FR	−0.30 (0.26)	−.02 (.03)	0.34† (0.21)	0.14 (0.13)	−0.21 (0.14)	−0.35 (0.50)	−0.22 (0.57)
	R^2 (adjusted)	−.01	−.02	.00	−.01	.02	−.00	−.02

Note. The table contains unstandardized regression coefficients with standard errors in parentheses. FR was centered on the sample mean before the analyses.
[a] 1 = frustration; 0 = satisfaction.
† $p < .10$. * $p < .05$. *** $p < .001$.

Study 1) observed that frustrated individuals are faster in assessing the mood of a happy target face. We, on the other hand, found that frustrated individuals fixated more angry than happy faces and more often responded angry than happy. The results, thus, seem to be contradictory. However, there is a crucial difference regarding the task between the study by DeWall et al. (2009) and our study. DeWall et al. (2009) used a face-in-the-crowd task, in which participants had to find a face among a crowd of distractor faces and they had to classify the mood of this divergent face. If participants are fast at identifying the mood of the happy face, this might be attributable to their fast classification of the happy face. However, it is also possible that they respond fast to the happy-face target because they are faster at accumulating information about the distractor faces (i.e., the neutral faces).

The advantage of the MoC task is that not the mood of one single face, but the overall mood of an entire crowd needs to be assessed. Thus, all facial stimuli are relevant for the decision, not only one single target face. In future studies, it would be interesting to assess the face-in-the-crowd task and the MoC task within one sample to examine relationships and discrepancies between the different measures.

Implicit and Explicit Motives

In the literature, it has been noted that implicit motives influence spontaneous behavior, whereas explicit motives affect deliberate choices (e.g., Brunstein & Hoyer, 2002; Brunstein & Maier, 2005; see also McClelland et al., 1989). If, for example, a participant has to decide whether to continue working on a performance task, this is supposed to be influenced by the explicit rather than the implicit achievement motive. If, on the other hand, the effort invested into a task is examined, the strength of the implicit rather than the explicit achievement motive should be decisive.

In our studies, we did not find such a clear distinction between implicit and explicit FR. Because of the similar pattern of results for the two motive variables, we conducted an additional analysis, in which we used a combined measure of implicit and explicit FR (mean of z-standardized implicit and explicit FR). In this analysis, we used the data of both studies (with only the first half of trials of Study 2 to enhance comparability with Study 1), including the number of the study as moderator. There was no significant moderation by the study number. Most essentially, for the starting point the condition by FR interaction effect was again significant and for the drift rate for angry-dominated trials the interaction was marginally significant. Furthermore, there was a significant main effect of FR on the drift rate for angry-dominated trials. Thus, the main pattern of results remains unchanged if the data of both studies are examined together and if both motive components are combined into one measure.

We can imagine three possible reasons for the similar findings for implicit and explicit FR: First, as far as we know, all previous studies that found a clear distinction between the behavioral effects of implicit and explicit motives focused on the hope rather than the fear component. Implicit and explicit fear of rejection might have more similar effects than implicit and explicit hope of affiliation or implicit and explicit hope for success. Second, another reason for the similar findings for implicit and explicit FR might be, that—as some researchers argue—the MMG does not measure implicit, but rather "semi-implicit" motives (e.g., Schüler et al., 2015, but see,

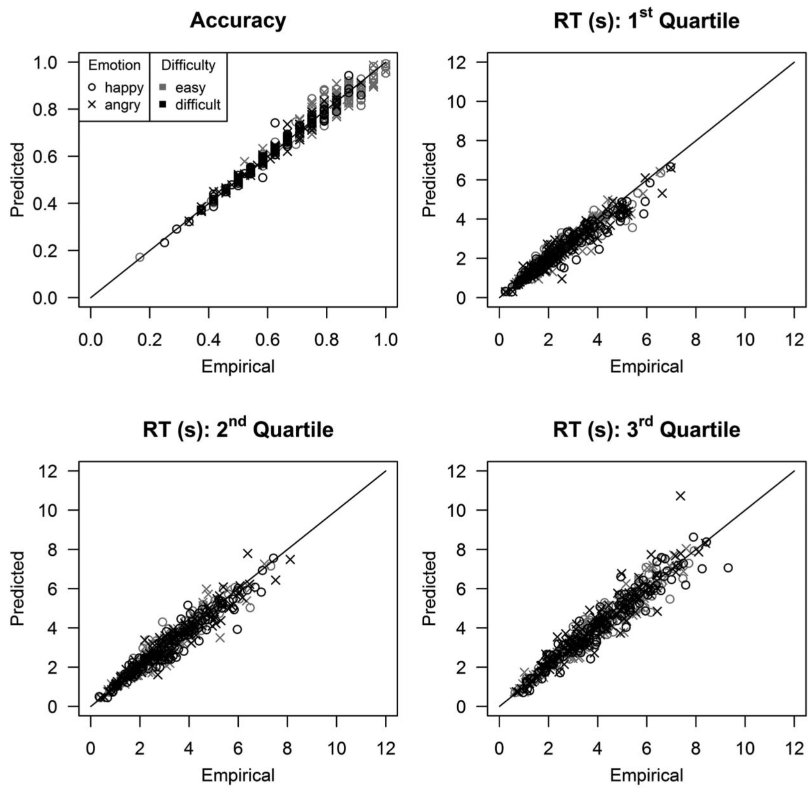

Figure 6. Graphical examination of model fit for first part of Study 2.

e.g., Langens & Schmalt, 2008). To examine this question, we computed correlations between the implicit and explicit fear and hope components of the affiliation motive. These analyses revealed small implicit-explicit relationships (Study 1: fear: $r = .20$, hope: $r = .14$; Study 2: fear: $r = .19$, hope: $r = .05$), suggesting that the MMG measures something different from the explicit motive measures. However, it would still be interesting to test whether our findings can be replicated with a motive measure that uncontroversially measures implicit motives. Thus, in future studies, Picture Story Exercises (e.g., McClelland et al., 1989; Schultheiss & Pang, 2007) might be used rather than—or in addition to—the administration of the MMG.

The third account is that there are differences in the implicit nature of drift rate and starting point. Remember that the condition by FR interaction effect on the starting point was found for both implicit and explicit FR. The significant correlation between FR and drift for negative information, on the other hand, was present only for the implicit motive. On a continuum of explicitness, starting point is probably closer to the explicit pole than drift rate, which is more likely to measure purely implicit processes. Thus, our results might actually be seen as in line with the findings from the literature. These findings could stimulate further interesting research in which one might try to examine—also based on other research fields (not only the affiliation motive)—whether the starting point measures explicit components of processing whereas the drift rate rather measures implicit processes.

