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Understanding the Effects of Positive and Negative Intergroup Contact

Dissertation
Understanding the Effects of Positive and Negative Intergroup Contact

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Understanding the Effects of Positive and Negative Intergroup Contact

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Jonah, Kiyan and Justus: Every second with you reminds me why life has value. Never stop asking all these questions!
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Abstract

Social psychologists only recently started to examine the joint effects of positive and negative intergroup contact. The present research contributes to this nascent field. After reviewing the current evidence for joint effects of positive and negative intergroup contact, the present work examines factors that influence positive and negative contact effects, specifically the intensity of intergroup contact and the individual’s history of intergroup contact. Manuscript #1 thereby focuses on the contact situation and how it is perceived. Specifically, we find that increasing intensity in the realm of positive contact increased favourable intergroup attitudes. For negative contact on the other hand, the (perceived) intensity of the negative experience did not make a difference. Manuscript #2 moves the focus to how an individual’s history of intergroup contact influences subsequent intergroup contact effects. Building on observations of in- and outgroup behaviour in a behavioural game, we demonstrate that having a positive history of intergroup contact can foster subsequent intergroup contact effects, while a negative history of intergroup contact decreased subsequent effects of intergroup contact. Overall our findings provide further evidence that it is indeed important to take not only positive but also negative contact into consideration when examining intergroup contact effects. The relevance of our findings for society and future research will be discussed.

Keywords: positive contact, negative contact, intergroup relations
Understanding the Effects of Positive and Negative Intergroup Contact

Introduction

Reducing discrimination and prejudice between different societal groups is a core task for diverse democratic societies (e.g., OECD, 2014). Intergroup contact is considered one key approach to achieve the aim of improved intergroup relations (Brown & Hewstone, 2005). Indeed, impressive evidence supports the assumption that positive intergroup contact reduces prejudice (for meta-analytic summaries see Lemmer & Wagner, 2015; Pettigrew & Tropp, 2006).

Yet, already in 1954, Gordon Allport, who was preeminent in providing a framework for the prejudice reducing effects of intergroup contact, pointed out that it “has sometimes been held that merely by assembling people without regard for race, color[sic], religion, or national origin, we can thereby destroy stereotypes and develop friendly attitudes. The case is not so simple.” (Allport, 1954, p. 261). Indeed, recent research has warned about one important caveat for intergroup contact: when members of different groups meet, not only positive but also negative intergroup contact occurs (e.g., Graf, Paolini, & Rubin, 2014; Hayward, Hornsey, Tropp, & Barlow, 2017).

Considering both positive and negative intergroup contact is especially important as some authors found larger prejudice increasing effects of negative contact than prejudice decreasing effects of positive contact (e.g., Barlow et al., 2012; Graf et al., 2014). Such a potential asymmetry of intergroup contact effects (Graf et al., 2014; Paolini, Harwood, & Rubin, 2010) even led to the suggestion, that “[a]ny reductions in prejudice associated with positive contact may be counteracted by increases in prejudice that co-occur with (even limited amounts of) negative contact” (Barlow et al., 2012, p. 1630). Yet, evidence regarding the interplay of positive and negative intergroup contact in intergroup relations remains scarce and does not yield unequivocal results (see Árnadóttir, Lolliot, Brown, & Hewstone, 2018).
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To date the emergent field of research on positive and negative contact has undoubtedly already yielded important insights. Still, Pettigrew and Tropp’s (2006) call to foster “a more comprehensive understanding of conditions that both enhance and inhibit the potentially positive effects of contact” (p. 767), remains relevant. We know little about factors which might influence the effects of positive and negative intergroup contact on attitudes and intergroup behaviour, and help to explain the divergent results for valenced contact effects.

