Original Article

Keeping the benefits of group cooperation: domain-specific responses to distinct causes of social exclusion ☆

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ABSTRACT

Some people are especially physically adept, others carry dangerous pathogens, some have valuable and rare knowledge, and still others cheat or deceive those around them. Because of these differences, and the costs and benefits they pose, natural selection has crafted mechanisms of partner choice that are selective: some people are chosen as social partners, others are not. When people are not chosen as partners—when they are socially excluded—they lose access to important fitness benefits. Thus, the mind should have adaptations to recapture these benefits by regaining inclusion. Is there one best way to regain inclusion? This is unlikely because there are multiple causes of exclusion; a single response is unlikely to be successful across all possible causes. Instead, distinct causes of exclusion might require adaptively tailored responses. We test whether there are tailored responses to five possible causes of exclusion from a cooperative group: inability to contribute, pathogen infection, free riding, disrupting group coordination, and exit from the group. Our results show that different causes of exclusion lead to distinct profiles of emotions and behavior. Each emotion and behavior profile is adaptively specialized to reverse or mitigate its specific cause of exclusion. Our research shows how taking an evolutionary view of human sociality can help map the psychology of cooperation and exclusion.

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1. Introduction

Some people are especially physically adept, others carry dangerous pathogens, some have valuable and rare knowledge, and still others cheat or deceive those around them. Because of these differences, and the costs and benefits they pose, natural selection has crafted mechanisms of partner choice that are selective: Some people are chosen as social partners; others are not (Cottrell, Neuberg, & Li, 2007; Delton & Robertson, 2012; Goffman, 1963; Kurzban & Leary, 2001; Neuberg, Smith, & Asher, 2000).

The flip side of selectivity is that some people are not chosen; they are socially excluded. Exclusion can range from subtle avoidance to outright expulsion (Kurzban & Leary, 2001). Regardless, excluded people may lose access to the benefits of sociality and cooperation, like food sharing, aid in health crises (Sugiyama, 2004), and defense from predators (both human and nonhuman; Wrangham & Peterson, 1996). Given these costs, there may be psychological mechanisms that respond to or defend against exclusion (e.g., Maner, DeWall, Baumeister, & Schaller, 2007).

Past empirical research on the psychology of social exclusion has frequently treated exclusion as a unitary phenomenon: Exclusion is a single thing and, therefore, there is a single normatively correct way

to respond. Here we challenge these assumptions. Different causes of exclusion each create their own, unique adaptive problems. Thus, a mind well-designed to respond to exclusion should have a menu of possible responses; for each ancestrally common cause of exclusion, there should be an adaptively tailored response.

1.1. Social exclusion is not a unitary phenomenon

In typical laboratory experiments on social exclusion, people interact with strangers. There is no relationship context – indeed, the interactions are often anonymous – and the stakes are low. When people are excluded, it happens without reason or warning. These factors conspire to make laboratory exclusion unlike real-world exclusion (for a review of typical methods, see Williams, 2007). Despite their lack of ecological validity, typical lab methods are the logical outgrowth of a tacit assumption: Exclusion is unitary and can best be investigated by stripping away purportedly confounding factors such as who excluded who or why.

Because exclusion is a unitary phenomenon, it follows that responding to exclusion is also unitary. Just as a head cold always causes one particular constellation of symptoms (e.g., congestion, a runny nose) and never others (e.g., warts, tendonitis), the tacit assumption is that exclusion always causes a particular syndrome of responses. For instance, excluded people are thought to be more aggressive (Warburton, Williams, & Cairns, 2006), to be worse at logical reasoning (Baumeister, Twenge, & Nuss, 2002), and to feel hurt

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or numb (Leary, Springer, Negel, Ansell, & Evans, 1998; Twenge, Catanese, & Baumeister, 2003). Although many behaviors and feelings are elicited by exclusion, in the tacit model of most empirical work there is no connection between the context or causes of exclusion and the specifics of responding to it.

The empirical assumption that exclusion is unitary is surprising because there is a long-running theoretical literature hinting that not all exclusion is created equal (e.g., Kurzban & Leary, 2001; Leary, 2005; Williams, 1997). For example, the need threat model proposes that different exclusions threaten different intrapsychic needs (e.g., a need to belong, a need for self-esteem; Williams, 1997). Responding to exclusion depends on which need is threatened. Similarly, the multi-motive model proposes that exclusion arouses several competing reactions in the excluded person and the winning reaction is determined in part by people's perceptions of the exclusion (e.g., whether it was fair or unfair; Smart Richman & Leary, 2009). Moreover, in the published reports we are aware of that take this issue seriously, different causes of exclusion do lead to distinct responses (e.g., Bernstein & Claypool, 2012; Çelik, Lammers, van Beest, Bekker, & Vonk, 2013).

