

# Imagining intergroup contact is more cognitively difficult for people higher in intergroup anxiety but this does not detract from its effectiveness

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## Abstract

Imagined intergroup contact (Crisp & Turner, 2009) is a new indirect contact strategy for promoting tolerance and more positive intergroup attitudes. We asked whether the positive effects of imagined contact are contingent upon characteristics that define the experience of intergroup relations. Specifically, we tested whether precontact intergroup anxiety makes imagining contact more cognitively effortful, and if it does, whether this detracts from its effectiveness. In two studies participants were asked to either imagine contact with an outgroup member or a control scene. We found that imagining contact counteracted the negative impact of intergroup anxiety on outgroup communicative behavior. Furthermore, performance on an ostensibly unrelated Stroop task revealed that this compensatory benefit requires cognitive resources proportional to the level of precontact anxiety. We conclude that the detrimental impacts of intergroup anxiety can be assuaged by imagining contact, but that doing so requires the allocation of attentional resources proportional to the positivity of preintervention contact experiences.

## Keywords

intergroup contact, imagined contact, prejudice, intergroup anxiety

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Anxiety has a negative impact on performance in a wide range of domains including academic tests (Elliot & McGregor, 1999), sporting events (Woodman & Hardy, 2003), public speaking (Merritt, Richards, & Davis, 2001), music (Kenny, Davis, & Oates, 2004), and sexual intercourse (McCabe, 2005). Given its pervasive negative impact it is perhaps unsurprising that anxiety is also an inhibitory factor that prevents the development of more positive intergroup relations. Anxiety felt at the prospect of contact with

outgroups has a profound negative impact on attitudes, evaluations, intention, and action (Paoletti, Hewstone, Cairns, & Voci, 2004; Pettigrew

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& Tropp, 2006; Swart, Hewstone, Christ, & Voci, 2011; Wagner, Christ, Pettigrew, Stellmacher, & Wolf, 2006). If intergroup contact is to promote positive impressions, dispel negative stereotypes, and foster more favorable relations, we must find ways of eliminating the negative impact of anxiety contexts of contact. In this article we present a new way of improving attitudes, intentions and communications with social outgroups that draws upon the power and potential of imaginative thought.

We focused our investigation on the interplay between intergroup anxiety and *intergroup contact*. Intergroup contact can alleviate intergroup anxiety and in turn promote more positive perceptions of outgroups, but high anxiety can also compel individuals to avoid intergroup contact and lead to hostility and ingroup bias when contact occurs (Pettigrew & Tropp, 2006; Stephan & Stephan, 1985). A recently developed indirect contact strategy for improving intergroup attitudes, *imagined intergroup contact* (Crisp & Turner, 2009), has been justified on the basis that where actual intergroup relations are difficult, or anxiety provoking, then imagined contact may offer a “safe” way of instigating intergroup contact. However, different people experience intergroup relations differently, and it is possible that just as higher precontact levels of anxiety will compel people to avoid intergroup contact, such individuals may find it harder to envisage a positive contact scenario. In this research we explored how differences in one’s emotional reaction to outgroups affect the efficacy of imagined contact. Our central hypothesis is that imagined contact will mitigate the detrimental effects of higher intergroup anxiety on intergroup attitudes and communicative behavior, but it will be more cognitively effortful for such individuals, and they will have to work harder to envisage a positive contact scenario than participants lower in intergroup anxiety. In other words, imagined contact will compensate for the detrimental impact of higher intergroup anxiety on attitudes and behavior, but doing so will require cognitive effort proportional to the level of precontact anxiety.

## Intergroup contact and imagined contact

Intergroup contact theory is the most influential theory for improving intergroup relations (Allport, 1954; Brown & Hewstone, 2005; Pettigrew & Tropp, 2008). A recent meta-analysis of over 500 studies (Pettigrew & Tropp, 2006) showed that intergroup contact has a robust effect in reducing prejudice (mean  $r = -.215$ ). Furthermore, there is emerging evidence that the concept of contact is even more powerful than previously thought—direct contact is not necessary to achieve positive effects on intergroup relations. The mere knowledge that an ingroup member has a close relationship with an outgroup member can improve intergroup attitudes (i.e., *extended contact*; Wright, Aron, McLaughlin-Volpe, & Ropp, 1997; see also Dovidio, Eller, & Hewstone, 2011). However, what happens if individuals do not have the *opportunity* for direct or extended contact? Prejudice can be a result of segregation which makes establishing meaningful contact between communities very difficult; for example Latino and White communities in the United States (Martin, 2006), Catholics and Protestants in Belfast in Northern Ireland (Office for National Statistics, 2001); with physical manifestations including the Green Line in Cyprus or the West Bank in Israel (Pettigrew, 2008; see also Crisp & Turner, 2009).

Imagined intergroup contact has recently been proposed as a further implementation of contact theory that can capitalize on the benefits of contact, even where opportunities for contact are unlikely or impossible. It is defined as “the mental simulation of a social interaction with a member or members of an outgroup category” (Crisp & Turner, 2009, p. 234). Research has shown positive effects of imagined contact on intergroup attitudes, behavioral intentions, stereotype threat, and behavior. Turner, Crisp, and Lambert (2007) found that male heterosexual participants asked to mentally simulate a positive social interaction with a gay man reported subsequently more positive intergroup attitudes towards gay men; an effect that was mediated by reduced anxiety at the

prospects of a future encounter with a gay man. These positive effects of imagined contact extend to response time measures of implicit attitudes towards Muslims (Turner & Crisp, 2010), enhanced projection of positive traits to ethnic and national outgroups (Stathi & Crisp, 2008), as well as college students' attitudes towards adults with schizophrenia (West, Holmes, & Hewstone, 2011), Turkish Cypriots' attitudes towards Greek Cypriots (Husnu & Crisp, 2010b), and a range of other groups not involved in the imagined contact scenario, as an extended effect of prejudice reduction towards the imagined outgroup (secondary transfer effects; Harwood, Paolini, Joyce, Rubin, & Arroyo, 2011). Imagined contact also encourages intentions to engage in future intergroup contact (Crisp & Husnu, 2011; Husnu & Crisp, 2010a; Husnu & Crisp, 2011), promotes member-to-group generalization of positive affect arising from the contact scenario (Stathi, Crisp, & Hogg, 2011), reduces the impact of negative self-stereotyping on cognitive performance in older adults (Abrams et al., 2008; Crisp & Abrams, 2008), and can promote outgroup approach behaviors (Turner & West, 2012; Turner, West, & Christie, in press).

