Core disgust is attenuated by ingroup relations

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We present the first experimental evidence that ingroup relations attenuate core disgust and that this helps explain the ability of groups to co-act. In Study 1, 45 student participants smelled a sweaty t-shirt bearing the logo of another university, with either their student identity (ingroup condition), their specific university identity (outgroup condition) or their personal identity (interpersonal condition) made salient. Self-reported disgust was lower in the ingroup condition than in the other conditions, and disgust mediated the relationship between condition and willingness to interact with target. In Study 2, 90 student participants smelled a sweaty target t-shirt bearing either the logo of their own university, another university or no logo, with either their student identity or their specific university identity made salient. Walking time to wash hands and pumps of soap indicated that disgust was lower where the relationship between participant and target was ingroup rather than outgroup or ambivalent (no logo).

Disgust | groups | social identity

In this paper, we are concerned with the impact of social boundaries on the experience of disgust, and, more specifically, on the attenuation of disgust within group boundaries. This is of broad significance, being critical to understanding both the functionality of disgust and how group behavior becomes possible.

For many who study disgust, it is a response that leads us to insulate ourselves from those who are foreign to us, whose pathogens may harm us. Thus the sensual intrusion of others upon ourselves (their sight, smell, touch, taste) leads to an overwhelming desire to re-establish distance (1, 2). This is true at both an individual and a group level. Strangers and members of outgroups are those who provoke most disgust (3, 4, 5).

Equally, amongst those who study relations between groups, there is a longstanding tradition which recognizes the critical role of disgust. In 1928, Park (6) wrote that "racial antipathies are intensified by anything which arouses disgust. For this reason we tend to contract many of our racial antipathies, so to speak, through the nose" (p. 17). Later, in his classic text on prejudice Allport affirmed that "the 'argument by odor' is so pervasive that it merits further examination" (7, p. 137). It has taken a while for such examination to occur, but recently it has been shown that invoking disgust invokes dehumanization, bias and extreme forms of prejudice against outgroups (8, 9).

In sum, it is well established that disgust plays a significant role in keeping groups apart, especially from those who, we believe, could contaminate us (10, 11). It is easy to see how this could be highly functional in protecting us from disease. But in other ways, it is highly dysfunctional. High levels of disgust impede people from coming together and cooperating. Hence lack of disgust is essential in keeping groups together and enabling them to work together effectively.

Drawing on self-categorization theory (12), for which group formation is based on people defining themselves in terms of a common category membership (e.g. "we are Americans", "we are psychologists") and leads fellow group members to be included as part of an extended social self, we suggest that this sense of commonality leads to lowered disgust which in turn facilitates interaction. In the same way that we see our own children as less "other" and hence are less disgusted by such things as removing their diapers (see 13), so, we suggest, we cease to see ingroup peers as other and cease to be disgusted by them.

It is important to stress here that we are concerned with disgust that arises out of the embodied presence of the other (so-called "core" disgust — 2), not the sense of moral disgust or sexual disgust invoked by the idea of the other. There may be connections between these, but it is generally recognised that they differ from each other along a number of dimensions (14). For instance, moral disgust is more akin to anger (15); "core" and moral disgust are associated with different patterns of autonomic response (16); more generally, Tybur and colleagues propose that the different types of disgust have different distal determinants and are proximally associated with different information processing systems (17, 18). So, while Harris & Fiske (19) show that moral disgust is limited to certain extreme outgroups, and that therefore we don't necessarily experience less moral disgust for ingroup members, it remains to be shown how group boundaries relate to the experience of "core" physical disgust.

Here, drawing both on the recognition that bodily waste products are the most potent elicitors of disgust (20, 21) and also Allport's(7) concern with the "argument by odor", we present two studies that investigate whether body odor is less disgusting when it is associated with an ingroup member as opposed to an outgroup member or an undefined individual. Secondarily, we also address whether lowered ingroup disgust arises through increased similarity and whether it facilitates increased interaction.

Study 1

Introduction

In this study, student participants from Sussex University were asked to rate a sweaty t-shirt which bore the emblem of a different university to their own (Brighton University). Either their personal identity was made salient, their specific university identity was made salient (in which case the source of the t-shirt was unknown); or they were asked to rate a sweaty t-shirt bearing the logo of another university, with either their student identity (ingroup condition) or their specific university identity (outgroup condition) made salient.