Our goal is to develop and test an evolutionary psychological model of responding to exclusion. Building on past theory, our model addresses why different types of exclusion would have occurred among human ancestors and how excluded people should adaptively respond. We focus on responses for regaining inclusion in cooperative groups. Although we do not study it, our approach can be extended to responding to exclusion from, for instance, mateships or friendships, and it could also be extended to understand strategies for strengthening outside relationships or forming new ones now that the focal relationship has ended. Our model has three key features and assumptions: (1) There are multiple causes of exclusion. (2) The mind has a menu of responses to exclusion, each adaptively tailored to a particular cause. (3) At a proximate level, responding to exclusion requires a suite of emotional and behavioral responses.

1.2. The role of emotions in organizing specialized responses to exclusion

Solving complex social problems like regaining acceptance after exclusion from a cooperative group requires integrating multiple sources of information, coordinating multiple psychological responses, and deploying appropriate behavioral responses. Past theory has suggested that emotional systems function in part to orchestrate these complex responses (Buck, 1985; Cosmides & Tooby, 2000; Cottrell & Neuberg, 2005). We apply this general framework to understand how the mind responds to exclusion from a group. Fig. 1 outlines hypothesized links between causes of exclusion, emotions, and behavioral responses. On this view, the mind first categorizes the exclusion event by the inferred motivation of the excluding group. This activates particular emotional systems. These then orchestrate a variety of psychological changes, including motivating behavioral responses. The emotions and behaviors depend on the initial categorization.

Borrowing from past taxonomies of emotion (e.g., Ekman & Friesen, 1975; Frijda, 1986; Nesse, 1990; Plutchik, 1980), we focus on fear, pity, disgust, anger, guilt, and shame. Fear is elicited by physical safety threats or, our primary focus, social threats. Fear's activation motivates protective behaviors (Nesse, 1990; Plutchik, 1980; Watson & Friend, 1969). Pity is elicited when a valued other is experiencing costs and it motivates improving the other's welfare (Frijda, 1986). Disgust is elicited by physical or moral contamination and motivates contamination-avoidance behaviors (Rozin, Markwith, & Nemeroff, 1992; Tybur, Lieberman, & Griskevicius, 2009). Anger is elicited when one is being undervalued – i.e., when other individuals are not placing enough weight on one's personal welfare – and motivates behaviors to increase others' valuation of the self (e.g., by threatening to withdraw cooperation; Sell, Tooby, & Cosmides, 2009). Guilt is elicited when the self has placed too little weight on the welfare of valued others (in a sense, the converse of anger) and motivates behaviors that increase the others' welfare (Fessler, 1999; Tangney, Stuewig, & Mashek, 2007). Shame is elicited by cues that others will devalue you and motivates behaviors to minimize devaluation, such as hiding or displaying submission (Fessler, 1999; Snyzcer & Tooby, 2011; Sznycer et al., 2012; Tangney et al., 2007).

1.3. Hypotheses connecting distinct types of exclusion to specialized responses

What causes of exclusion are sufficiently distinct to require specialized responses? Although there are many possibilities, we focus on five: (1) free riding, (2) inability to contribute, (3) pathogen infection, (4) disrupting group coordination, and (5) exit from the group (e.g., Cottrell et al., 2007; Kurzban & Leary, 2001; Moreland & Levine, 2002; Neuberg et al., 2000; Rozin et al., 1992; Tooby, Cosmides, & Price, 2006). This list is not exhaustive and is intended only as an initial starting point. Guided by the model in Fig. 1 and by task analyses of the different causes of exclusion, we derive a series of hypotheses about the particular emotional reactions and behavioral strategies that specific causes of exclusion should elicit (summarized in Table 1).

Free riders withhold contributions to the group but still take group benefits, reducing or eliminating the benefits of cooperation (Olson, 1965), thus showing they place little value on the group's welfare (Delton, Cosmides, Guemo, Robertson, & Tooby, 2012). Exclusion for free riding should therefore cause guilt and perhaps shame and reparative behavioral strategies such as apologizing and demonstrating valuation of the group by working harder and being a cooperative team player (see Section 1.2; also Bottom, Gibson, Daniels, & Murnighan, 2002).

Resource pooling accounts of human sociality suggest that people failing to contribute due to bad luck, error, or injury may expect support from their group (Kameda, Takezawa, & Hastie, 2005; Kaplan & Hill, 1985; Sugiyama, 2004). On the other hand, they may be excluded for making cooperation less efficient or mistakenly by being categorized as free riders (Kurzban & Leary, 2001; Neuberg et al., 2000). Exclusion for inability should therefore cause anger (for the group placing too little weight on the excluded party's welfare), but also possibly guilt for imposing costs on the group (motivating
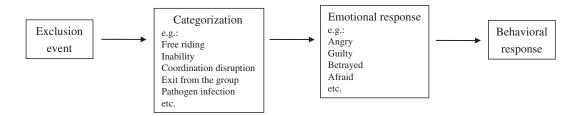

Fig. 1. Theoretical model: The mind first categorizes the exclusion event by the inferred motivation of the excluding group, which activates emotional systems, which then orchestrate a variety of psychological changes, including motivating behavioral responses. The elicited emotions and behaviors depend on initial categorization of the exclusion.

Table 1
Emotions and strategies predictions and results from Study 1 summary.