### Anxiety blights communication with outgroups

Part of the justification for both extended and imagined contact interventions is that they provide a way of introducing intergroup contact to individuals who might otherwise be disinclined to entertain such thoughts (due to high levels of intergroup anxiety—a defining feature of disharmonious intergroup relations). The prospect of intergroup contact can evoke intergroup anxiety: Negative expectations of rejection or discrimination during cross-group interactions or because of fears that the interaction partner, or the respondents themselves, may behave in an incompetent or offensive manner lead to intergroup anxiety (Islam & Hewstone, 1993; Stephan & Stephan, 1985). This can mean that if and when intergroup contact

does occur it is difficult and stilted, negatively affecting the quality of communications (Gudykunst & Shapiro, 1996; Hubbert, Gudykunst, & Guerrero, 1999), compelling individuals to rely on stereotypes (Stephan & Stephan, 1985; Wilder, 1993) and likely resulting in more negative outgroup evaluations (Stephan & Stephan, 1985).

High communication quality is perceived when the interaction is relaxed, smooth, open, attentive, and with minimal breakdowns (Duck, Rutt, Hurst, & Strejc, 1991). As with interpersonal communication, communication quality in *intergroup* relationships increases with intimacy (Duck et al., 1991). However, intergroup communication is especially difficult compared to interpersonal communication (Hoyle, Pinkley, & Insko, 1989); it involves greater anxiety and uncertainty (Gudykunst & Shapiro, 1996). This is because of concerns about appearing prejudiced, behaving incompetently or offensively, or about being negatively evaluated (Stephan & Stephan, 1985). This means that the quality of intergroup communications varies with the individuals' ability to manage their anxiety and uncertainty (Gudykunst, 1998). Research has shown that the more anxiety one feels at the prospect of communicating with an outgroup member, the poorer the quality of the subsequent communication. Participants who report higher levels of anxiety are subsequently more stressed and insecure, less likely to self-disclose, and demonstrably more uncomfortable in the intergroup communicative context (Gudykunst & Shapiro, 1996; Hubbert et al., 1999). Furthermore, participants high in anxiety perceive their communication as less effective (Gudykunst & Nishida, 2001). Reducing anxiety at the prospect of intergroup communication is therefore an important goal for efforts to improve intergroup relations.

### This research

Research has shown that imagined intergroup contact produces positive perceptions of *outgroups*, for example, improved intergroup attitudes. Furthermore, previous studies have indicated that

reduced anxiety is important in explaining the positive effects of imagined contact (Crisp & Turner, 2009). However, no studies have yet explored the potential *moderating* impact of imagined contact on precontact intergroup anxiety. This is important because while moderation can provide evidence of process, it can *also* test important boundary conditions on the effectiveness of experimental manipulations, and therefore ultimately (in this case) the effectiveness of intervention strategies for different people (something that mediational analysis cannot). This is especially important when, as in the case of intergroup anxiety, there are distinct psychological consequences that operate at different levels of the construct. Specifically, while researchers have suggested that imagined contact is a safe, anxiety-free way of introducing the idea of imagining contact (Crisp, Husnu, Meleady, Stathi, & Turner, 2010; Crisp & Turner, 2009, 2010; Turner et al., 2007), just as anxiety can compel people to avoid intergroup contact, there are reasons to think that imagined contact may also not be entirely immune to the effects of precontact intergroup anxiety.

Based on what we know of the avoidance-inducing effects of intergroup anxiety, it is likely that individuals higher in intergroup anxiety will not only be used to avoiding actual contact (Stephan & Stephan, 1985), but even *thinking* about positive contact. For such individuals, thinking about positive encounters with outgroup members may be hard because of their anxiety about the outgroup in question. Research has shown that anxiety is cognitively depleting (Easterbrook, 1959; Kahneman, 1973), and that intergroup anxiety aroused in an interracial interaction is associated with self-regulatory demands and can interfere with cognitive control (Amodio, 2009; Richeson & Shelton, 2003; Richeson & Trawalter, 2005; Trawalter & Richeson, 2006).

Intergroup anxiety can therefore negatively impact on the potential to engage in positive interactions with outgroup members. Should then contact, as some commentators have suggested, be singularly *ineffective* for people who have had negative outgroup experiences? The evidence points to the contrary. In his recent

review, Hodson (2011) found that direct contact is actually *most* effective for high-prejudiced individuals, and that these effects were persistent for different types of contact (e.g., direct contact, friendships, and indirect friendships). His review supports the notion that contact interventions are indeed effective for people who have had negative outgroup experiences. We argue that one of the reasons why this is the case is that contact can provide the positive outgroup experience that may be lacking for these individuals, and as such we would expect *imagined* contact to be particularly effective for these very people.

In sum, we expected that, as with actual contact, imagining an intergroup contact encounter would be more cognitively effortful for individuals higher in intergroup anxiety compared to those lower in intergroup anxiety. Those lower in intergroup anxiety will likely find the idea of thinking about positive contact more palatable than those higher in intergroup anxiety, and will likely be more able to readily form an envisaged positive contact scenario with a relevant outgroup member. This leads to the (perhaps ironic) prediction that imagining contact will be *especially* effective for people higher in intergroup anxiety, because for these people imagining contact (while difficult) will provide them with the contact experiences to assuage the negative, avoidance-inducing impacts of high intergroup anxiety. In contrast, people who have preexisting low levels of intergroup anxiety will already exhibit high levels of tolerance, so imagining another positive contact experience for them will be cognitively easy. In other words, we expect to replicate the well-established negative correlation between intergroup anxiety and tolerance in the control condition, but for this relationship to disappear in the imagined contact condition as the imagery task brings tolerance levels of higher anxiety participants up to the same high levels as observed for people lower in intergroup anxiety.