To fill this gap in the literature, in this thesis I will examine two factors, intensity of the valence of the intergroup contact experience and the individual’s history of valenced intergroup contact, which are thought to differentially influence valenced intergroup contact effects. In Manuscript #1 I suggest that the effects of intergroup contact vary not only depending on whether the contact is positive or negative, but also on how intense the positive or negative contact experience is. Specifically, I argue that increasing positivity should have a stronger impact on contact effects on attitudes, than increasing negativity. To test this assumption, I analysed evidence from a large cross-sectional sample among majority and minority members in Great Britain, and conducted three experiments.

In Manuscript #2, I demonstrate that individual experiences of valenced intergroup contact shape how subsequent contact affects intergroup relations, within small scale interactions over a short time and with immediate behavioural responses from one person’s behaviour to the other person’s behaviour. To examine the role of this individual history of valenced intergroup contact, Manuscript #2 analyzed data from a behavioural game, where actual behaviour within and between groups was observed over multiple rounds.

Both manuscripts thereby provide new theoretical considerations and rely on experimental and observed behavioural data, extending the empirical evidence on valenced intergroup contact. The current research thus expands the field of research examining
negative contact as a potential antagonist to the ameliorative effects of positive intergroup contact for intergroup relations. Furthermore, both manuscripts address current methodological concerns raised towards the overall literature on intergroup contact. These critiques state, for example, that the literature on intergroup contact is insufficiently based on experimental research (e.g., Paluck, Green, & Green, 2018), a lacuna which is addressed by three experiments included in Manuscript #1. Manuscript #2 is also situated in a highly structured setting, using data from repeated intergroup contact in a behavioural game. It addresses concerns that to date most research studying intergroup contact has used overall measures of intergroup contact over large time-spans, which might lead to a neglect of possible short term dynamics (e.g., MacInnis & Page-Gould, 2015).

To examine the role of intensity of the valenced contact experience and the individual history of intergroup contact, I will first review findings regarding the frequency, relation and content of positive and negative intergroup contact, including insights from my own ongoing quantitative and qualitative work. I next summarize the current evidence on joint effects of positive and negative intergroup contact on different outcomes. Building on this foundation, I will give an overview of three possible explanations for the diverse findings of joint effects of valenced intergroup contact, as they are discussed in the current literature: (a) Different effects of positive vs. negative contact on different outcomes, (b) the effects of intensity on valenced contact effects, and (c) potential interactions of positive and negative contact which might be explained by the individual history of intergroup contact. I will subsequently point out some current methodological critiques of research of intergroup contact, which will be addressed in the following manuscripts. Next Manuscript 1# elaborates on the effects of intensity for positive and negative contact. This is followed by Manuscript #2, which draws out the effects of an individual’s history of contact in repeated
intergroup interactions. The final discussion summarizes the results of the present work, points out its limitations and suggests implications for society and further research.

**Positive and negative contact – basic properties and content**

The hypothesis that positive contact reduces prejudice is at the heart of a long and extensive branch of research (e.g., Pettigrew & Tropp, 2006; Pettigrew, Tropp, Wagner, & Christ, 2011). Traditionally, this research makes reference to *The Nature of Prejudice* by Allport (1954). In this book Allport elaborates the hypothesis that positive face to face contact between members of different groups under certain conditions, specifically equal status in the contact situation, common goals, cooperation and institutional support, reduces prejudice. Current evidence suggests that the conditions Allport (1954) postulates are facilitating rather than necessary (e.g., Pettigrew & Tropp, 2006). However, the overall hypothesis that positive contact reduces prejudice finds strong empirical support from different settings and from studies including a wide range of social groups (e.g., Lemmer & Wagner, 2015; Pettigrew & Tropp, 2006). For example Pettigrew and Tropp (2006) conducted a large meta-analysis, comprising 713 independent samples, which yielded strong support for the hypothesis that positive contact reduces prejudice: their study yielded an average effect size of $r = -0.22$, thus a small to medium effect. In their conclusion, the authors point out that, while we can state with confidence that positive contact reduces prejudice, „[f]actors that curb contact’s ability to reduce prejudice are now the most problematic theoretically, yet the least understood“ (Pettigrew & Tropp, 2006, p. 767).