		Predictions	Confirmed in Study 1	Unexpected in Study 1
Free riding	Emotions	Guilt, Shame	Guilt, Shame	None
	Strategies	Apologize, Be a team player, Work harder	Apologize, Be a team player, Work harder	None
Inability	Emotions	Anger, Guilt	Anger, some Guilt (less than free riders)	None
	Strategies	Apologize, Remind group of shared history, Work harder	Apologize, Work harder	Low Remind group of shared history
Coordination disruption	Emotions	Guilt, Shame	Guilt, Shame (less than free riders)	Anger, Betrayal
	Strategies	Apologize, Work harder, Be a team player	Apologize, Work harder, Be a team player	None
Exit from the group	Emotions	Guilt, Pride or Satisfaction	Pride (relative to other conditions)	Little Guilt
	Strategies	Apologize, Work harder, Remind group of shared history	Apologize, Work harder, Remind group of shared history	None
Pathogen infection	Emotions	Anger, little Guilt	Anger, little Guilt	None
	Strategies	Remind of shared history, Evoke guilt from group, Work harder	Remind of shared history, Evoke guilt from group, Work harder	None

reparative behaviors such as apologizing), and behavioral strategies to increase the group's valuation of the excluded person, including reminding the group of past contributions and demonstrating ability to contribute by working harder.

Many group activities require that group members mentally and physically coordinate their activities (e.g., Kurzban & Neuberg, 2005; Steiner, 1966). For instance, researchers collaborating on a paper are unlikely to be productive if each has entrenched – and opposing – theoretical commitments. Those unable to coordinate therefore impose a cost. Exclusion for disrupting coordination, similar to exclusion for free riding, should cause guilt and shame, and behavioral strategies that demonstrate intention to reform such as apologizing, working harder, and being a cooperative team player.

Successful cooperation often requires a minimum number of participants (Smith, 1981), and socialization of new members takes time (Moreland & Levine, 2002). Thus, groups may suffer when a member leaves and sometimes try to prevent exit. Although a person cannot be excluded if they have already exited, they can face repercussions if they consider exiting but ultimately do not (cf. Pinto, Marques, Levine, & Abrams, 2010). Exclusion for considering exit should cause guilt (for indicating lack of commitment to the group), but also potentially pride or satisfaction (because it suggests they are of high value to others), and reparative behavioral strategies such as apologizing and working harder, as well as reminding the group of past commitment.

Exposure to pathogens is a risk of sociality (Schaller, 2011), and it is increased by actively helping the ill, causing tension between providing aid and avoiding infection. One by-product of attempting to reduce pathogen exposure is that even noninfectious illnesses or physical abnormalities (such as cancer patients and burn victims), may cause avoidance (Houston & Bull, 1994; Kurzban & Leary, 2001; Rozin et al., 1992; Stahly, 1988). Exclusion for pathogen infection, similar to exclusion for inability, should elicit anger (because the group demonstrates low valuation by being unwilling to bear the risk), and strategies to increase the group's valuation, such as reminding them of past contributions and demonstrating ability to contribute by working harder. Because reducing pathogen exposure is distinct from limiting free riding, failure to contribute is not inherently relevant to pathogen-based exclusion. Thus, people excluded for pathogen infection are unlikely to feel guilt; they have not placed inappropriately low weight on the welfare of their group.

In addition to these specific hypotheses about particular specialized responses, this approach produces the following general hypotheses (see Fig. 1):

General Hypothesis 1. Different causes of exclusion will lead to different patterns of emotional responses.

General Hypothesis 2. Different causes of exclusion will lead to different patterns of behavioral strategies to regain social acceptance.

General Hypothesis 3. Emotions will, at least partially, mediate the connection between exclusion and behavioral strategies.

1.4. The present research

In two studies, we examine exclusion from enduring cooperative groups. Group members work together to accomplish goals, are invested in one another's welfare, and see no definite end to their association. Such groups were an important component of ancestral human sociality (Tooby et al., 2006). We present initial evidence that distinct causes of exclusion elicit distinct patterns of emotional reactions and behavioral inclinations, and that the specifics of these patterns are predictable by analyzing the fit between the cause of exclusion and the actions necessary to regain inclusion.

2. Study 1: Distinct emotional responses and behavioral strategies

Study 1 was designed to test whether different causes of exclusion lead to qualitatively distinct and theoretically predictable profiles of emotions and behavioral inclinations. Participants imagined belonging to a cooperative group. They then imagined being excluded from that group for one of five reasons: free riding, inability, pathogen infection, coordination disruption, or exit from the group. They rated their emotional reactions and ranked behavioral strategies they might use to regain the group's acceptance. The behavioral strategies were generated from a combination of theory and the results of a pilot study in which participants described strategies they would use to regain acceptance in the same scenarios (see supplemental information, available on the journal's website at www.ehbonline.org).

Because our focus is on what people will do when they are motivated to regain acceptance from the excluding group, we restricted the behavioral strategies offered to those aimed at gaining reacceptance. We asked participants to rank the strategies for how effective they would be for regaining inclusion.