Further knowledge about differences between prior and dynamic biases could help to deduce training programs, for example for giving presentations in front of crowds of people (a situation that in many jobs is not avoidable). Thereby, negative prior biases might require different interventions than negative dynamic biases. For example, if a person manifests a negative prior bias, it might be helpful to use explicit interventions. The presenting person might be encouraged to imagine beforehand who will be in the crowd and realize that most of the people are sympathetic toward them (e.g., friendly colleagues, family members, etc.). In the treatment of negative *dynamic* biases, on the other hand, implicit methods might be more fruitful. Individuals might be trained in directing their attention to happy faces. Thus, we think that the distinction between prior and dynamic biases it not only important for a better understanding of the mechanisms underlying behavior, but in consequence also for the composition of intervention programs.

Counterregulation Theory

One finding from our studies might seem astonishing at first glance: In the satisfaction group, the fearless individuals (Study 1: implicit FR; Study 2: explicit FR) had a prior bias for negative facial expressions. This cannot be explained on the mere basis of needs theories, which only assume that individuals will try to restore a thwarted need. However, our result is in line with the counterregulation theory by Rothermund, Voss, and Wentura (2008, see also Rothermund, 2011; Wentura, Müller, Rothermund, & Voss, 2018; Wentura, Voss, & Rothermund, 2009). This theory assumes that automatic attentional processes operate to counteract

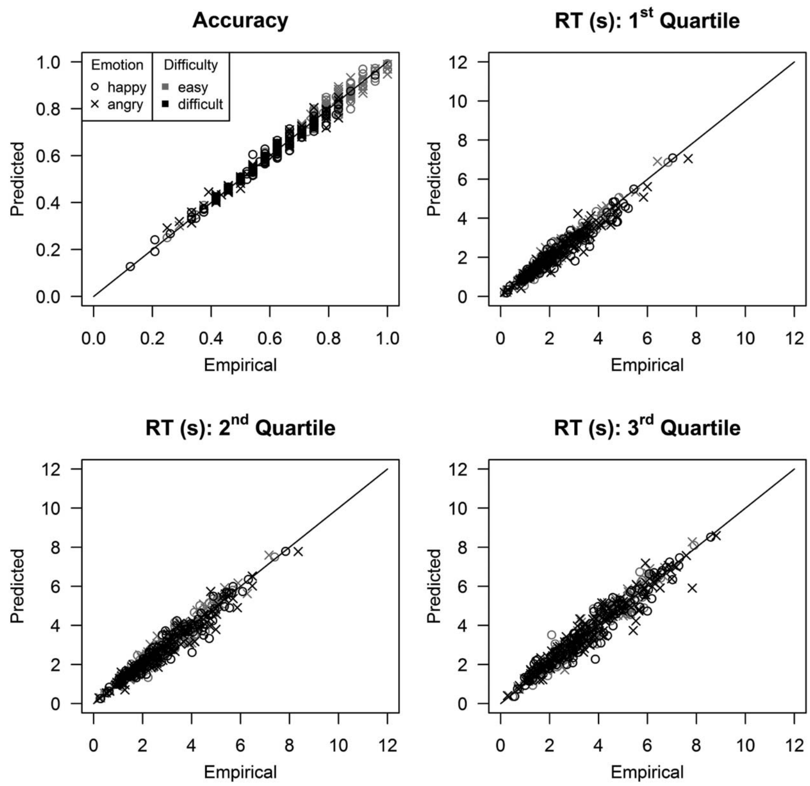

Figure 7. Graphical examination of model fit for second part of Study 2.

momentary motivational and affective states. This incongruence effect has been shown for both positive and negative states. Thus, individuals with a negative outcome focus direct their attention to positive information, whereas the opposite is true for individuals in a positive outcome focus. These mechanisms help people to avoid emotional escalations and maintain a status of homeostasis and, in consequence, lead to more flexibility in information processing.

The exact processes underlying the counterregulation have not yet been fully understood. Our results suggest that counterregulation manifests in the prior setting of the starting point rather than in differences in speed of information accumulation. A study by Voss and Schwieren (2015, Study 1) has revealed a similar pattern. Using a color-classification paradigm, in which different colors indicated financial gains and losses, the authors found a general positivity bias in starting point. If, however, participants had already reached high financial gains (in other words, they were satisfied with their performance) and were at the same time in control of their outcomes (i.e., they could select strategies to maximize their gains), the starting point was shifted in the direction of the negative threshold. If participants did not have control, there were no counterregulatory processes for the starting point. Furthermore, drift rate was not affected by any of the two variables (financial gains and possibility of control).

Thus, from the results by Voss and Schwieren (2015, Study 1) one might infer that drift rate and starting point differ in the degree to which they are affected by top-down processes. Starting point is more affected by top-down processes than drift rate. This reasoning is in accordance with our finding that for drift rate there was only an effect of implicit FR, whereas starting point was also affected by explicit FR (see preceding section on “Implicit and Explicit Motives” for further details).

Whereas the previous studies typically observed counterregulatory processes in the context of anticipated financial outcomes, the present study expands the scope of this approach to the realm of motive frustration (see Koranyi & Rothermund, 2012, for an example of the application of counterregulation in social relationships).

Diffusion Modeling in Motive Research

We did not find significant group by FR interaction effects for the behavioral variables (mean RT and accuracy). This finding is in line with the results from other diffusion model studies that report effects on model parameters but not on behavioral data (e.g., Lerche et al., 2018; Lerche, Neubauer, et al., 2018). There are different explanations why effects on model parameters can be more robust than effects on behavioral data: First, it is possible that experimental effects spread over error rates and RT means, and only the combination of both sources allows pinpointing an effect. Second, diffusion model parameters are purer measures for single processes; thus, possibly reducing measurement errors. Third, as is the case in our Study 1, two different cognitive mechanisms might be triggered that cancel out each other’s effects on behavioral variables to a certain degree. Thus, one great advantage of diffusion modeling is the ability of disentangling different, otherwise confounded, processes.