Significance

Two experiments showed that where there is shared identity with others in a group the disgust experienced at smelling their sweat is significantly attenuated, and willingness to interact with them increased, compared to when the sweat was from an outgroup member or another individual. This difference is explained by the similarity to self of ingroup members. The analysis points to both the importance of social group boundaries in moderating the experience of "core" physical disgust and also the importance of disgust in the analysis of basic social processes, including the ability of group members to cohere and work together.

Reserved for Publication Footnotes
Measures were also taken of their perceived similarity to the source (t-shirt wearer) and willingness to interact with the source. Our argument is specifically that disgust is attenuated when a source is ingroup rather than that it is accentuated when the source is outgroup. Accordingly, it was predicted that disgust will be lower in the broad ‘student identity’ condition than in either the ‘university’ or the ‘personal’ identity conditions, which themselves should not differ.

Fig. 1. Perceived similarity as a mediator of the relationship between condition (ingroup/non-ingroup) and disgust. *p < .05, **p < .01 Values represent unstandardized regression weights.

Fig. 2. Disgust as a mediator of the relationship between experimental condition (ingroup/non-ingroup) and desired social interaction. *p < .001. Values represent unstandardized regression weights.

Fig. 3. Time Walking to Hand Sanitizer by Experimental Condition

Results

Manipulation Checks Sussex University identity salience differed between conditions (interpersonal, \( M = 2.27, SD = 0.97 \); outgroup, \( M = 4.73, SD = 1.03 \); ingroup, \( M = 4.49, SD = 1.28 \); \( F(2, 42) = 15.78, p < .001 \); \( \eta^2 = .43 \)). Post-hoc Tukey tests revealed that scores were significantly greater in the outgroup and ingroup conditions than in the interpersonal condition (both \( p < .001 \)). There was no significant difference between the outgroup and ingroup conditions.

Student identity salience also differed between conditions (interpersonal, \( M = 2.20, SD = 0.93 \); outgroup, \( M = 4.18, SD = 1.28 \); ingroup, \( M = 5.16, SD = 1.41 \); \( F(2, 42) = 22.67, p < .001 \); \( \eta^2 = .52 \)). Post-hoc Tukey tests revealed that scores were significantly higher in the outgroup and ingroup conditions than the interpersonal condition (both \( p < .001 \)). There was no significant difference between the outgroup and ingroup conditions.

Finally, awareness of the Brighton University logo on the t-shirt was near ceiling (\( M = 6.67, SD = .67 \)).

Effects of Condition on Disgust There was a significant effect of condition upon self-reported disgust (interpersonal, \( M = 5.33, SD = 0.44 \); outgroup, \( M = 4.74, SD = 0.91 \); ingroup, \( M = 3.26, SD = 3.26 \); \( F(2, 42) = 25.09, p < .01 \); \( \eta^2 = .54 \)). As predicted, post-hoc Tukey tests revealed that the disgust score was lower in the interpersonal condition than in either the outgroup or ingroup conditions (both \( p < .001 \)), but there was no significant difference between the interpersonal and outgroup conditions.

Similarity as a Mediator of Disgust We first analysed the effect of condition on similarity ratings and found a significant difference (interpersonal, \( M = 2.84, SD = 1.05 \); outgroup, \( M = 2.91, SD = 1.03 \); ingroup, \( M = 5.13, SD = 0.92 \); \( F(2, 42) = 25.17, p < .001 \); \( \eta^2 = .55 \)). Post-hoc Tukey tests revealed that perceived similarity was significantly greater in the interpersonal condition than in the other two conditions (both \( p < .001 \)), but there was no difference between the outgroup and interpersonal conditions.

On the basis of this finding we then collapsed the three conditions into two - ingroup vs. non-ingroup (i.e. interpersonal + outgroup) - and then examined whether similarity mediated the effect of condition on disgust. All mediation analyses were conducted using the Hayes (22) PROCESS macro. Results based on 5000 bootstrapped samples indicated that there was a significant indirect effect of condition on disgust through perceived similarity, \( b = 1.05 \), bias-corrected and accelerated (BCa) confidence intervals (CI) [0.33, 2.12]. Because zero is not in the 99% confidence interval, this is significantly different from zero at \( p < .001 \).