2.1. Methods

2.1.1. Participants

Two hundred seventy-nine undergraduates (223 female, 13 did not provide gender) participated (Mean Age ± SD = 20.6 ± 2.4). An additional 52 undergraduates (38 female, 1 did not provide gender) later received a control condition (Mean Age ± SD = 20.7 ± 2.9).

2.1.2. Design and materials

Participants imagined being excluded for one of five reasons (free riding, inability, pathogen infection, coordination disruption, and exit

from the group) while belonging to one of three groups (an acting troupe, a basketball team, or a restaurant staff; see supplemental information for stimuli, available on the journal's website at www. ehbonline.org). The additional participants in the control condition only imagined belonging to one of the three groups.

The group descriptions all mentioned that the members of the group spend a lot of time together, both while working on group-relevant tasks but also outside of specific group work, and that the participant considers them friends. For example, the basketball team was described this way:

> You play on a basketball team. The league is year-round, and you're always on the same team. It takes a lot of practice to function as a team, so you spend a lot of time working with the other members. You have really become friends with them, and find that you spend time with them outside of practice, too.

The other group descriptions were similar, but replaced basketball-specific details with other details appropriate for the group (see supplemental information, available on the journal's website at www.ehbonline.org). All were written to be approximately the same length.

The exclusion descriptions all mentioned that recently the other group members had asked the participant to stop coming. The group's perception of what had gone wrong was described as accurate. Between subjects we varied why participants were excluded. For example, exclusion for free riding was described this way:

> Recently the others asked you to stop coming because they feel like you haven't been pulling your weight with the group—they think you've been taking advantage of their hard work. When you think about how you've acted recently, you realize that they're right.

The other exclusion cause descriptions were similar, but substituted the appropriate exclusion cause. All were written to be approximately the same length.

2.1.3. Procedure and dependent measures

After reading about their group and the cause of their exclusion, participants completed emotion ratings and behavioral rankings in counterbalanced order.

Each emotion rating asked how much the participant would feel a specified emotion using a 5-point scale (1 = "Not at All," 3 = "Moderately," 5 = "Very"). Participants rated their feelings of fear ("afraid that others will find out"), disgust ("morally disgusted by the group"), anger, having been betrayed, guilt, pity ("pity for the group"), shame, satisfaction, pride, anxiety, sadness, happiness, and inclusion (the latter served as a manipulation check).

Behavioral strategies that participants ranked were: (1) "Apologize to the group and ask for another chance," (2) "Remind the other group members of your history together," (3) "Be more of a 'team player'," (4) "Give the group your perspective so they feel bad for you," and (5) "Work twice as hard to show your dedication".

2.2. Results and discussion

2.2.1. Manipulation and methodological checks

2.2.1.1. Did the exclusion manipulation lead people to feel excluded?
Yes: Participants in all five exclusion conditions felt less included, compared to the control condition (all $ts > 16.11$, all $Ps < .001$). Moreover, there were no differences between exclusion conditions in how included people felt ($F_{4,276} = 1.28$, $P = .28$). The exclusion manipulation appears successful. As we detail in the supplemental information, available on the journal's website at www.ehbonline.org, there were a variety of differences between the inclusion control and the five exclusion conditions. Given the wealth of data on the psychological effects of inclusion versus exclusion (Williams, 2007),

we focus our main results section instead on the primary differences relevant to our theoretical model: differences between different exclusion types.

2.2.1.2. Did group type, order of measures, or participant sex interact with exclusion type to affect emotions?
No: A series of univariate analyses of variance (ANOVAs) on the emotion ratings revealed no more interactions between exclusion type and these other factors than would be expected by chance (with $P = .05$, approximately 4.25 out of 84 possible interactions would be significant by chance; 5 in fact were). Including these variables in analyses did not impact the results reported below. These variables are therefore not included in our primary analyses.

2.2.2. Hypothesis 1: Do different exclusion types lead to distinct emotion profiles?
Yes, emotions differed by exclusion type. (These analyses do not include the control condition, because that would inflate the apparent overall differences between conditions)
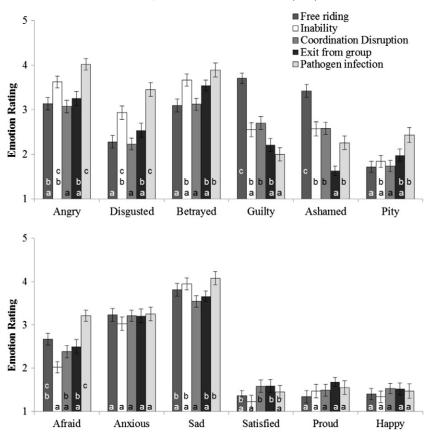
We first performed a series of one-way ANOVAs on each of the emotion ratings. Nine of twelve emotions differed by exclusion condition ($Fs > 2.72$, $Ps < .04$; happy, proud and anxious did not; see supplemental information, available on the journal's website at www.ehbonline.org and Fig. 2).