Table 7
Study 2, Second Part–First Part: Hierarchical Regression of the Behavioral Variables on Group, Fear of Rejection (FR), and the Interaction Thereof

Step	Variable	% Angry responses	$\text{MeanRT}_{\text{angry}}$	$\text{MeanRT}_{\text{happy}}$	$\text{Accuracy}_{\text{angry}}$	$\text{Accuracy}_{\text{happy}}$
			Implicit motive			
1	Intercept	0.05 (0.94)	-0.06^{***} (0.02)	-0.06^{***} (0.02)	−0.69 (1.31)	−0.77 (1.19)
	Group[a]	−0.70 (1.36)	0.00 (0.02)	0.02 (0.02)	−0.91 (1.90)	0.49 (1.73)
	FR	-0.69^{*} (0.29)	0.00 (0.01)	−0.00 (0.00)	-0.91^{*} (0.40)	0.47 (0.36)
	R^2 (adjusted)	.03	−.01	−.01	.03	−.00
2	Intercept	0.05 (0.94)	-0.06^{***} (0.02)	-0.06^{***} (0.02)	−0.69 (1.31)	−0.76 (1.19)
	Group[a]	−0.71 (1.37)	0.00 (0.02)	0.02 (0.02)	−0.91 (1.90)	0.49 (1.73)
	FR	−0.52 (0.38)	0.00 (0.01)	0.00 (0.01)	−0.81 (0.52)	0.24 (0.48)
	Group × FR	−0.40 (0.58)	−0.00 (0.01)	−0.01 (0.01)	−0.24 (0.81)	0.54 (0.74)
	R^2 (adjusted)	.03	−.02	−.02	.02	−.01
			Explicit motive			
1	Intercept	−0.17 (0.95)	-0.06^{***} (0.02)	-0.06^{***} (0.02)	−0.85 (1.34)	−0.48 (1.18)
	Group[a]	−0.24 (1.38)	0.00 (0.02)	0.01 (0.02)	−0.59 (1.95)	−0.12 (1.72)
	FR	-3.58^{*} (1.62)	0.02 (0.03)	0.01 (0.03)	−2.30 (2.29)	4.86^{*} (2.02)
	R^2 (adjusted)	.02	−.01	−.01	−.01	.03
2	Intercept	−0.18 (0.96)	-0.06^{***} (0.02)	-0.06^{***} (0.02)	−0.79 (1.35)	−0.39 (1.19)
	Group[a]	−0.24 (1.39)	0.00 (0.02)	0.01 (0.02)	−0.58 (1.95)	−0.11 (1.72)
	FR	$-3.81^{\dagger}$ (2.30)	−0.00 (0.04)	0.00 (0.04)	−1.31 (3.23)	6.36^{*} (2.85)
	Group × FR	0.47 (3.26)	0.04 (0.06)	0.02 (0.06)	−2.01 (4.59)	−3.03 (4.04)
	R^2 (adjusted)	.02	−.02	−.02	−.01	.03

Note. The table contains unstandardized regression coefficients with standard errors in parentheses. FR was centered on the sample mean before the analyses. The analyses for mean RT are based on logarithmized RTs.
[a] 1 = frustration; 0 = satisfaction.
$^{\dagger} p < .10$. $^{*} p < .05$. $^{***} p < .001$.

As far as we know, up-to-date only one other study has applied the diffusion model to analyze effects of a threatened motive (Lerche, Neubauer, et al., 2018). The study focused on the achievement motive and found that individuals high in implicit fear of failure whose motive is frustrated are worse in information accumulation. The present study that was based on the affiliation motive further demonstrates that mathematical models such as the diffusion model can help to gain new insights in the field of motive research.

Note that in our eye-tracking data, we did not find motive by condition interaction effects either. One problem of eye-tracking is that a longer duration of fixations does not give clear indications about the exact underlying processes. The reasons for a fixation can be manifold: Individuals can fixate stimuli, for example, because they are interested in them, or because they have more difficulty to understand them (e.g., Was, Sansosti, & Morris, 2017, p. 156). An interesting idea for future research would be to use joint modeling of eye-tracking data and diffusion model data in one model (cf. Krajbich, Armel, & Rangel, 2010).

Integration of Motive Disposition Theory and Needs Theories

In different research traditions, different concepts have been investigated that focus on satisfying relationships with other individuals. Schüler and Brandstätter (2013, see also Schüler, Sheldon, & Fröhlich, 2010) regard the *affiliation motive* of the motive disposition theory (e.g., McClelland, 1985) to be analogue to the *need for relatedness* of needs theories (e.g., Baumeister & Leary, 1995; Deci & Ryan, 2000, 2002) such as the self-determination theory. They argue that the incentives of the affiliation motive are "phenomenologically closely related" to characteristics of the environment that are supposed to fulfill the social relatedness need (p. 689). One major difference between motive disposition theory and self-determination theory is the significance of interindividual differences.

Whereas supporters of self-determination theory usually declare no particular interest in such differences ("we believe that these innate differences are not the most fruitful place to focus attention"; Deci & Ryan, 2000, p. 232), interindividual differences are in the focus of motive disposition theory. For example, Schüler and Brandstätter (2013) examined the moderating role of the implicit affiliation motive in regard to affective reactions to satisfaction of the need for relatedness (see also Hofer & Busch, 2011; Schüler, Wegner, & Knechtle, 2014). They found that individuals with a high implicit affiliation motive profit more from environments that fulfill their need for relatedness than less affiliation-motivated individuals. The need Frustration × Motive interaction effects observed in our research further support the idea of an integration of MDT and need theories such as self-determination theory.

Stability and Generalizability of Findings

One limitation of our study is that we had only two groups, a frustration and a satisfaction group. In future studies, it would be interesting to include a control group with no affiliation-relevant feedback (but, e.g., competence-relevant feedback), a medium-intensity feedback (in between our frustration and satisfaction group), or no feedback at all. This would also make the study more

Table 8
Study 2, Second Part–First Part: Hierarchical Regression of the Diffusion Model Parameters on Group, Fear of Rejection (FR), and the Interaction Thereof