Fig. 4. Time Washing Hands by Experimental Condition
.01. This represents a large effect, \( \kappa^2 = .40, 95\% \text{ BCa CI [0.14, 0.63]} \).  

**Disgust as a Mediator of Interaction** We first analysed the effect of condition on ratings of desired interaction and found a significant difference (interpersonal, \( M = 2.38, SD = 0.64 \); outgroup, \( M = 2.64, SD = 0.94 \); ingroup, \( M = 3.96, SD = 1.37 \). \( F(2, 42) = 10.10, p < .01 \), \( \kappa^2 = .33 \). Post-hoc Tukey tests revealed that perceived similarity was significantly greater in the ingroup condition than in the other two conditions (both \( p < .001 \)). There was no difference between the outgroup and interpersonal conditions.

Next, we again created two conditions - ingroup and non ingroup - and examined whether disgust mediated the effect of condition on interaction. Results based on 5000 bootstrapped samples indicated a significant indirect effect of condition on interaction through disgust, \( b = -1.37, \text{ BCa CI [-2.72, -.70]} \). This represents a large effect, \( \kappa^2 = .47, 95\% \text{ BCa CI [0.24, 0.67]} \) (see Figure 2).  

**Discussion**

Both our main and our subsidiary predictions are supported by this study. We found that when the source was included as part of a common ingroup (a fellow student), the level of disgust was attenuated compared to when the source was either a separate individual or a member of a separate group (and, moreover, that the level of disgust in these two latter conditions did not differ). We also found that the effect of ingroup membership in lowering disgust is mediated by perceived similarity and that lowered disgust mediates the effect of ingroup membership on social interaction.

However, any conclusions must be tempered by three considerations. First, manipulation checks revealed no significant differences in measures of either "Sussex University" identity or of "student" identity in either of the group conditions. Yet, post-hoc scales of identification are notoriously reactive (the mere act of measurement can prime a previously non-salient identification). Moreover, our analyses (notably the effect of condition on perceived similarity) are consistent with the claim that identity has been manipulated, and such a claim provides a comprehensive and parsimonious explanation of results.

Second, while our design involves keeping the identity of the source constant and thereby rules out explanations relating to the status or else the stereotypic content of that source, it does involve variability in the identity of participants. Therefore the results might be explained in terms of the stereotypic content of participant identity. That is, it is possible that "individual identity", "Sussex identity" and "student identity" invoke different standards concerning personal hygiene leading to different levels of disgust at exposure to body odors. It would be preferable to have a design in which unconfounds ingroup/outgroup relations from the specific identity of the ingroup.

Third our findings are based on self-reports of disgust which are open to several biases. It would be preferable to employ behavioral measures.

**Study 2**

**Introduction**

This second study differed in two respects from the first. First, we manipulated the identity of the source as well as the identity of the participants. Participants, who were St Andrews University students, either had their specific "St Andrews student" identity or else their broad "student" identity made salient. Then they had to smell a sweaty t-shirt which either had a St Andrews University logo, a Dundee University logo (a local "rival" university, equivalent to Brighton University in Study 1), or no logo. If the critical determinant of disgust ratings is the categorical relationship between judge and source, then we would find attenuated disgust for the Dundee t-shirt in the "student" as opposed to the "St Andrews" identity conditions (since the source is ingroup in the former and outgroup in the latter), but no differences in disgust ratings for the St Andrews t-shirt in these two identity conditions (since the source is ingroup in both conditions). If, however, the results derive from the norms of the different groups, then we would find differences in disgust ratings between the two identity conditions to occur irrespective of which t-shirt is smelt. This design therefore unconfounds the effects of categorical relations from those of group identity.

Second, this study employs behavioral measures. Participants were asked to smell the t-shirt, then walk over to a table on which a hand sanitizer had been placed, dispense some sanitizer and wash their hands. Because people seek to distance themselves from disgust-inducing phenomena (e.g. 17) and also that these produce enhanced hygiene behavior (21), we reasoned that greater disgust would be reflected in faster walking, more pumps and longer hand washing.