This result is consistent with our General Hypothesis 1 about qualitatively distinct emotion profiles, but it is also consistent with the mind treating different exclusion types as being of the same *kind* but differing only in *degree*. For example, free riding might elicit stronger emotions than any other exclusion. To show that emotional reactions qualitatively differ by exclusion, we next conducted a mixed-model ANOVA with exclusion type as a between-subjects factor and emotion type as a within-subjects factor. In this analysis, the main effect of emotion is not meaningful, but the interaction between exclusion type and emotions reveals whether participants' emotion profiles differ qualitatively by exclusion type. They do, as evidenced by a significant interaction ($F_{44,1032} = 4.62$, $P < .001$, $\eta_p^2 = .16$).

However, one or a few conditions could be driving these results. For example, the free rider condition could be qualitatively different from the other conditions, with the others differing only in degree. To test against this alternative, the same mixed-model analysis was conducted for every possible combination of two conditions (i.e., free riding vs. inability, free riding vs. coordination problem, etc.); for all ten, the interactions between exclusion type and emotions were significant (all $Ps < .005$, η_p^2s between .23 [coordination problem vs. temporary inability] and .61 [free rider vs. pathogen]).

We wanted to go still further and ask how much information these profiles provided. That is, can emotional reactions be used to back-predict which exclusion the participant faced? To test this, we used a discriminant functions analysis. This analysis creates a series of mathematical functions that use a set of quantitative outcome variables (here, emotion ratings) to predict a participant's group membership (here, exclusion type).

Participants' emotion profiles did predict exclusion type, as indicated by a significant overall Wilk's lambda ($\Lambda = .45$, $\chi^2_{48} = 208.75$, $N = 270$, $P < .001$). The discriminant functions successfully predicted participants' exclusion condition in 46% of cases (significantly greater than the 20% expected by chance, $P < .001$). A "leave one out" cross-validation procedure was similar, with 42% correctly classified (relative to chance, $P < .001$). ("Leave one out" computes a predicted group membership for each participant without using the participant's own data to generate the functions used to make the prediction. This prevents the participant's known group membership, which would otherwise be used to calculate the functions, from influencing their predicted

Fig. 2. Study 1 means for each emotion by exclusion type. Different types of exclusion lead to different emotion profiles. *Note*. Error bars show standard errors; within each emotion, bars that do not share a letter are significantly different from each other, *P* < .05, based on Games–Howell post hoc tests.
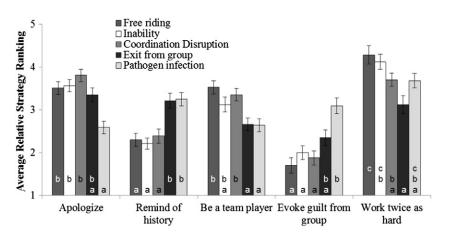
group membership.) Emotion profiles qualitatively differed by exclusion type and successfully back-predicted the exclusion participants experienced.

2.2.3. Hypothesis 2: Do different exclusion types lead to distinct behavioral response strategies?

Yes: Using participants' mean rankings for each strategy, we conducted the same analyses for the behavioral strategies as for the emotions (cf. Lieberman, Tooby, & Cosmides, 2003). Consistent with our General Hypothesis 2, all five strategies differed by exclusion type, as shown by a series of univariate ANOVAs (*F*s > 6.43, *P*s < .001; see supplemental information, available on the journal's website at www.

ehbonline.org and Fig. 3). The strategy profiles also differed qualitatively, not simply in degree. This is revealed by a significant interaction in a mixed-model ANOVA with exclusion type as a between- and strategy ranking as a within-subjects factor ($F_{16,1088} = 6.26$, $P < 001$, $\eta_p^2 = .08$), and by the same mixed-model analysis conducted with each pairwise combination of conditions. Eight of the ten were significant (*P*s < .05); the exceptions were inability compared to free riding ($P = .48$) and inability compared to coordination disruption ($P = .14$).

As with the emotions, we tested whether strategy profiles could effectively predict the exclusion. All five strategy items were entered into a discriminant functions analysis with exclusion type as the

Fig. 3. Study 1 mean rankings for each behavioral strategy rankings by exclusion type. Higher numbers indicate more attractive strategies. Different types of exclusion lead to different strategy profiles. *Note*. Error bars show standard errors; within each strategy, bars that do not share a letter are significantly different from each other, *P* < .05, based on Games–Howell tests.

grouping variable. Participants' strategy profiles did predict their exclusion (Wilk's $\Lambda = .67$, $\chi^2_{20} = 107.06$, N = 277, $P < .001$). The discriminant functions successfully predicted participants' exclusion condition in 39% of cases (significantly greater than chance of 20%, $P < .001$). The "leave one out" cross-validation procedure showed the same result, with 36% of cases correctly classified (relative to chance, $P < .001$). Strategy profiles qualitatively differed by exclusion type and successfully back-predicted the exclusion.