Step	Variable	a	z_r	$v_{angry\text{-}happy}$	v_{angry}	v_{happy}	t_0	s_{t0}
				Implicit motive				
1	Intercept	−0.15† (0.08)	.02* (.01)	−0.09 (0.07)	−0.05 (0.04)	0.04 (0.04)	−0.22† (0.12)	−0.24 (0.18)
	Group[a]	0.05 (0.11)	−.01 (.02)	−0.02 (0.10)	−0.01 (0.06)	0.02 (0.06)	−0.02 (0.17)	−0.08 (0.26)
	FR	0.05* (0.02)	−.00 (.00)	−0.02 (0.02)	−0.02† (0.01)	0.00 (0.01)	−0.06 (0.04)	−0.08 (0.06)
	R^2 (adjusted)	.02	−.00	−.00	.01	−.02	.00	.00
2	Intercept	−0.15† (0.08)	.02* (.01)	−0.09 (0.07)	−0.05 (0.04)	0.04 (0.04)	−0.22† (0.12)	−0.24 (0.18)
	Group[a]	0.05 (0.11)	−.01 (.02)	−0.02 (0.10)	−0.01 (0.06)	0.02 (0.06)	−0.02 (0.17)	−0.08 (0.26)
	FR	0.05† (0.03)	.00 (.00)	−0.03 (0.03)	−0.03 (0.02)	0.00 (0.02)	−0.06 (0.05)	−0.10 (0.07)
	Group × FR	−0.02 (0.05)	−.01 (.01)	0.01 (0.04)	0.02 (0.03)	0.00 (0.03)	0.01 (0.07)	0.03 (0.11)
	R^2 (adjusted)	.01	.00	−.01	.00	−.02	−.00	−.00
				Explicit motive				
1	Intercept	−0.15† (0.08)	.02* (.01)	−0.10 (0.07)	−0.05 (0.04)	0.04 (0.04)	−0.21† (0.12)	−0.23 (0.18)
	Group[a]	0.06 (0.11)	−.01 (.02)	−0.02 (0.10)	−0.01 (0.06)	0.01 (0.06)	−0.05 (0.17)	−0.11 (0.27)
	FR	−0.10 (0.13)	−.01 (.02)	−0.05 (0.12)	0.04 (0.07)	0.09 (0.07)	0.29 (0.20)	0.28 (0.31)
	R^2 (adjusted)	−.01	−.01	−.01	−.01	−.00	.00	−.01
2	Intercept	−0.15† (0.08)	.03* (.01)	−0.11 (0.07)	−0.06 (0.04)	0.05 (0.04)	−0.21† (0.12)	−0.24 (0.18)
	Group[a]	0.06 (0.11)	−.01 (.02)	−0.02 (0.10)	−0.01 (0.06)	0.01 (0.06)	−0.05 (0.17)	−0.11 (0.27)
	FR	−0.06 (0.19)	.03 (.03)	−0.29† (0.17)	−0.06 (0.11)	0.23* (0.10)	0.18 (0.29)	0.09 (0.44)
	Group × FR	−0.08 (0.27)	−.09* (.04)	0.48* (0.24)	0.20 (0.15)	−0.28* (0.14)	0.21 (0.41)	0.39 (0.63)
	R^2 (adjusted)	−.02	.02	.01	−.01	.02	−.01	−.01

Note. The table contains unstandardized regression coefficients with standard errors in parentheses. FR was centered on the sample mean before the analyses.
[a] 1 = frustration; 0 = satisfaction.
† $p < .10$. * $p < .05$.

comparable to the studies by Bucher and Voss (2018) who did not give their participants a future belongingness feedback.

Future studies further need to test the stability and generalizability of the biases that we observed across different manipulations. For example, one might replace the future-alone manipulation by a manipulation of the immediate satisfaction of the affiliation motive. However, as previous studies did not find differences between anticipated and immediate threats (DeWall et al., 2009; Maner et al., 2007; Twenge et al., 2001), we do not expect to find diverging results either.

Our analyses of the data from Study 2 showed that the effects were not stable from the first to the second part of trials. Effects disappeared or even turned around. In future studies, it would be interesting to examine these temporal effects further. For example, from our study design one cannot infer whether effects change because of the mere passing of time or because of the continuous processing of facial information in the MoC task. Furthermore, in theory, it would also be interesting to examine even smaller units, for example, only the first 20 trials directly following the fake feedback. However, the diffusion model does not provide reliable parameter estimates for such small trial numbers (e.g., Lerche, Voss, & Nagler, 2017). Behavioral variables such as mean RT or accuracy could be analyzed in such smaller units. However, effects in these variables cannot be interpreted reliably (e.g., if contrary effects in starting point and drift rates are present). A solution might be to use a manipulation that maintains the effect of social rejection for a longer period. The future-alone manipulation is based on one single feedback. However, multiple feedbacks could be given when using a chat room framework (e.g., Donate et al., 2017; Gardner, Pickett, & Brewer, 2000). While the participants are working on the MoC task, a chat window could pop up repeatedly. Like in the study by Donate et al. (2017), participants in the frustration condition might receive fewer questions by the ostensible other chat room participants.

Finally, in future studies, it would be interesting to examine whether our findings for the MoC task are generalizable to other mood classification tasks. In our two studies, we were interested in how individuals react in situations in which the overall mood of a crowd of people is decisive. If, for example, artists perform in front of an audience, in probably most cases, they will hope that the majority of people likes their performance. They will care less about single individuals among the audience. For such situations, in which the overall mood rather than the mood of single individuals is important, the MoC task presents an adequate simulation.

In other situations, however, it might be that only one or few of the individuals are of relevance for the presenting person. For example, among the audience might be a person that the presenting person wants to impress (e.g., the boss, a potential mating partner, etc.). For the simulation of such a situation, a visual search task that requires the classification of a single face among a crowd of faces might be used (note, however, that visual search tasks are less adapted for diffusion modeling). One might also show single faces rather than crowds of faces. This could simulate a situation in which people interact in dyads and are interested in the opinion of their interaction partner. The single faces might be obscured by noise to enhance the difficulty of the task (similar to Nikitin & Freund, 2015). In future studies one might also use a task with mixed trials, for example, trials of the MoC and a single-face classification task, to examine whether the same processes are at work in both types of tasks.

Conclusions

Our studies demonstrate that diffusion modeling can supply interesting insights into motivational processes. We could show that the bias for negative information of individuals high in fear of rejection is a dynamic bias rather than a prior bias. Thus, these individuals accumulate negative facial information faster. Furthermore, the fearless but not the fearful individuals tried to counteract experienced threat of social exclusion that became apparent in a prior bias for the response happy. This means that they had a preference before the stimuli were presented. Thus, the diffusion model allowed the separation of different types of biases that might in consequence require different intervention strategies.

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(*Appendix follows*)

Appendix

Analyses Based on Hope of Affiliation

Table A1

Study 1: Hierarchical Regression of the Eye-Tracking Variables and Behavioral Variables on Group, Hope of Affiliation (HA), and the Interaction Thereof