**Results**

**Preliminary Analyses** We carried out two preliminary analyses. The first looked at gender and revealed no effect on any of the dependent measures. Accordingly gender was not included as a factor in the main analyses. The second analysis was undertaken to ensure that time taken in smelling the t-shirt was constant across conditions and therefore could be ruled out as an explanation of the effect of condition on other variables. The findings confirmed that there were no main effects of condition nor interactions on how long participants smelt the t-shirt.

**Time spent walking to the hand sanitizer** There was a significant main effect of t-shirt ("St Andrews, \( M = 6.06, SD = 1.76 \); Dundee, \( M = 4.52, SD = 1.50 \); plain, \( M = 4.09, SD = 0.69 \)). \( F(2, 79) = 17.12, p < .001 \), \( \kappa^2 = .30 \). Post-hoc Tukey tests revealed that participants smelling a St Andrews University t-shirt took significantly longer to walk to the hand sanitizer than participants who smelt a Dundee University or plain t-shirt (both \( p < .001 \)). There was no significant difference in time walking between the Dundee University and plain t-shirt conditions. This main effect was qualified by a significant interaction between t-shirt and identity salience, \( F(2, 79) = 4.22, p = .02, \kappa^2 = .10 \) (see Figure 3).

An alpha level of .0045 was used to control for multiple comparisons in the following statistics. As predicted, planned comparisons demonstrated that for the Dundee t-shirt, time walking was significantly longer in the student identity condition (\( M = 5.30, SD = 1.58 \)) than in the St Andrews identity condition (\( M = 3.74, SD = 0.94 \), \( t(28) = 3.28, p = .003 \). There were no significant differences in time walking for the St Andrews or plain t-shirt conditions (both \( p > .10 \)).

**Number of pumps of hand sanitizer**

The data for this measure were highly non-normal in distribution (Shapiro-Wilkes (85) = .445, \( p < .001 \)). Indeed all the participants dispensed either one or two pumps, with the exception of one who dispensed three. Accordingly, it was not appropriate to use parametric analyses. Rather, participants were dichotomized into those who used one pump and those who used more than one pump. Data were then further re-coded to represent participation in either an "ingroup" condition (St Andrews identity and St Andrews t-shirt; student identity and St Andrews or Dundee t-shirt) or "outgroup" condition (St Andrews identity and Dundee t-shirt). Participants who smelt the plain t-shirt were omitted from this analysis since their group relationship to the participant was undefined. In the ingroup condition 39 participants used one pump and two used more than one pump. In the outgroup condition, 9 people used one pump and 6 used more than one pump. A Fisher’s Exact test showed this difference was significant (\( p = .003 \)).
Time spent washing hands

There was no significant main effect of t-shirt (St Andrews, $M = 13.40$, $SD = 6.87$; Dundee, $M = 13.48$, $SD = 6.28$; plain, $M = 11.69$, $SD = 5.23$) on time spent washing hands, $F(2, 79) = 0.89$, $p = .41$, $\eta^2_p = .02$, nor of salient identity ($St. Andrews, M = 12.02$, $SD = 6.23$; student, $M = 13.69$, $SD = 5.96$), $F(1, 79) = 1.73$, $p = .19$, $\eta^2_p = .02$. There was no significant interaction between t-shirt and identity conditions, $F(2, 79) = 1.63$, $p = .20$, $\eta^2_p = .04$ (see Figure 4).

Discussion

On two out of three behavioral measures, the results indicated that ingroup relations attenuate disgust (we also included two ratings of disgust, self-rated disgust and observer rated disgust; the former did not produce the predicted pattern of results while the latter largely did). However because of problems with both measurements, and because of our focus on behaviour in this second study, we did not include the details of these findings in the main results section). Participants went to wash their hands more quickly and used more soap after smelling a t-shirt that was associated with another individual or a member of another group than when it was associated with an ingroup member. We did not obtain significant results on how long they spend washing their hands. But this may be simply because, once participants had got to the point of whether we expect to see local not to wash them, and had no need to do more.

In this study, unlike the first, we are able to rule out the possibility that our results are down to "hygiene norms" associated with the ingroup since there was no difference between the participant identity conditions when smelling a St. Andrews or a plain t-shirt, but only when smelling a Dundee t-shirt. The fact that, after smelling this Dundee t-shirt, people are quicker when their St. Andrews identity is salient than when their student identity is salient also means that the target stereotype effect. The remaining explanation is in terms of category relations. Only when the target is ingroup do people rush less to clean themselves after being exposed to the smell of sweat.