2.2.4. Do the particular links between exclusion type, emotion, and behavioral strategy follow predictions?

Yes, in general the results supported the predictions connecting different causes of exclusion to distinct emotional and behavioral responses (see Table 1 and Figs. 2 and 3 for summaries). Exclusion for free riding caused people to feel guilt and shame, and to choose to apologize, be a team player, and work hard. Exclusion for inability caused people to feel anger and some guilt, to choose to apologize and work hard, and to not choose to remind the group of shared history. Coordination disruption caused people to feel guilt and shame (to a lesser extent than free riders), to also feel anger and like they had been betrayed, and to choose to apologize (their overall strategy profile, however, was similar to free riders). Exclusion for considering exit caused people to feel satisfied and (unexpectedly) to not feel guilt and shame, and to choose to apologize and to remind of shared history. Finally, exclusion for pathogen infection caused people to feel anger and disgust, to not feel guilt, and to choose to remind of shared history, work hard, and attempt to evoke guilt from the group.

2.3. Summary

Different emotion profiles and behavioral strategy profiles were elicited by different causes of exclusion and the profiles had sufficient information to successfully back-predict exclusion. Thus, this study provided support for the hypothesis that different exclusions lead to different patterns of emotional response (General Hypothesis 1) and the hypothesis that different exclusions lead to different behavioral strategies (General Hypothesis 2).

In addition, the particular emotions and behavioral strategies each group exclusion motivation elicited were almost all predicted by the analysis of the fit between specific situations and responses (see Introduction). The exception was finding unexpectedly low guilt and shame for exclusion for considering leaving the group. Based on our theoretical analysis, considering leaving should indicate a lack of commitment to the group; however, the scenario may have inadvertently prevented this by explicitly stating that the person had already decided not to leave. Altogether, however, our results provide evidence that the mind has specialized responses tailored to distinct causes of exclusion.

3. Study 2: Emotions as a mediator

Study 1 showed that different causes of exclusion led to distinct and theoretically predicted sets of emotions and behaviors. Study 2 was designed to test whether emotions help organize the complex processes involved with regaining acceptance after exclusion by testing whether emotions mediate the relationship between exclusion and behavioral strategies (General Hypothesis 3; see Fig. 1). This study was restricted to free riding and pathogen infection because they elicited very different responses from participants and are theoretically quite different (one related to cooperation, the other to contamination), thus allowing for a clear test of the mediation hypothesis.

Study 2 was similar to Study 1 but with two changes to address potential weaknesses of Study 1. First, in Study 1, participants rank ordered behavioral strategies, possibly exaggerating otherwise trivial differences. In Study 2, participants made independent ratings of each possible strategy. Second, in Study 1, a critic might wonder if there

was anything special about the categories of exclusion we identified. Perhaps any differences at all, even trivial ones, would lead to different emotion and behavior profiles. To test against this in Study 2 we varied theoretically irrelevant features. On the critic's account, these differences should lead to differences in emotions and behaviors comparable to the differences elicited by free riding versus pathogen infection. As before, we varied the theoretically irrelevant dimension of group (basketball team, acting troupe, restaurant employees). We also manipulated the description of the *cause of exclusion* and the description of *how the group signaled exclusion*. Although exclusion for free riding versus pathogen infection should lead to different profiles of emotion and behavior, these profiles should be unaffected by the specific type of cooperative group and the specifics of how exclusion was described and signaled.

3.1. Methods

3.1.1. Participants

Two hundred nineteen undergraduates (169 female, 3 did not provide gender) participated (mean age $\pm$ SD = 21.5 $\pm$ 2.4).

3.1.2. Design, manipulations, and dependent measures

The design was similar to Study 1 with the following exceptions: (1) Participants received one of two reasons for exclusion: free riding or pathogen infection. (2) There were (a) two different versions of each description of the exclusion (i.e., two for free riding and two for pathogen) and (b) two different versions of each description of the exclusion signal (see supplemental information, available on the journal's website at www.ehbonline.org). All conditions were between subjects. (3) Participants rated the behavioral strategies (instead of ranking them), using 7-point scales (1 = "Incredibly ineffective", 7 = "Incredibly effective"). (4) We added a new emotion, remorse ("Sorry for what you did").

3.2. Results and discussion

3.2.1. Manipulation and methodological checks

3.2.1.1. Did participants feel excluded? Yes: Compared to Study 1's control condition, participants in both conditions in Study 2 felt less included (free rider: M $\pm$ SD = 1.67 $\pm$ .72, $t_{161} = 16.96$, $P < .001$, $r^2 = .64$; pathogen: M $\pm$ SD = 1.54 $\pm$ .78, $t_{158} = 18.05$, $P < .001$, $r^2 = .67$). There was no difference between the free rider and pathogen conditions ($t_{217} = 1.21$, $P = .23$, $r^2 = .01$). The exclusion manipulation appears successful.

3.2.1.2. Did scenario surface features, group type, or participant sex interact with exclusion type to affect emotions? No: A series of univariate ANOVAs on the emotion ratings revealed no more interactions between exclusion type and these other factors than would be expected by chance (with $P = .05$, approximately 9.1 out of 182 possible interactions would be significant by chance; 10 in fact were). Including these variables in analyses did not impact the results reported below. These variables are therefore not included in our primary analyses.