Step	Variable	% Duration of angry fixations	% Number of angry fixations	% Angry responses	$\text{MeanRT}_{\text{angry}}$	$\text{MeanRT}_{\text{happy}}$	$\text{Accuracy}_{\text{angry}}$	$\text{Accuracy}_{\text{happy}}$
				Implicit motive				
1	Intercept	48.94*** (0.27)	49.67*** (0.17)	47.63*** (0.99)	3.58*** (0.03)	3.57*** (0.03)	69.68*** (1.58)	74.41*** (1.40)
	Group[a]	0.95* (0.38)	0.54* (0.25)	3.46* (1.41)	−0.02 (0.04)	−0.01 (0.04)	3.77† (2.25)	−3.10 (2.00)
	HA	0.04 (0.10)	−0.09 (0.06)	−0.18 (0.36)	−0.01 (0.01)	−0.01 (0.01)	−0.61 (0.57)	−0.27 (0.51)
	R^2 (adjusted)	.05	.06	.05	.00	−.00	.02	.01
2	Intercept	48.94*** (0.27)	49.67*** (0.17)	47.63*** (0.98)	3.58*** (0.03)	3.57*** (0.03)	69.68*** (1.58)	74.41*** (1.40)
	Group[a]	0.95* (0.38)	0.54* (0.25)	3.46* (1.39)	−0.02 (0.04)	−0.01 (0.04)	3.77† (2.25)	−3.10 (1.99)
	HA	−0.05 (0.14)	−0.10 (0.09)	−0.82 (0.53)	−0.01 (0.01)	−0.01 (0.01)	−1.22 (0.85)	0.40 (0.75)
	Group × HA	0.16 (0.19)	0.01 (0.13)	1.16 (0.71)	0.00 (0.02)	0.00 (0.02)	1.11 (1.15)	−1.22 (1.01)
	R^2 (adjusted)	.05	.04	.07	−.01	−.01	.02	.01
				Explicit motive				
1	Intercept	48.92*** (0.27)	49.65*** (0.17)	47.66*** (0.99)	3.58*** (0.03)	3.57*** (0.03)	69.71*** (1.60)	74.39*** (1.41)
	Group[a]	0.98* (0.38)	0.58* (0.25)	3.39* (1.42)	−0.02 (0.04)	−0.01 (0.04)	3.70 (2.28)	−3.04 (2.01)
	HA	0.22 (0.36)	0.26 (0.24)	−0.54 (1.34)	−0.01 (0.04)	−0.01 (0.04)	−0.64 (2.16)	0.46 (1.90)
	R^2 (adjusted)	.05	.05	.05	−.02	−.02	.01	.01
2	Intercept	48.91*** (0.27)	49.64*** (0.18)	47.61*** (1.00)	3.58*** (0.03)	3.57*** (0.03)	69.55*** (1.61)	74.33*** (1.42)
	Group[a]	0.98* (0.38)	0.58* (0.25)	3.41* (1.42)	−0.02 (0.04)	−0.01 (0.04)	3.75 (2.28)	−3.03 (2.02)
	HA	0.40 (0.57)	0.44 (0.37)	0.40 (2.13)	−0.02 (0.06)	−0.00 (0.06)	2.10 (3.42)	1.34 (3.03)
	Group × HA	−0.30 (0.74)	−0.30 (0.48)	−1.56 (2.75)	0.02 (0.08)	−0.01 (0.08)	−4.57 (4.41)	−1.46 (3.91)
	R^2 (adjusted)	.04	.04	.04	−.03	−.04	.01	−.01

Note. The table contains unstandardized regression coefficients with standard errors in parentheses. HA was centered on the sample mean before the analyses. The analyses for mean RT are based on the logarithmized values.

[a] 1 = frustration; 0 = satisfaction.

† $p < .10$. * $p < .05$. *** $p < .001$.

(*Appendix continues*)

Table A2
Study 1: Hierarchical Regression of the Diffusion Model Parameters on Group, Hope of Affiliation (HA), and the Interaction Thereof

Step	Variable	a	z_r	$v_{angry\text{-}happy}$	v_{angry}	v_{happy}	t_0	s_{t0}
				Implicit motive				
1	Intercept	2.46*** (0.08)	.50*** (.01)	−0.10 (0.07)	0.43*** (0.05)	0.53*** (0.05)	2.92*** (0.23)	2.49*** (0.22)
	Group[a]	0.13 (0.11)	.00 (.02)	0.16 (0.11)	0.06 (0.07)	−0.10 (0.07)	−0.28 (0.32)	−0.34 (0.31)
	HA	0.03 (0.03)	.00 (.01)	−0.03 (0.03)	−0.04* (0.02)	−0.00 (0.02)	−0.18* (0.08)	−0.15† (0.08)
	R^2 (adjusted)	.00	−.02	.02	.03	.01	.04	.03
2	Intercept	2.46*** (0.08)	.50*** (.01)	−0.10 (0.07)	0.43*** (0.05)	0.53*** (0.05)	2.92*** (0.23)	2.49*** (0.22)
	Group[a]	0.13 (0.11)	.00 (.02)	0.16 (0.10)	0.06 (0.07)	−0.10 (0.07)	−0.28 (0.32)	−0.34 (0.31)
	HA	0.04 (0.04)	.01 (.01)	−0.08* (0.04)	−0.07* (0.03)	0.02 (0.03)	−0.23† (0.12)	−0.17 (0.12)
	Group × HA	−0.03 (0.06)	−.01 (.01)	0.09† (0.05)	0.06 (0.04)	−0.03 (0.03)	0.08 (0.17)	0.04 (0.16)
	R^2 (adjusted)	−.01	−.02	.05	.05	.01	.03	.02
				Explicit motive				
1	Intercept	2.47*** (0.08)	.50*** (.01)	−0.10 (0.07)	0.42*** (0.05)	0.53*** (0.05)	2.91*** (0.23)	2.49*** (0.22)
	Group[a]	0.11 (0.11)	−.00 (.02)	0.17 (0.11)	0.07 (0.07)	−0.11 (0.07)	−0.25 (0.33)	−0.35 (0.32)
	HA	−0.17† (0.10)	−.02 (.02)	0.07 (0.10)	0.06 (0.07)	−0.01 (0.06)	0.20 (0.32)	−0.04 (0.30)
	R^2 (adjusted)	.03	−.01	.01	−.01	.01	−.01	−.01
2	Intercept	2.47*** (0.08)	.50*** (.01)	−0.10 (0.08)	0.42*** (0.05)	0.52*** (0.05)	2.90*** (0.24)	2.48*** (0.22)
	Group[a]	0.11 (0.11)	−.00 (.02)	0.17 (0.11)	0.07 (0.07)	−0.10 (0.07)	−0.25 (0.34)	−0.34 (0.32)
	HA	−0.27† (0.16)	.00 (.03)	0.05 (0.16)	0.10 (0.11)	0.05 (0.10)	0.40 (0.50)	0.03 (0.48)
	Group × HA	0.17 (0.21)	−.04 (.04)	0.03 (0.21)	−0.06 (0.14)	−0.10 (0.13)	−0.32 (0.65)	−0.12 (0.61)
	R^2 (adjusted)	.02	−.01	.00	−.02	−.00	−.02	−.02

Note. The table contains unstandardized regression coefficients with standard errors in parentheses. HA was centered on the sample mean before the analyses.
[a] 1 = frustration; 0 = satisfaction.
† $p < .10$. * $p < .05$. *** $p < .001$.