General Discussion

There are four important points arising from our findings. First, in both studies, core disgust does not increase for targets labelled as "outgroup" compared to those labelled as another individual. However it does decrease for targets labelled as ingroup compared to the other two. Hence, our findings point specifically to the attenuation of disgust for ingroup targets rather than the accentuation of disgust for outgroup targets. Second, the findings show specifically that the ingroup relationship is important in terms of attenuating disgust, rather than either the status or stereotypes associated with particular targets (as emphasised by Allport 7) or cleanliness/disgust standards associated with particular ingroups. Third, the findings hold across both self-report and behavioral measures. Fourth, the attenuation of disgust arises out of the sense that ingroup members are less "other" and facilitates harmonious interaction with them.

Clearly, this is an initial investigation. Firmer conclusions depend upon further studies involving a wider range of social categories and of measures - in particular, behavioral measures of interaction. It is also important to examine whether lowered ingroup disgust has pernicious as well as positive consequences, leading to risky health behaviors (e.g. sharing food and drink) and increasing the possibility of disease transmission in groups (24). This is a particular concern in the emerging field of mass gatherings medicine (25, 26).

Nonetheless our findings already carry significant implications for both the study of disgust and group processes. On the one hand, they demonstrate the importance of social boundaries in the experience of disgust. Even if one accepts that disgust serves to distance us from others on biological grounds (the avoidance of infection), our perceptions of "otherness" depend upon the social processes by which "otherness" is defined. One of our most powerful findings is that the same target (e.g., a Dundee student) can be either outgroup or ingroup and elicit more or less disgust as appropriate. It is clear that we need to know whether we fail to see this or more inclusively (e.g., as "from St. Andrews" or as "a student").

On the other hand our findings contribute to a growing body of evidence that group identities impact not only social perceptions but also our basic sensual experiences: of cold (27), of noise (28), and now of smell. More fundamentally, the studies remind us that groups involve not only a gathering of minds but also of sweaty, smelly, tactile bodies. It is impossible to work with people if you cannot stand their physical presence. Accordingly, understanding of how group life is possible will necessarily remain incomplete without attention to the sensual dimension.

Methods

Study 1

Participants Forty-five female students from Sussex University participated in return for entry into a £25 cash draw. This sample size was determined via pilot testing and then used for the subsequent experiment.

Design All participants smelt a t-shirt bearing the logo of the Brighton University (another local university), and had either their personal, Sussex University, or student identity made salient. They then filled in a questionnaire containing measures of perceived similarity to the source, disgust, and willingness to interact.

Materials The t-shirt was white, medium sized and bore a large Brighton University logo. In order to render it pungent, the t-shirt was worn for a week by a male research assistant both during daily physical exercises and in bed. It was then placed into a tightly sealed plastic container to maintain the odor.

Measures Disgust. The disgust scale ($a = .91$) comprised six items which were adapted from the Disgust Sensitivity Scale Revised (29); e.g. "When I smell a big smell of body odor, I worry I would vomit". Three items ($a = .77$) were adapted from Novel-Druy and Reicher (28) e.g., "I would not mind socialising with this person", "I would like to meet this person".

Perceived similarity. Three items ($a = .87$) were devised by the authors; e.g. "I felt I belonged to the same group as this person".

Manipulation checks. Both strength of identification as a Sussex University student ($a = .94$), and as a student ($a = .97$), were measured using three items adapted from standard scales (31, 32), e.g. "The fact that I am a student [at Sussex University] is an important part of who I am". These scales were used as checks for the identity manipulation. We also checked whether participants were aware of the identity of the source by asking "Did you notice the Brighton logo on the t-shirt?"

Procedure The study took place over five days. Independent judges were asked to rate the pungency of the t-shirt each day in order to confirm that the odor remained consistent throughout the data gathering. They rated the odor as consistent.

To disguise its true purpose, participants were told that the experiment was designed to investigate their perception of pheromones. They were approached opportunistically in communal student areas. Nobody who was approached refused to participate. They were then told that the purpose of the study was to investigate people's ability to detect compared with others / students from other Universities / non-students and the questionnaire was headed "Pheromone detection test: A comparison of individuals / Sussex University students / students in pheromone detection compared with others / students from other Universities / non-students" and the questionnaire was headed "Pheromone detection test: A comparison of individuals / Sussex University students / students in pheromone detection compared with others / students from other Universities / non-students". The experimenter verbally explained to participants that they were to have a "big smell" of the t-shirt once the lid was taken off the box, and "once you feel you have had a big enough smell of the t-shirt, put the box back down".