Note especially that there were essentially no interactions involving either the description of the exclusion or the description of the exclusion signal. In other words, theory-irrelevant differences did not lead to qualitatively different emotional responses. This speaks against a potential alternative hypothesis for the results of Study 1; theory-irrelevant differences did not affect emotions.

3.2.2. Hypothesis 1: Do different exclusion types lead to distinct emotion profiles?

Yes: As predicted, participants in the pathogen condition felt more fear, disgust, anger, betrayed, and pity ($Ps < .001$); those in the free
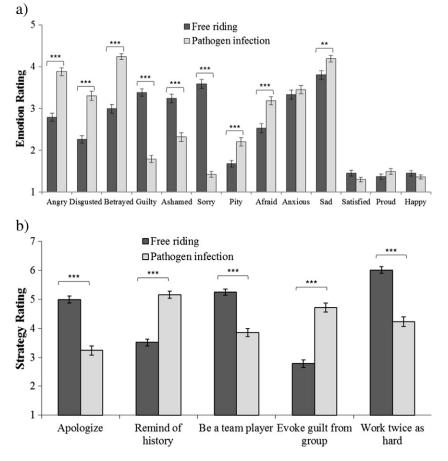
a)

b)

Fig. 4. Study 2 means by exclusion type for a) emotions, and b) behavioral strategies. Different types of exclusion lead to different emotion and strategy profiles. *Note.* Error bars show standard errors; ** $P < .01$, *** $P < .001$, based on t-tests.

rider condition felt more guilt, shame, and remorse ($Ps < .001$); and satisfaction and pride showed little difference (supplemental information, available on the journal's website at www.ehbonline.org and Fig. 4).

In addition, the patterns of emotional reactions were qualitatively different. This was revealed by a significant interaction in a mixed-model ANOVA, with exclusion type as a between-subjects factor and emotion type as a within-subjects factor ($F_{12,203} = 38.40$, $P < .001$, $\eta_p^2 = .69$).

Emotion profiles successfully back-predicted exclusion type in a discriminant functions analysis (Wilk's $\Lambda = .30$, $\chi^2_{13} = 248.13$, N = 216, $P < .001$) with accuracies of 92% and 89% in the standard and "leave one out" methods, respectively (compared to chance of 50%, $Ps < .001$).

3.2.3. Hypothesis 2: Do different exclusion types lead to distinct behavioral response strategies?

Yes: All of the behavioral strategies differed by exclusion type (supplemental information, available on the journal's website at www.ehbonline.org and Fig. 4). Participants in the free rider condition more strongly endorsed apologizing to the group, being more of a team player, and working hard to show dedication ($Ps < .001$); those in the pathogen condition more strongly endorsed reminding the group of shared history and evoking guilt from the group ($Ps < .001$). Behavioral strategy profiles, moreover, differed qualitatively, as shown by a significant interaction in a mixed-model ANOVA with exclusion type as a between-subjects factor and strategy type as a within-subjects factor ($F_{4,214} = 75.92$, $P < .001$, $\eta_p^2 = .59$). Further, behavioral strategy profiles successfully back-predicted exclusion type in a discriminant functions analysis (Wilk's $\Lambda = .41$, $\chi^2_5 = 189.69$, N = 219, $P < .001$) with accuracies of 89% and 88% in the
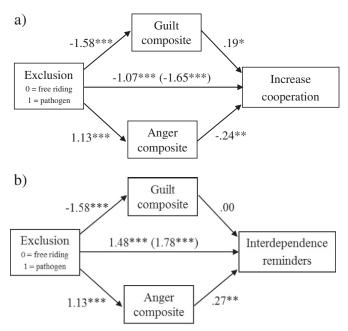
standard and "leave one out" analyses, respectively (compared to chance of 50%, $Ps < .001$).

3.2.4. Hypothesis 3: Is the link between exclusion type and behavioral strategy mediated by emotion?

Yes: To test this, we conducted two multiple mediator bootstrapping analyses (Preacher & Hayes, 2008). To simplify analysis, we used composite variables: *guilt* and *anger* composites for the emotions and *interdependence reminders* and *increased cooperation* for the behavioral strategies. The guilt composite was the mean of guilty, ashamed, and remorseful (Cronbach's $\alpha = .86$); the anger composite was angry, disgusted, and betrayed ($\alpha = .82$). The emotion composites were only moderately correlated ($r = .31$). The interdependence reminders composite was the mean of reminding the group of shared history and evoking guilt from the group (combining the strategies that were highly rated in the pathogen condition; $\alpha = .69$); the increased cooperation composite was apologizing, being a team player, and working harder (combining the strategies highly rated in free riding; $\alpha = .72$). The behavioral strategy composites were only moderately correlated ($r = .36$).