## Experiment 1

Our proposition is that mentally simulating an intergroup communication will eliminate the

detrimental impact of precommunication anxiety on the actual communication. We hypothesized that imagined contact would improve communication quality for participants high in precommunication anxiety. However, the imagined contact task should be more difficult for individuals higher in precontact intergroup anxiety, leading to resource depletion. We measured postcommunication depletion using the Stroop test. The Stroop task is regarded as the “golden standard” task to measure selective attention and cognitive control, and its effect is seen as large and statistically reliable (MacLeod, 1992). It has been used in over 700 studies to measure executive function and response inhibition in cognitive psychology (for a review see MacLeod, 1991; MacLeod & MacDonald, 2000), as well as in clinical and psychometric psychology (Jensen & Rohwer, 1966).

In this first study we used a variant of the basic imagined contact task that is derived from the more general literature on mental simulation (Crisp, Birtel, & Meleady, 2011; Crisp et al., 2010; Rivkin & Taylor, 1999). This literature has demonstrated a range of beneficial impacts of mental imagery on subsequent performance. For instance, Taylor, Pham, Rivkin, and Armor (1998) found that students felt more confident about writing an essay, and subsequently wrote a better essay, when they were first instructed to mentally simulate writing the essay. Furthermore, mental simulation of good study habits reduced preexam anxiety in students which in turn improved their grades in the subsequent exam (Pham & Taylor, 1999). A meta-analysis by Driskell, Copper, and Moran (1994) showed that mental imagery enhanced task performance and was more effective the more this task involved cognitive activities (e.g., comparing and contrasting information). Furthermore, mental imagery employed prior to a netball game led to higher sporting confidence in netball players (Callow & Hardy, 2001). Knudstrup, Segrest, and Hurley (2003) found that participants asked to imagine doing well in a job interview reported lowered perceived stress about a forthcoming interview, and were more likely to achieve higher performance in a subsequent (mock) interview.

What is noticeable about this research on imagery and performance is that invariably participants imagine the *specific* behavior to be performed, and find that this behavior is subsequently performed to a higher level. In contrast, all existing research on imagined contact has asked participants to envisage an outgroup encounter in an abstract setting, and then go on to ask about general impressions of the outgroup as a whole. While this constitutes a strong test of the imagined contact hypothesis (especially its ability to produce “primary” transfer effects), it does provide something of a disconnect with the rest of the extant literature on mental simulation. Because we were interested in a specific outgroup contact behavior in this study (i.e., communicating with the outgroup through a video message), and to provide the first study aligning imagined contact with the wider literature on mental simulation, we therefore asked participants to imagine the specific form of contact that they would subsequently engage in. Correspondingly, we also focused on anxiety specific about this upcoming performance, rather than generalized intergroup anxiety (for a similar approach to measuring performance anxiety see Abrams et al.’s [2008] study in which they examined the effects of imagined contact on mitigating stereotype threat on older people’s cognitive performance).

## Method

### *Participants*

Thirty-eight students at the University of Kent (29 female, nine male), aged between 18 and 40 ( $M = 21.39$ ,  $SD = 4.03$ ), were randomly allocated to one of the two imagery conditions. The initial sample size was  $N = 40$  but was reduced for the analysis due to two outliers in the Stroop test. One half were asked to imagine recording a video to an older stranger, introducing themselves and talking about things they might have in common with them (imagined contact condition), the other half had to imagine an outdoor scene (control condition). Participants received either course credits or a small payment (£3.00) for their participation.



### *Procedure*

Participants were told that the study consisted of three independent parts which would examine “mental preparation, speech, and cognition.” In the first part, participants were informed that they were going to “record a short video introducing yourself to an elderly stranger. In particular, we want you to talk about the things that you might have in common.” Immediately after being informed of this, performance anxiety about recording the video was measured. Next, participants were randomly assigned to one of the two imagery task conditions. Previous research on imagined contact has tested an extensive variety of control conditions, including neutral contact (Stathi & Crisp, 2008, Experiment 1), no-contact control scenes (Stathi & Crisp, 2008, Experiment 3; Turner et al., 2007, Experiment 1), nonrelevant positive interaction (Stathi & Crisp, 2008, Experiment 2) and outgroup priming (Turner et al., 2007, Experiment 2). The benefits of imagining positive contact scenarios have been demonstrated against all of these conditions. Participants in the *control condition* were asked: “Please take a moment to imagine an outdoor scene. Try to imagine aspects of the scene (e.g., is it a beach, a forest, are there trees, hills, what’s on the horizon).” Participants in the *imagined contact condition* received the following instruction: “Please spend the next 2 minutes imagining that you are recording the video introducing yourself to an elderly stranger, and in particular talking about the things that you might have in common.” The rationale for asking participants to talk about things they had in common was to make this a positive, co-operative communication. Following this, to reinforce the effects of the imagery task, all participants were instructed to describe what they had just imagined. Participants were then asked to record a 2-minute video introducing themselves to an older adult stranger, and talking about what they might have in common with them. In the third part of the session, participants completed a Stroop (1935) color-naming test. They were told that “we are interested in whether different types of mental preparation also

have an effect on basic categorization tendencies.” Finally, participants were thanked and debriefed.