The box lid was replaced and participants then completed the measures.

Ethics Statement The study protocol was approved by the University of Sussex Social Psychology Research Governance Committee in 2010. All participants provided their written informed consent before participation.

Study 2

Participants Ninety students at St Andrews University participated. Participants were either primed to have perceived similarity to participants that they were to have a "big smell" of the t-shirt once the lid was taken off the box, and "once you feel you have had a big enough smell of the t-shirt, put the box back down". The box lid was replaced and participants then completed the measures.

Footline Author
Materials All the t-shirts were white, one was plain, the St Andrews and Dundee t-shirts had equivalent sized navy blue logos. Each t-shirt was worn by the same female researcher during a strenuous one-hour run, after which they were immediately placed into a tightly sealed plastic container to maintain the odor over the week that the experiment took place.

Measures All measures were based on the video records, and time measures were based on the time codings on these videos. The person coding the data was blind to which condition participants were in.

Time spent smelling the t-shirt: this was the time taken from the moment participants first placed the t-shirt back on their face to when they began moving the t-shirt back down towards the desk.

Time spent walking to hand sanitizer: this was the time taken from the moment participants placed the t-shirt back onto the desk, to the moment they first pressed the pump on the bottle of hand sanitizer. The t-shirt and the hand sanitizer were 6 metres apart in all conditions.

Number of pumps of hand sanitizer: this was the number of separate times that the participant pressed down on the pump to the sanitizer bottle.

Awareness of source: At the end of the questionnaire participants were asked “Did you notice a logo on the t-shirt?”, and “If yes, what was the logo?”

Procedure The study was conducted in the Social Immersion laboratory at St Andrews University which allows for unobstructed filming. On arrival, participants were directed to a side room next to the laboratory, where they were told they were participating in a study examining the ability of members of one group to detect social information from odors, that they would be asked to smell a t-shirt taken from another study investigating the production of pheromones during exercise, and that they would then be asked to make ratings of the wearer. To manipulate identity, they were then told that we were interested in them as either St Andrews students or as “students” and they were asked to note down three things which they thought were the distinctive defining characteristics of St Andrews students/students (33). After this, participants were taken into the main laboratory where the experimenter indicated the t-shirt which was placed on a table at one end of the laboratory, and the hand sanitizer which was across from a participant at the other end. The experimenter gave the instruction “When you’re ready, you can pick up the t-shirt and smell it to see what information you can get about the owner. There is hand sanitizer on the table if you would like to use it after”. After these tasks, participants completed a final questionnaire.

Results

Did you notice a logo on the t-shirt? If yes, what was the logo?

2205 More than one logo

2206 No logo noticed

2207 Could not see logo

2208 Other

If yes, what was the logo?

2209 St Andrews logo

2210 Dundee logo

2211 Orange

2212 Blue

2213 Green

2214 Black

2215 White

2216 Other

Awareness of source

2217 St Andrews students

2218 Dundee students

2219 Other

2220 Other

Procedure

The study was conducted in the Social Immersion laboratory at St Andrews University which allows for unobstructed filming. On arrival, participants were directed to a side room next to the laboratory, where they were told they were participating in a study examining the ability of members of one group to detect social information from odors, that they would be asked to smell a t-shirt taken from another study investigating the production of pheromones during exercise, and that they would then be asked to make ratings of the wearer. To manipulate identity, they were then told that we were interested in them as either St Andrews students or as “students” and they were asked to note down three things which they thought were the distinctive defining characteristics of St Andrews students/students (33). After this, participants were taken into the main laboratory where the experimenter indicated the t-shirt which was placed on a table at one end of the laboratory, and the hand sanitizer which was across from a participant at the other end. The experimenter gave the instruction “When you’re ready, you can pick up the t-shirt and smell it to see what information you can get about the owner. There is hand sanitizer on the table if you would like to use it after”. After these tasks, participants completed a final questionnaire.

Footnotes