Table A3
Study 2, Part 1: Hierarchical Regression of the Eye-Tracking Variables and Behavioral Variables on Group, Hope of Affiliation (HA), and the Interaction Thereof

Step	Variable	% Angry responses	$\text{MeanRT}_{\text{angry}}$	$\text{MeanRT}_{\text{happy}}$	$\text{Accuracy}_{\text{angry}}$	$\text{Accuracy}_{\text{happy}}$
			Implicit motive			
1	Intercept	49.66*** (0.91)	3.44*** (0.03)	3.44*** (0.03)	67.90*** (1.27)	68.56*** (1.43)
	Group[a]	1.68 (1.32)	−0.01 (0.04)	−0.02 (0.04)	−0.23 (1.84)	−3.60† (2.07)
	HA	0.15 (0.32)	−0.01 (0.01)	−0.01 (0.01)	−0.41 (0.45)	−0.71 (0.50)
	R^2 (adjusted)	−.00	−.01	−.01	−.01	.02
2	Intercept	49.65*** (0.90)	3.44*** (0.03)	3.44*** (0.03)	67.88*** (1.25)	68.56*** (1.43)
	Group[a]	1.68 (1.31)	−0.01 (0.04)	−0.02 (0.04)	−0.24 (1.81)	−3.59† (2.07)
	HA	−0.37 (0.43)	−0.01 (0.01)	−0.01 (0.01)	−1.20* (0.59)	−0.45 (0.67)
	Group × HA	1.20† (0.64)	0.01 (0.02)	0.01 (0.02)	1.81* (0.89)	−0.58 (1.02)
	R^2 (adjusted)	.02	−.01	−.01	.02	.02
			Explicit motive			
1	Intercept	49.64*** (0.91)	3.44*** (0.03)	3.44*** (0.03)	67.88*** (1.27)	68.58*** (1.44)
	Group[a]	1.73 (1.32)	−0.01 (0.04)	−0.02 (0.04)	−0.18 (1.83)	−3.65† (2.09)
	HA	1.07 (1.31)	0.10* (0.04)	0.11** (0.04)	1.94 (1.81)	−0.22 (2.06)
	R^2 (adjusted)	.00	.03	.04	−.01	.01
2	Intercept	49.63*** (0.92)	3.44*** (0.03)	3.44*** (0.03)	67.89*** (1.27)	68.60*** (1.44)
	Group[a]	1.73 (1.33)	−0.01 (0.04)	−0.02 (0.04)	−0.17 (1.84)	−3.63† (2.09)
	HA	1.46 (1.69)	0.09† (0.05)	0.09† (0.05)	1.41 (2.34)	−1.49 (2.66)
	Group × HA	−0.98 (2.69)	0.02 (0.08)	0.05 (0.08)	1.35 (3.73)	3.23 (4.23)
	R^2 (adjusted)	−.00	.02	.04	−.01	.01

Note. The table contains unstandardized regression coefficients with standard errors in parentheses. HA was centered on the sample mean before the analyses. The analyses for mean RT are based on the logarithmized values.
[a] 1 = frustration; 0 = satisfaction.
† $p < .10$. * $p < .05$. *** $p < .001$.

(*Appendix continues*)

Table A4

Study 2, Part 1: Hierarchical Regression of the Diffusion Model Parameters on Group, Hope of Affiliation (HA), and the Interaction Thereof

Step	Variable	a	z_r	$v_{angry\text{-}happy}$	v_{angry}	v_{happy}	t_0	s_{t0}
				Implicit motive				
1	Intercept	2.43*** (0.09)	.50*** (.01)	−0.00 (0.05)	0.39*** (0.03)	0.39*** (0.04)	1.99*** (0.15)	1.76*** (0.17)
	Group[a]	0.03 (0.13)	.00 (.01)	0.07 (0.08)	−0.02 (0.05)	−0.10 (0.06)	−0.23 (0.22)	−0.02 (0.25)
	HA	−0.01 (0.03)	−.00 (.00)	0.00 (0.02)	−0.01 (0.01)	−0.01 (0.01)	−0.08 (0.05)	−0.06 (0.06)
	R^2 (adjusted)	−.02	−.01	−.01	−.01	.01	.01	−.01
2	Intercept	2.43*** (0.09)	.50*** (.01)	−0.00 (0.06)	0.39*** (0.03)	0.39*** (0.04)	1.99*** (0.15)	1.76*** (0.17)
	Group[a]	0.03 (0.13)	.00 (.01)	0.07 (0.08)	−0.02 (0.05)	−0.10 (0.06)	−0.23 (0.22)	−0.02 (0.25)
	HA	−0.04 (0.04)	−.00 (.00)	−0.01 (0.03)	−0.02 (0.02)	−0.01 (0.02)	−0.09 (0.07)	−0.05 (0.08)
	Group × HA	0.08 (0.06)	.00 (.01)	0.02 (0.04)	0.02 (0.02)	−0.01 (0.03)	0.03 (0.11)	−0.02 (0.12)
	R^2 (adjusted)	−.01	−.02	−.02	−.01	.00	.00	−.02
				Explicit motive				
1	Intercept	2.42*** (0.08)	.50*** (.01)	−0.00 (0.05)	0.39*** (0.03)	0.39*** (0.04)	1.99*** (0.15)	1.76*** (0.17)
	Group[a]	0.04 (0.12)	.00 (.01)	0.07 (0.08)	−0.02 (0.05)	−0.10 (0.06)	−0.23 (0.22)	−0.01 (0.25)
	HA	0.30* (0.12)	.01 (.01)	−0.02 (0.08)	−0.02 (0.05)	0.00 (0.06)	0.21 (0.22)	0.39 (0.25)
	R^2 (adjusted)	.03	−.01	−.01	−.01	.00	.00	.00
2	Intercept	2.42*** (0.08)	.50*** (.01)	−0.00 (0.06)	0.39*** (0.03)	0.39*** (0.04)	1.99*** (0.15)	1.76*** (0.17)
	Group[a]	0.04 (0.12)	.00 (.01)	0.07 (0.08)	−0.02 (0.05)	−0.10 (0.06)	−0.23 (0.22)	−0.02 (0.25)
	HA	0.18 (0.16)	−.00 (.02)	0.02 (0.10)	−0.00 (0.06)	−0.03 (0.08)	0.20 (0.28)	0.52 (0.32)
	Group × HA	0.31 (0.25)	.03 (.03)	−0.11 (0.16)	−0.04 (0.10)	0.07 (0.12)	0.02 (0.45)	−0.34 (0.51)
	R^2 (adjusted)	.04	−.02	−.01	−.02	−.00	−.01	−.00

Note. The table contains unstandardized regression coefficients with standard errors in parentheses. HA was centered on the sample mean before the analyses.
[a] 1 = frustration; 0 = satisfaction.
* $p < .05$. *** $p < .001$.