### *Independent measure*

**Performance anxiety** Performance anxiety about recording the video introducing oneself to an older adult stranger was measured before the imagery task. Performance anxiety rather than intergroup anxiety was used in this study. This type of anxiety is more appropriate than intergroup anxiety here because participants imagined the interaction task they were about to perform (we return to this issue in Experiment 2 in which participants imagined a more general intergroup encounter). Stephan and Stephan (1985) argue that intergroup anxiety leads to hostility when one is concerned about being negatively appraised, whereas performance anxiety leads to reduced cognitive performance when one is concerned about appearing prejudiced (see Abrams, Eller, & Bryant, 2006). Both types of anxiety reduce available cognitive resources (Easterbrook, 1959; Wilder, 1993; Wilder & Shapiro, 1991), directly affecting performance (see Abrams et al., 2006).

The measure asked: “Thinking about what you might say in this task, how do you feel?” followed by eight items adapted from the scale used by Abrams et al. (2006). Participants reported how under pressure, tense, nervous, confident (reversed), uneasy, calm (reversed), afraid of not doing well, and uncomfortable they felt on a 7-point Likert scale (1 = *not at all*, 7 = *very much*). Items were recoded such that higher scores represented greater performance anxiety. A composite performance anxiety score was created by the mean of these items ( $\alpha = .88$ ).

### *Dependent measures*

**Communication quality** The video recordings were coded for communication quality by two independent coders who were blind to the hypotheses and what condition participants were in, using items from the Iowa Communication Record

(Duck et al., 1991). The participants' introduction to an elderly stranger was rated on how *relaxed-strained*, *personal-impersonal*, *in-depth-superficial*, *smooth-difficult*, *open-guarded*, *free from conflict-laden with conflict*, and *free of communication breakdowns-laden with communication breakdowns* it was on a semantic differential ranging from 1 to 9. Items were recoded such that higher scores represented greater communication quality. A composite communication quality score was created by the mean of these items for each rater ( $\alpha_1 = .94$ ,  $\alpha_2 = .92$ ). The interrater reliability was  $\alpha = .74$ .

**Stroop test** The Stroop (1935) color-naming test was conducted with a color-coded keyboard. Participants received the instruction that color words (red, blue, yellow, green) and X strings (xxx, xxxx, xxxxx) would be presented on the screen in one of the following colors: red, blue, yellow, or green. They were asked to press the button corresponding to the ink color of the word as quickly as they could, whilst ignoring the word itself. Each of the color words and control X strings appeared for a maximum of 2,000 ms, preceded by a fixation cross (+). The intertrial interval (ITI) was 1,500 ms. The Stroop task consisted of 32 practice trials with X strings followed by four blocks of 24 trials with color words and X strings each, for a total of 96 experimental trials. *Incongruent* trials consisted of color words appearing in an ink color other than its semantic meaning (e.g., "green" in a red ink color). *Control* trials consisted of the X string in the corresponding ink color (e.g., "xxxxx" in a red ink color).

## Results and discussion

### Initial analysis

**Anxiety** Preliminary analysis showed no differences in premanipulation anxiety between the imagined contact and the control condition,  $t(35) = 0.68$ ,  $p = .498$ . Means, standard deviations, and correlations can be found in Tables 1 and 2.

**Stroop** Participants with more than 15% errors (two cases) were removed from the analysis. Of

**Table 1.** Means and standard deviations of all measures as a function of imagery task (Experiment 1)

	Imagery task	
	Control	Imagined contact
Performance anxiety	3.77 (0.96)	4.02 (1.26)
Communication quality	6.43 (1.48)	6.66 (0.94)
Stroop interference	72.60 (61.41)	90.37 (68.24)

Note: Standard deviations shown in parentheses.

the remaining 38 participants, incorrect responses were recoded as missing (4.4% errors). The analysis was conducted on the mean correct reaction times (RT). The mean correct RTs were used to control for effects of outliers. Reaction time outliers (2.41%) were winsorized using Van Selst and Jolicoeur's (1994) nonrecursive procedure (NR) with moving criterion. Response latencies < 200 ms were recoded as 200 ms. For response latency outliers above the mean, a cutoff per participant in each within-participant condition (i.e., incongruent and control) was calculated (for the *SD* criterion see Van Selst & Jolicoeur, 1994, Table 4, p. 642). A moving criterion was used instead of an absolute 2.5 *SD* criterion to take into account unequal numbers of observations between conditions and to not decrease power. The Stroop interference was calculated by subtracting the mean correct RTs in control trials from the mean correct RTs in incongruent trials. Greater Stroop interference (worse task performance) is represented by higher values. In the present sample, Stroop interference ranged from -52.03 to 249.11 ( $M = 81.02$ ,  $SD = 64.48$ ).

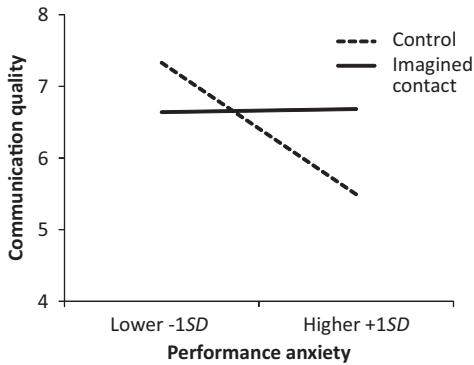
### Main analysis

**Communication quality** To assess the predicted interactive effect of imagery task and performance anxiety on communication quality, a moderated regression analysis (Aiken & West, 1991) was computed. The interaction variable was created by multiplying the centered performance anxiety scores with the imagery task variable

**Table 2.** Pearson correlation matrix among all measures as a function of imagery task (Experiment 1)

	Imagery task					
	Control			Imagined contact		
	Anxiety	Quality	Stroop	Anxiety	Quality	Stroop
Anxiety		$r = -.53^*$	$r = -.34$		$r = .02$	$r = .59^*$
Quality			$r = .36$			$r = .39$
Stroop						

Note.  $*p < .05$ .



**Figure 1.** Communication quality as a function of imagery task and performance anxiety, Experiment 1.

coded as  $-1$  (control) and  $+1$  (imagined contact). The imagery task and the centered performance anxiety variables were entered on the first step, the interaction variable (Imagery Task  $\times$  Performance Anxiety) on the second step. There were no significant main effects of imagery task,  $\beta = .10$ ,  $t(30) = 0.59$ ,  $p = .560$ , nor performance anxiety,  $\beta = -.28$ ,  $t(30) = -1.63$ ,  $p = .115$ .