Exclusion type was entered as the independent variable ($0 =$ free riding, $1 =$ pathogen infection) and the emotion composites as mediators. In one analysis, the interdependence reminders composite was the dependent variable; in another analysis, the increased cooperation composite was the dependent variable. The direct paths from exclusion type to the emotions and to the behaviors were all significant (all $Ps < .001$); three of the four direct paths from the emotions to the behaviors were significant (those $Ps < .05$; Fig. 5).

The critical question is whether the indirect paths from the independent variables to the dependent variables through the

Fig. 5. Study 2 mediation of the exclusion type-behavioral strategy link by emotions. Unstandardized regression coefficients are presented. The two panels have different dependent variables: (a) the strategy of increasing cooperation and (b) the strategy of reminding the group of your interdependence. On the paths from exclusion cause to the strategies, values inside parentheses indicate the unstandardized regression coefficient before including the mediating variables (i.e., the total effect). The value outside parentheses indicates the unstandardized regression coefficients in the final model (i.e., the direct effect that remains once the mediators are included). *Note.* * *P* < .05, ** *P* < .01, *** *P* < .001.

mediators were significant. This was true for three of the four indirect paths. To test this, we examined the 95% bias-corrected and accelerated bootstrap confidence intervals (CIs) for the indirect paths (1000 bootstrap sample); confidence intervals should not include zero. Exclusion for pathogen infection, relative to free riding, predicted more anger, which in turn predicted more interdependence reminders (indirect effect = 0.29; 95% CI ranged from 0.09 to 0.54) and less willingness to increase cooperation (indirect effect = −0.26; 95% CI ranged from −0.53 to −0.01); neither confidence interval included zero. Exclusion for free riding, relative to pathogen infection, predicted more guilt, which in turn predicted increased cooperation (indirect effect = −0.31; 95% CI ranged from −0.55 to −0.08); again the confidence interval did not include zero. Only the indirect path predicting interdependence reminders from guilt was not significant (indirect effect = 0.01; 95% CI ranged from −0.29 to 0.25). Thus, the emotions of guilt and anger each partially mediated the link between exclusion and increased cooperation and the emotion of anger partially mediated the link between exclusion and interdependence reminders. Although correlational, these results are consistent with a causal chain from exclusion to emotions to behavioral strategies.

4. General discussion

Different causes of exclusion led to qualitatively distinct and theoretically predicted sets of emotions and behaviors. Emotions partially mediated the effect of exclusion on behavior, suggesting that emotions may be partly responsible for organizing responses to these complex social problems. The particular emotions and behavioral strategies appear to be specialized responses to distinct problems, targeted at solving the adaptive problems created by different exclusions.

4.1. Types versus dimensions

We used a typology of threats to group functioning (based on, e.g., Goffman, 1963; Kurzban & Leary, 2001) as a heuristic to generate categorical exclusion types that might require qualitatively different responses. But perhaps the mind uses continuous dimensions instead of categories (e.g., Jones et al., 1984). If the process is dimensional, the set of dimensions must be rich and nuanced—rich enough to produce the textured responding we observed. Consider that emotion and behavioral strategy profiles consistently contained enough information to successfully back-predict the exclusions causing those profiles. Other analyses showed that all possible pairs of exclusion types had qualitatively different patterns of emotions. Any model must successfully capture this complexity.

4.2. Limitations and alternative explanations

One limitation of these data is that people imagined exclusion instead of living it. This approach has drawbacks because it only captures what people can successfully mentally simulate, but it allows tighter control for hypothesis testing. In addition, it makes possible the study of situations that would be both impractical and unethical to otherwise experimentally create, such as exclusion from a long-standing group for pathogen infection. Future research should bring different causes of exclusion into the lab or study people excluded in naturalistic settings.

Another concern is that any possible set of exclusion stimuli would produce qualitatively different patterns—perhaps this method is so sensitive that it detects any minor differences. Two lines of evidence speak against this. First, participants imagined belonging to one of three groups. The group situations, while different in many details, consistently produced similar emotion patterns when the exclusion was the same. Second, in Study 2, there were two different versions of each exclusion description and two different versions of the exclusion signal; these also did not lead to different patterns.

4.3. Implications and future directions

Although some aspects of exclusion response may apply to any form of exclusion, our results suggest responses to exclusion are tailored to the particular cause of exclusion. Researchers should consider whether this issue is relevant to their research question. This may depend on the specifics of the situation and the response being studied, and may not be obvious based on surface features.

These findings may also help make sense of previously controversial findings in the literature, such as exclusion causing poor logical thinking and inability to concentrate (Baumeister et al., 2002) and people in ostracism studies often seeming to "shut down" and become non-responsive (Williams, 2001). These past studies provide no reason for exclusion. Perhaps when people cannot determine why they were excluded, they perseverate, attempting to infer the cause, and thus are distracted from other tasks.

4.4. Conclusion

We approached variation in exclusion by considering the structure of ancestral situations, and the engineering problems they posed—what kind of information was available to the self and the group, and how others would respond to specific actions or responses. When reliable social support is called into question, there is no one-size-fits-all solution. Instead, solutions will be highly organized, specialized for the specifics of exclusion.

Supplementary Materials

Acknowledgments

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