Table A5

Study 2, Part 2: Hierarchical Regression of the Eye-Tracking Variables and Behavioral Variables on Group, Hope of Affiliation (HA), and the Interaction Thereof

Step	Variable	% Angry responses	$\text{MeanRT}_{\text{angry}}$	$\text{MeanRT}_{\text{happy}}$	$\text{Accuracy}_{\text{angry}}$	$\text{Accuracy}_{\text{happy}}$
			Implicit motive			
1	Intercept	49.70*** (0.99)	3.38*** (0.03)	3.38*** (0.03)	67.19*** (1.32)	67.79*** (1.50)
	Group[a]	1.01 (1.44)	−0.01 (0.04)	−0.01 (0.04)	−1.08 (1.92)	−3.10 (2.17)
	HA	0.31 (0.35)	−0.01 (0.01)	−0.02† (0.01)	−0.55 (0.47)	−1.17* (0.53)
	R^2 (adjusted)	−.01	−.00	.01	−.00	.04
2	Intercept	49.70*** (1.00)	3.38*** (0.03)	3.38*** (0.03)	67.17*** (1.32)	67.78*** (1.50)
	Group[a]	1.00 (1.44)	−0.01 (0.04)	−0.01 (0.04)	−1.09 (1.91)	−3.10 (2.18)
	HA	0.19 (0.47)	−0.02 (0.01)	−0.02 (0.01)	−0.98 (0.62)	−1.36† (0.71)
	Group × HA	0.27 (0.71)	0.01 (0.02)	0.01 (0.02)	0.98 (0.94)	0.44 (1.07)
	R^2 (adjusted)	−.01	−.01	−.00	−.00	.03
			Explicit motive			
1	Intercept	49.67*** (0.99)	3.38*** (0.03)	3.38*** (0.03)	67.15*** (1.31)	67.82*** (1.53)
	Group[a]	1.08 (1.44)	−0.01 (0.04)	−0.00 (0.04)	−1.00 (1.91)	−3.16 (2.22)
	HA	1.40 (1.42)	0.10* (0.04)	0.11** (0.04)	3.13† (1.89)	0.31 (2.19)
	R^2 (adjusted)	−.00	.03	.04	.01	.00
2	Intercept	49.67*** (1.00)	3.38*** (0.03)	3.38*** (0.03)	67.16*** (1.32)	67.84*** (1.53)
	Group[a]	1.07 (1.44)	−0.01 (0.04)	−0.00 (0.04)	−0.99 (1.91)	−3.15 (2.22)
	HA	1.62 (1.84)	0.10† (0.05)	0.10* (0.05)	2.34 (2.43)	−0.93 (2.82)
	Group × HA	−0.56 (2.93)	−0.00 (0.08)	0.01 (0.08)	2.01 (3.87)	3.16 (4.50)
	R^2 (adjusted)	−.01	.02	.03	.00	−.00

Note. The table contains unstandardized regression coefficients with standard errors in parentheses. HA was centered on the sample mean before the analyses. The analyses for mean RT are based on the logarithmized values.
[a] 1 = frustration; 0 = satisfaction.
† $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$.

(*Appendix continues*)

Table A6

Study 2, Part 2: Hierarchical Regression of the Diffusion Model Parameters on Group, Hope of Affiliation (HA), and the Interaction Thereof

Step	Variable	a	z_r	$v_{angry\text{-}happy}$	v_{angry}	v_{happy}	t_0	s_{t0}
				Implicit motive				
1	Intercept	2.28*** (0.08)	.52*** (.01)	−0.09 (0.06)	0.33*** (0.04)	0.43*** (0.04)	1.77*** (0.14)	1.52*** (0.16)
	Group[a]	0.08 (0.11)	−.00 (.01)	0.05 (0.09)	−0.03 (0.05)	−0.08 (0.06)	−0.25 (0.21)	−0.10 (0.24)
	HA	−0.03 (0.03)	−.00 (.00)	0.04† (0.02)	0.01 (0.01)	−0.03† (0.01)	−0.08 (0.05)	−0.10† (0.06)
	R^2 (adjusted)	−.00	−.00	.01	−.01	.03	.01	.01
2	Intercept	2.28*** (0.07)	.52*** (.01)	−0.09 (0.06)	0.33*** (0.04)	0.43*** (0.04)	1.77*** (0.14)	1.52*** (0.16)
	Group[a]	0.08 (0.11)	−.00 (.01)	0.05 (0.09)	−0.03 (0.05)	−0.08 (0.06)	−0.25 (0.21)	−0.10 (0.23)
	HA	−0.08* (0.04)	−.00 (.00)	0.04 (0.03)	0.01 (0.02)	−0.03 (0.02)	−0.04 (0.07)	−0.00 (0.08)
	Group × HA	0.12* (0.05)	−.00 (.01)	−0.00 (0.04)	−0.01 (0.03)	−0.01 (0.03)	−0.08 (0.10)	−0.23* (0.11)
	R^2 (adjusted)	.02	−.01	.00	−.02	.02	.01	.04
				Explicit motive				
1	Intercept	2.28*** (0.08)	.52*** (.01)	−0.10 (0.06)	0.33*** (0.04)	0.43*** (0.04)	1.77*** (0.14)	1.52*** (0.16)
	Group[a]	0.09 (0.11)	−.00 (.01)	0.05 (0.09)	−0.03 (0.05)	−0.08 (0.06)	−0.25 (0.21)	−0.09 (0.24)
	HA	0.21† (0.11)	.01 (.01)	0.11 (0.09)	0.09† (0.05)	−0.02 (0.06)	0.20 (0.21)	0.36 (0.23)
	R^2 (adjusted)	.02	−.01	.00	.01	−.00	.00	.00
2	Intercept	2.28*** (0.08)	.52*** (.01)	−0.10 (0.06)	0.33*** (0.04)	0.43*** (0.04)	1.77*** (0.14)	1.52*** (0.16)
	Group[a]	0.09 (0.11)	−.00 (.01)	0.05 (0.09)	−0.03 (0.05)	−0.08 (0.06)	−0.25 (0.21)	−0.09 (0.24)
	HA	0.22 (0.14)	.00 (.02)	0.14 (0.11)	0.10 (0.07)	−0.04 (0.08)	0.13 (0.27)	0.37 (0.30)
	Group × HA	−0.02 (0.22)	.01 (.02)	−0.06 (0.18)	−0.01 (0.11)	0.05 (0.12)	0.18 (0.43)	−0.04 (0.48)
	R^2 (adjusted)	.01	−.02	−.01	.00	−.01	−.00	−.00

Note. The table contains unstandardized regression coefficients with standard errors in parentheses. HA was centered on the sample mean before the analyses.
[a] 1 = frustration; 0 = satisfaction.
† $p < .10$. * $p < .05$. *** $p < .001$.