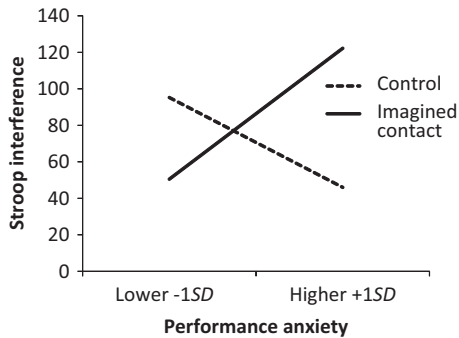
More importantly, the analysis revealed the predicted significant interaction between imagery task and performance anxiety,  $\beta = .37$ ,  $t(29) = 2.18$ ,  $p = .038$ ,  $R$  square change = .13 (see Figure 1). In the control condition performance anxiety was negatively correlated with communication quality,  $\beta = -.53$ ,  $t(29) = -2.47$ ,  $p = .020$ . In contrast, this relationship was not apparent following imagined contact—there was high-quality performance regardless of precommunication anxiety,  $\beta = .02$ ,  $t(29) = 0.07$ ,  $p = .942$ . Differences between the

imagery conditions at higher ( $+1$   $SD$ ) and lower levels ( $-1$   $SD$ ) of performance anxiety revealed that at higher levels of performance anxiety, communication quality was higher in the imagined contact condition compared to the control condition, a difference that approached significance,  $\beta = .48$ ,  $t(29) = 2.00$ ,  $p = .055$ . In contrast, at lower levels of performance anxiety, communication quality did not differ significantly between the imagery conditions,  $\beta = -.28$ ,  $t(29) = -1.15$ ,  $p = .259$ . In sum, imagined contact normalized communication quality for higher anxiety participants. Put another way, for participants higher in precommunication anxiety, imagined contact improved communication quality to the same level as exhibited by participants lower in anxiety.

**Stroop interference** We predicted that it would be more cognitively taxing for participants higher in anxiety to imagine a successful intergroup communication. In other words, those participants higher in anxiety would show subsequent poor Stroop performance compared to lower anxiety participants. We computed the same analysis as for communication quality.

There were no significant main effects of imagery task,  $\beta = .11$ ,  $t(34) = 0.66$ ,  $p = .517$ , nor performance anxiety,  $\beta = .19$ ,  $t(34) = 1.14$ ,  $p = .262$ . Most importantly, however, the analysis revealed the predicted significant interaction between imagery task and performance anxiety,  $\beta = .45$ ,  $t(33) = 2.93$ ,  $p = .006$ ,  $R$  square change = .20 (see Figure 2). Consistent with the hypothesis that imagining the outgroup communication is





**Figure 2.** Stroop interference as a function of imagery task and performance anxiety, Experiment 1.

proportionally more cognitively demanding as anxiety increases, in the imagined contact condition performance anxiety was positively related to Stroop interference,  $\beta = .59$ ,  $t(33) = 2.92$ ,  $p = .006$ . In contrast, in the control condition, which is not group-relevant so should not be cognitively taxing as a function of anxiety, there was no significant relationship,  $\beta = -.34$ ,  $t(33) = -1.47$ ,  $p = .152$ . Furthermore, we tested the differences between the imagery conditions at higher (+1 *SD*) and lower levels (-1 *SD*) of performance anxiety. At higher levels of performance anxiety, Stroop interference was higher in the imagined contact condition compared to the control condition,  $\beta = .58$ ,  $t(33) = 2.63$ ,  $p = .013$ . At lower levels of performance anxiety, Stroop interference did not differ between the imagery conditions,  $\beta = -.34$ ,  $t(33) = -1.58$ ,  $p = .123$ .

This study shows that the detrimental effects of anxiety on intergroup communications can be mitigated by the use of precommunication imagery tasks, but that doing so requires attentional resources proportional to the level of precommunication anxiety.

## Experiment 2

Having shown that the compensatory effect of imagined contact for high-anxiety participants requires attentional resources, in Experiment 2 we further explored the cognitive dynamics underlying the interplay of imagined contact with anxiety.

We also sought to extend the generalizability of the effect to the wider literature on imagined contact. In Experiment 1, participants imagined giving an outgroup communication, and were subsequently asked to give that communication. In other words, what they imagined they subsequently did. However, much of the literature on imagined contact has used a more abstract imagery scenario and tested whether this general imagined experience has an impact on outgroup attitudes as a whole. In addition, we do not know from this data whether the Stroop performance detriment reflected difficulty imagining contact, or difficulty carrying out the subsequent task. Because communication quality *improved*, this strongly indicates that it is not the subsequent task that high-anxiety participants found difficult. However a more robust test would be to actually ask participants how difficult they found the subsequent task, and show that it bears no correlation with the Stroop task. Finally, in Experiment 1 it was possible that it is simply imagining the to-be-done task—not the intergroup element—that compensated for the negative impact of anxiety. Having thus provided evidence in Experiment 1 that imagining a specific contact behavior improves *specific* performance (thus aligning imagined contact research with the more general literature on mental simulation), we moved to test the more robust hypothesis that imagining *any* encounter would have a positive impact on a different specific behavior. In Experiment 2, we therefore asked participants to imagine a typical imagined contact scenario and then do a task that was unrelated in behavioral terms to what was imagined. Correspondingly, in this study we measured *intergroup* anxiety, not performance anxiety.

Regarding dependent measures we also used a new behavioral measure to examine whether the Stroop performance detriment reflects difficulty carrying out the imagined contact task or the difficulty of the subsequent interaction task. We asked participants to write an email to an international student. If it is the subsequent interaction task which participants find difficult, then there should be no difference in communication difficulty reported in the imagined contact and the control conditions,

and the impaired Stroop test performance for high-anxious individuals will reflect the difficulty of the email-writing task. If it is the imagined contact task which participants find difficult (as we predict), then imagined contact should reduce communication difficulty for participants higher in intergroup anxiety. For these higher anxiety individuals it is the imagined contact task that requires more cognitive resources, which would be reflected in the impaired postcommunication Stroop test performance, similar to Experiment 1.

### Method

Thirty-six British students at the University of Kent (29 female, seven male), aged between 18 and 31 ( $M = 20.81$ ,  $SD = 2.81$ ), were randomly allocated to one of the two imagery task conditions. The initial sample size was  $N = 39$  but was reduced for the analysis due to three outliers in the Stroop test. One half were asked to imagine meeting an international student for the first time (imagined contact condition), the other half had to imagine an outdoor scene (control condition). Participants received either course credits or a small amount of money (£4.00) as reward for their participation.

### Procedure

Participants were told that the study aimed to investigate "people's experiences with and feelings about international students" as well as whether "visual imagery has an effect on a categorization task." At the beginning of the study, they were asked to indicate their intergroup anxiety towards international students. In the "visual imagery" part of the study, participants were randomly assigned to one of the two imagery task conditions. Participants in the *control condition* were asked to imagine an outdoor scene as described in Experiment 1. Participants in the *imagined contact condition* received the following instruction: "Please take a moment to imagine yourself meeting an international student stranger for the first time. Imagine that the interaction is positive,

relaxed, and comfortable." This instruction differed from what participants imagined in the experimental condition in Experiment 1 where the imagined task matched exactly the behavioral task. We decided to use a more general instruction specifically to see whether imagined contact in a more generalized form could be beneficial to a specific task. This is important because it will show if we can achieve a generalization of impacts of simulation on outgroup perception. Following this, to reinforce the effects of the imagery task, all participants were instructed to describe what they had just imagined in as much detail as possible.

The next part of the study was introduced as a necessary break between the visual imagery and the Stroop task. Participants were told that the university was doing a "project on the integration of international students." Participants were asked whether they would be willing to write an email to an international student, talking about their experiences as a student at the university or any other topic they would like to share. Those willing to help were given as much time as they wanted to write the email and indicated afterwards the difficulty with which writing the email was perceived. In the third part of the session, participants completed the Stroop task. Finally, participants were thanked and debriefed.

### Independent measure

**Intergroup anxiety** To measure anxiety concerning a future interaction with an international student, participants were asked "If you were to meet an international student in the future, how do you think you would feel?" followed by 10 items from the scale by Stephan and Stephan (1985). Participants reported how awkward, suspicious, embarrassed, defensive, anxious, happy (reversed), comfortable (reversed), self-conscious, confident (reversed), and careful they would feel on a 7-point Likert scale (1 = *not at all*, 7 = *very much*). Items were recoded such that higher scores represented higher intergroup anxiety. A

**Table 3.** Means and standard deviations of all measures as a function of imagery task (Experiment 2)

	Imagery task	
	Control	Imagined contact
Intergroup anxiety	2.15 (0.63)	2.24 (0.78)
Communication difficulty	3.46 (1.66)	2.31 (1.25)
Stroop interference	70.12 (44.66)	78.17 (59.38)

*Note.* Standard deviations shown in parentheses.

**Table 4.** Pearson correlation matrix among all measures as a function of imagery task (Experiment 2)

	Imagery task					
	Control			Imagined contact		
	Anxiety	Difficulty	Stroop	Anxiety	Difficulty	Stroop
Anxiety		$r = .57^*$	$r = -.15$		$r = -.13$	$r = .56^*$
Difficulty			$r = -.16$			$r = .03$
Stroop						

*Note.*  $^*p < .05$ .

composite intergroup anxiety score was created by the mean of these items ( $\alpha = .77$ ).

*Dependent measures*

**Communication difficulty** To measure communication difficulty (writing the email to an international student), participants were asked “How easy or difficult was it for you to write this email?” on a 9-point Likert scale (1 = *extremely easy*, 9 = *extremely difficult*).

**Stroop interference** The Stroop (1935) color-naming test was conducted as described in Experiment 1.

*Results and discussion*

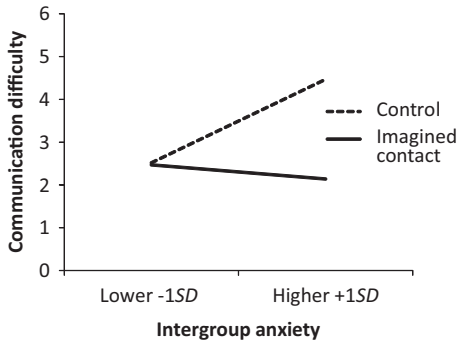
**Initial analysis**

*Anxiety* A preliminary analysis showed no differences in premanipulation anxiety between the imagined contact and the control condition,  $t(34) = 0.40$ ,  $p = .692$ . Means, standard deviations and correlations can be found in Tables 3 and 4.

*Stroop* Participants with more than 15% errors (three cases) were removed from the analysis. Of the remaining 36 participants, incorrect responses were recoded as missing (5.2% errors). The analysis was conducted on the mean correct reaction times (RTs). The mean correct RTs were used to control for effects of outliers. Reaction time outliers (2.50%) were winsorized using Van Selst and Jolicoeur’s (1994) nonrecursive procedure (NR) with moving criterion and recoded as described in Experiment 1. The Stroop interference was calculated as described in Experiment 1. In the present sample, Stroop interference ranged from  $-28.16$  to  $230.52$  ( $M = 73.92$ ,  $SD = 51.52$ ).