Table A7

Study 2, Second Part–First Part: Hierarchical Regression of the Behavioral Variables on Group, Hope of Affiliation (HA), and the Interaction Thereof

Step	Variable	% Angry responses	$\text{MeanRT}_{\text{angry}}$	$\text{MeanRT}_{\text{happy}}$	$\text{Accuracy}_{\text{angry}}$	$\text{Accuracy}_{\text{happy}}$
			Implicit motive			
1	Intercept	0.04 (0.96)	−0.06*** (0.02)	−0.06*** (0.02)	−0.72 (1.34)	−0.77 (1.19)
	Group[a]	−0.68 (1.39)	0.00 (0.02)	0.02 (0.02)	−0.86 (1.93)	0.49 (1.73)
	HA	0.16 (0.34)	−0.01 (0.01)	−0.01 (0.01)	−0.14 (0.47)	−0.46 (0.42)
	R^2 (adjusted)	−.01	−.01	.00	−.01	−.01
2	Intercept	0.05 (0.96)	−0.06*** (0.02)	−0.06*** (0.02)	−0.71 (1.34)	−0.78 (1.19)
	Group[a]	−0.67 (1.39)	0.00 (0.02)	0.02 (0.02)	−0.85 (1.94)	0.49 (1.73)
	HA	0.56 (0.45)	−0.00 (0.01)	−0.01 (0.01)	0.22 (0.63)	−0.90 (0.56)
	Group × HA	−0.93 (0.68)	−0.01 (0.01)	−0.01 (0.01)	−0.83 (0.95)	1.02 (0.85)
	R^2 (adjusted)	−.01	−.01	−.00	−.02	−.00
			Explicit motive			
1	Intercept	0.03 (0.96)	−0.06*** (0.02)	−0.06*** (0.02)	−0.73 (1.33)	−0.77 (1.20)
	Group[a]	−0.66 (1.39)	0.00 (0.02)	0.02 (0.02)	−0.82 (1.93)	0.49 (1.74)
	HA	0.33 (1.38)	0.00 (0.02)	0.00 (0.02)	1.19 (1.91)	0.53 (1.72)
	R^2 (adjusted)	−.01	−.02	−.01	−.01	−.01
2	Intercept	0.03 (0.97)	−0.06*** (0.02)	−0.06*** (0.02)	−0.73 (1.34)	−0.77 (1.21)
	Group[a]	−0.65 (1.40)	0.00 (0.02)	0.02 (0.02)	−0.82 (1.94)	0.48 (1.75)
	HA	0.16 (1.78)	0.01 (0.03)	0.02 (0.03)	0.93 (2.47)	0.56 (2.22)
	Group × HA	0.42 (2.84)	−0.02 (0.05)	−0.04 (0.05)	0.66 (3.93)	−0.08 (3.54)
	R^2 (adjusted)	−.02	−.02	−.01	−.02	−.02

Note. The table contains unstandardized regression coefficients with standard errors in parentheses. HA was centered on the sample mean before the analyses. The analyses for mean RT are based on logarithmized RTs.
[a] 1 = frustration; 0 = satisfaction.
*** $p < .001$.

(*Appendix continues*)

Table A8
Study 2, Second Part–First Part: Hierarchical Regression of the Diffusion Model Parameters on Group, Hope of Affiliation (HA), and the Interaction Thereof

Step	Variable	a	z_r	$v_{angry\text{-}happy}$	v_{angry}	v_{happy}	t_0	s_{t0}
				Implicit motive				
1	Intercept	−0.15[†] (0.08)	.02[*] (.01)	−0.09 (0.07)	−0.05 (0.04)	0.04 (0.04)	−0.22[†] (0.12)	−0.24 (0.18)
	Group[a]	0.05 (0.11)	−.01 (.02)	−0.03 (0.10)	−0.01 (0.06)	0.02 (0.06)	−0.02 (0.17)	−0.07 (0.26)
	HA	−0.02 (0.03)	−.00 (.00)	0.03 (0.02)	0.02 (0.02)	−0.02 (0.01)	−0.00 (0.04)	−0.04 (0.06)
	R^2 (adjusted)	−.01	−.01	.00	−.01	−.00	−.02	−.01
2	Intercept	−0.15[†] (0.08)	.02[*] (.01)	−0.09 (0.07)	−0.05 (0.04)	0.04 (0.04)	−0.22[†] (0.12)	−0.24 (0.18)
	Group[a]	0.05 (0.11)	−.01 (.02)	−0.03 (0.10)	−0.01 (0.06)	0.02 (0.06)	−0.02 (0.17)	−0.07 (0.26)
	HA	−0.03 (0.04)	.00 (.01)	0.04 (0.03)	0.03 (0.02)	−0.02 (0.02)	0.05 (0.06)	0.05 (0.09)
	Group × HA	0.03 (0.05)	−.01 (.01)	−0.02 (0.05)	−0.02 (0.03)	0.00 (0.03)	−0.11 (0.08)	−0.21 (0.13)
	R^2 (adjusted)	−.02	−.02	−.01	−.01	−.01	−.01	.00
				Explicit motive				
1	Intercept	−0.14[†] (0.08)	.02[*] (.01)	−0.10 (0.07)	−0.06 (0.04)	0.04 (0.04)	−0.22[†] (0.12)	−0.24 (0.18)
	Group[a]	0.05 (0.11)	−.01 (.02)	−0.02 (0.10)	−0.00 (0.06)	0.02 (0.06)	−0.02 (0.17)	−0.08 (0.26)
	HA	−0.09 (0.11)	.00 (.02)	0.13 (0.10)	0.11[†] (0.06)	−0.02 (0.06)	−0.01 (0.17)	−0.03 (0.26)
	R^2 (adjusted)	−.01	−.01	−.00	.01	−.01	−.02	−.02
2	Intercept	−0.15[†] (0.08)	.02[*] (.01)	−0.09 (0.07)	−0.06 (0.04)	0.04 (0.04)	−0.22[†] (0.12)	−0.24 (0.18)
	Group[a]	0.05 (0.11)	−.01 (.02)	−0.02 (0.10)	−0.00 (0.06)	0.02 (0.06)	−0.02 (0.17)	−0.08 (0.27)
	HA	0.04 (0.14)	.01 (.02)	0.11 (0.13)	0.10 (0.08)	−0.02 (0.08)	−0.07 (0.22)	−0.15 (0.34)
	Group × HA	−0.33 (0.22)	−.02 (.03)	0.05 (0.20)	0.03 (0.13)	−0.02 (0.12)	0.16 (0.35)	0.30 (0.54)
	R^2 (adjusted)	.00	−.02	−.01	.00	−.02	−.02	−.02

Note. The table contains unstandardized regression coefficients with standard errors in parentheses. HA was centered on the sample mean before the analyses.
[a] 1 = frustration; 0 = satisfaction.
[†] $p < .10$. [*] $p < .05$.

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