**Main analysis**

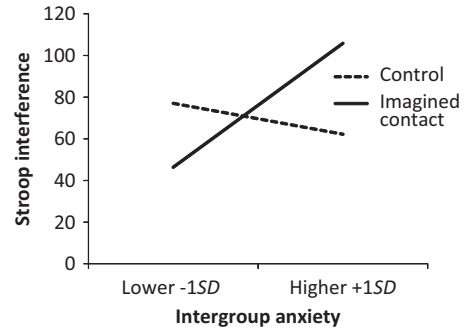
*Communication difficulty* To assess the predicted interactive effect of imagery task and intergroup anxiety on perceived difficulty in writing the email, a moderated regression was computed as described in Experiment 1. There was a significant main effect of imagery task on communication difficulty,  $\beta = -.39$ ,  $t(23) = -2.07$ ,  $p = .050$ . In line with the prediction that even abstract



**Figure 3.** Communication difficulty as a function of imagery task and intergroup anxiety, Experiment 2.

contact imagery can aid communicative behavior in intergroup contexts, communication difficulty was lower after imagined contact ( $M = 2.31$ ) compared to the control condition ( $M = 3.46$ ). There was no main effect of intergroup anxiety,  $\beta = .23$ ,  $t(23) = 1.23$ ,  $p = .231$ .

Most importantly the analysis revealed the predicted interaction between imagery task and intergroup anxiety,  $\beta = -.36$ ,  $t(22) = -2.04$ ,  $p = .05$ ,  $R$  square change = .13 (see Figure 3). In the control condition intergroup anxiety was positively correlated with communication difficulty,  $\beta = .57$ ,  $t(22) = 2.28$ ,  $p = .031$ . In contrast, this relationship was eliminated in the imagined contact condition,  $\beta = -.13$ ,  $t(22) = -.44$ ,  $p = .666$ . Furthermore, differences between the imagery conditions at higher (+1  $SD$ ) and lower levels (-1  $SD$ ) of intergroup anxiety revealed that at higher levels of intergroup anxiety, communication difficulty was lower in the imagined contact condition compared to the control condition,  $\beta = -.75$ ,  $t(22) = -3.00$ ,  $p = .007$ . In contrast, at lower levels of intergroup anxiety, communication difficulty did not differ significantly between the imagery conditions,  $\beta = -.01$ ,  $t(22) = -.04$ ,  $p = .970$ . In sum, imagined contact normalized difficulty for higher and lower anxiety participants. Put another way, for participants higher in intergroup anxiety, imagined contact reduced the perceived difficulty in writing the email to the same level as exhibited by participants lower in intergroup anxiety.



**Figure 4.** Stroop interference as a function of imagery task and intergroup anxiety, Experiment 2.

*Stroop interference* To assess the interaction between imagery task (imagined contact vs. control) and intergroup anxiety on Stroop interference, we computed the same analysis as for communication difficulty. There were no main effects of imagery task ( $\beta = .06$ ,  $t(33) = 0.36$ ,  $p = .719$ ), nor intergroup anxiety ( $\beta = .27$ ,  $t(33) = 1.60$ ,  $p = .118$ ).

More importantly, the analysis revealed the predicted significant interaction between imagery task and intergroup anxiety on Stroop interference,  $\beta = .36$ ,  $t(32) = 2.23$ ,  $p = .033$ ,  $R$  square change = .12 (see Figure 4). Further analysis within experimental conditions revealed that, consistent with the hypothesis that imagined contact is proportionally more cognitively demanding as anxiety increases, in the imagined contact condition intergroup anxiety was positively related to Stroop interference,  $\beta = .56$ ,  $t(32) = 2.59$ ,  $p = .015$ . There was no significant relationship in the control condition,  $\beta = -.15$ ,  $t(32) = -.61$ ,  $p = .546$ . Furthermore, we tested the differences between the imagery conditions at higher (+1  $SD$ ) and lower levels (-1  $SD$ ) of intergroup anxiety. At higher levels of intergroup anxiety, Stroop interference was marginally significantly higher in the imagined contact condition compared to the control condition,  $\beta = .42$ ,  $t(32) = 1.86$ ,  $p = .071$ . At lower levels of intergroup anxiety, Stroop interference did not differ between the imagery conditions,  $\beta = -.30$ ,  $t(32) = -1.32$ ,

$p = .197$ . In sum, these findings show that it was the imagined contact task which participants higher in anxiety found difficult, reflected in Stroop performance, rather than the subsequent communicative task.

## General discussion

While it is well established that imagined intergroup contact produces positive perceptions of outgroups, we aimed to examine whether imagined contact moderates the negative impacts of precontact intergroup anxiety. We examined whether the effectiveness of imagined contact is contingent upon characteristics that define the experience of intergroup relations; in particular, whether higher levels of precontact intergroup anxiety makes imagining intergroup contact more cognitively difficult and whether this detracts from the effectiveness of the approach. Across two studies we showed consistently that imagined contact can compensate for the negative impacts of higher levels of intergroup anxiety. In the following section we summarize the key findings, and explore implications and applications for future research.

In Experiment 1 we explored the cognitive dynamics involved in imagining contact for people already high in intergroup anxiety. Compared to a control condition in which higher anxiety predicted lower quality of communication to outgroups, this relationship was eliminated following imagined contact with an older adult. Imagined contact compensated for the negative impact of high anxiety on outgroup communication. Furthermore, the postexperimental Stroop test showed that compared to the control condition, in which there was no relationship between anxiety and Stroop performance, higher anxiety led to more Stroop interference in the imagined contact condition. This suggests that the compensatory effects of imagined contact are cognitively taxing. In other words, people who are higher in anxiety show greater cognitive depletion after imagining positive contact, indicating that they may have to put in more effort to imagine positive contact, but

nonetheless they are able to do so, and this leads to positive outcomes for communication quality.

Having shown that the compensatory effects of imagined contact are accompanied by cognitive depletion, in Experiment 2 we provided a more robust test showing that the Stroop performance detriment reflects the difficulty of the imagined contact task and not the difficulty of carrying out the subsequent interaction task. Consistent with predictions, in the control condition difficulty of writing an email to an international student was positively correlated with anxiety, but this relationship was not apparent in the imagined contact condition. Furthermore, we replicated the Stroop test findings from Experiment 1. This confirms that imagined contact makes the subsequent outgroup interaction task easier, and that it is the imagined contact task itself that is difficult, not the subsequent task (Stroop performance was correlated with anxiety in the imagined contact condition; outgroup communication was not).

In other words, we found that the detriment observed on the Stroop task by individuals higher in anxiety, who imagined contact, reflects the difficulty with which participants found this imagined contact task, not the difficulty of the subsequent communication task. This is because communication difficulty is not correlated with anxiety in the imagined contact condition (Experiment 2), and because communication quality is enhanced for such individuals who undertake imagined contact (Experiment 1).

It is also important to note that these data do *not* show that imagined contact only works for higher, but not lower, anxiety participants. Rather they show that for lower anxiety participants, communication quality is high *irrespective* of imagined contact and therefore imagined contact only has a noticeable impact on the groups who need it most—those higher in anxiety. In other words, people lower in intergroup anxiety find it easy to envisage an imagined outgroup encounter, and have none of the inhibitions associated with higher anxiety. In contrast, the effects of imagined contact can be acutely observed for people higher in intergroup anxiety, because for these



participants imagining contact gets them to think about the outgroup in new ways, with all the benefits that brings. This can be equated to the way successful *actual* contact might be expected to have more dramatic effects on people initially higher in intergroup anxiety. We found that imagined contact had this benefit, and importantly this was despite the fact that the task is harder for these higher anxiety participants, as revealed by the Stroop test data. This should not, however, imply that imagined contact is useless for low-anxious individuals, or that imagined contact only shows effects because low-anxious people already have positive attitudes. The point of prejudice-reducing interventions should be to target individuals who need it most, and through the processes that apply to these people (for a similar argument see Hodson, 2011).

While Richeson and colleagues have shown that actual intergroup contact can require attentional resources, especially for high-prejudiced people (e.g., Richeson & Shelton, 2003); our research has shown that *imagined* contact also requires those resources, especially for people higher in intergroup or intergroup-related (performance) anxiety. While we found that this need for resources did not prevent imagined contact from being effective at improving behaviors directed towards the outgroup, in some cases such resources may be in short supply. Future research should therefore explore how imagined contact can remain effective even under conditions of cognitive depletion.

Finally, we note that previous research has established the reduction in intergroup anxiety as being a mediator of improved attitudes following imagined contact (Husnu & Crisp, 2010a; Turner et al., 2007). While examining the *moderating* impact of anxiety can tell us about the underlying processes (Spencer, Zanna, & Fong, 2005), critically it can also answer questions that a pure mediating approach cannot. Specifically, just because anxiety mediates the relationship between imagined contact and prejudice, one cannot simply assume that imagined contact reduces anxiety in people who are already highly anxious. Indeed, it has been suggested that imagining contact will be impossible for high-anxious people, and that it

would only reduce anxiety in people already low in anxiety (e.g., Bigler & Hughes, 2010). In demonstrating that especially high-anxious people profit from the positive effects of imagined contact, and that it is not impossible but just more difficult for them, we add further evidence to the claim that the approach is a valuable addition to the arsenal of techniques that can be recruited to improve intergroup relations.

## Implications

The two studies reported in this article have shown, for the first time, that a simple cognitive task involving mental simulation can counter the negative impacts of higher anxiety on intergroup perceptions and behavior. We demonstrated that even when imagined contact is cognitively demanding (when anxiety is high—illustrated by detriments on the postcommunication Stroop test), it can improve communication quality and reduce communication difficulty. These findings support the efficacy of mental simulation as a cognitive-behavioral intervention, not only in a range of academic and sporting domains (Taylor et al., 1998), but increasingly to efforts to promote, encourage, and enhance more harmonious intergroup relations (e.g., for research related to imagined contact see Hodson, Choma, & Costello [2009] who found that imagining oneself as an oppressed minority can elicit more positive attitudes and empathy [towards gay men and women]).

The findings suggest that the imagery task provides individuals high in anxiety the tools with which to negotiate an anxiety-provoking contact situation and to achieve a better intergroup interaction. In countering the negative impacts of anxiety on outgroup communicative behavior this work shows that imagined contact makes it more likely, once contact is established, that the interaction will proceed successfully and yield all the benefits we know to accrue from long-term, high-quality intergroup contact (Pettigrew & Tropp, 2006).

In sum, while previous work has established the beneficial impact of imagined contact on intergroup attitudes, and supports its efficacy as an intervention where there exists little or no opportunity for contact; this research shows it can also be

used as a compensatory measure—a way of helping individuals higher in anxiety to engage positively and effectively in actual intergroup contact.

## Applications

We believe mental simulation, as in other domains, can offer considerable potential as an intervention for improving intergroup relations in educational and organizational settings. Imagined contact involves a short task that can be understood by adults and children alike; it produces clear and effective results and requires little obvious expense. Through imagining such communications, individuals can prepare themselves for future contact with lesser anxiety and greater confidence. In turn, this may help encourage a greater interest, and intention to engage, in direct future contact. Using imagined contact as part of intervention strategies would make programs designed to reduce prejudice more effective because the role of learners would be transformed from “passive consumers” to “active producers” (Paris & Combs, 2006). Individuals higher in intergroup anxiety may benefit from properly implemented imagined contact because, although this research shows how this is cognitively difficult, it will provide the cognitive tools for effective future contact encounters. As well as in educational contexts, we believe that imagined contact can be applied to human resource development training in organizations. Today’s organizations are becoming more and more diverse in terms of age, gender, race, sexual orientation, and disability. Imagined intergroup contact could provide an additional tool in diversity training or multicultural team-building programs.

To conclude, our findings demonstrate that imagined intergroup contact has the potential to improve communicative behavior and with this intergroup relations. It combats the detrimental effects of intergroup anxiety on intergroup communications to achieve a high-quality experience. These findings support the increasingly evident benefits of mental simulation, not only in a range of personal and professional domains, but

increasingly to efforts to promote, encourage, and enhance more harmonious intergroup relations.

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