Indeed, even though there long has been evidence from other strands of social-psychology (i.e., intergroup threat literature) that negative intergroup interactions can increase prejudice (e.g., Aberson & Gaffney, 2008; Stephan et al., 2002), research with reference to intergroup contact theory had long neglected the effects of negatively valenced intergroup contact.
Understanding the Effects of Positive and Negative Intergroup Contact

To date, evidence regarding positive and negative contact is still scarce, but initial research has yielded important insights. First of all, positive contact is more frequent than negative contact (Graf et al., 2014). This difference is found towards a range of outgroups, for example Black Americans (Hayward et al., 2017, Study 1), overweight people (Alperin, Hornsey, Hayward, Diedrichs, & Barlow, 2014), Igbo people in Nigeria (Adesokan, 2014), and foreigners in Germany (Van Assche, Asbrock, Dhont, & Roets, 2018). It is important to note that, of course, not only majority, but also minority, group members experience positive and negative contact. Yet, the higher frequency of positive contact experiences also holds true for groups that constitute minorities in their current societies (e.g., Hayward et al., 2017, Study 2; Reimer et al., 2017). In my own research (Schäfer, 2019), even highly vulnerable groups, like Syrian refugees in Germany\(^1\), reported more positive (\(M = 3.94, SE = .16\)) than negative (\(M = 2.11, SE = .12, t(149) = 9.13, p<.001, d_z = 0.75\)) contact. The same pattern was also found in a more diverse sample of refugees in Germany\(^2\) (Schäfer & Piecha, 2019), where again, refugees reported significantly more positive contact (\(M = 5.52, SE = .15\)) than negative contact. (\(M = 1.89, SE = .11, t(130) = 20.25, p<.001, d_z = 1.63\)). In only two samples I know of, did participants report more negative than positive contact. One is a sample of police officers (Dhont, Cornelis, & Van Hiel, 2010), which might per se be a context with many negative interactions; the other one is a sample of Bulgarian majority group members reporting intergroup contact with Roma, who constitute a highly stigmatized group, especially in eastern European countries (Visintin, Green, Pereira, & Miteva, 2017).

\(^1\) \(N=150\), male: 65.9\%, female: 4.7\%, no response: 7.8\%; staying in Germany for \(M=11.43\) months, \(SD = 6.99\); positive and negative contact frequency were measured on a 7-point scale from 1 (never) to 7 (very frequent).

\(^2\) \(N=176\), \(M_{age}=29.60, SD=8.22\); female: 36.5\%, male: 62.8\%, other gender: 0.6\%; 31.3\% from Syria, 26.7\% from Afghanistan, 13.6\% from Iraq. Positive and negative contact frequency were measured on a 7-point scale from 1 (never) to 7 (very frequent).
Additionally, recent research has demonstrated that it is indeed important to differentiate between positive and negative contact, as individuals’ positive and negative intergroup experiences were not correlated in several samples (e.g., Aberson, 2015; Hayward et al., 2017, Study 1; Reimer et al. 2017, Study 1b; Techakesari et al., 2015, Study 2 and Study 3). In other samples, the correlation between positive and negative direct contact yielded small to medium effect sizes (e.g., Barlow et al., 2012; Hayward et al., 2017, Study 2; Techakesari et al., 2015, Study 1). In only one sample I know of, were positive and negative contact (between Icelandic majority members and Polish people living in Iceland) highly, but negatively, correlated – for both majority and minority members (Árnadóttir et al., 2018). Realizing that positive and negative contact are not necessarily strongly related is important, as it implies that they might be differentially influenced. For example, Kros and Hewstone (2019) demonstrate that high neighbourhood diversity is related to more positive, but not more negative intergroup contact. Measures increasing positive contact thus do not necessarily increase negative contact. On the other hand, it is also important to keep in mind that reducing negative contact will not automatically result in positive intergroup contact.

Yet, positive and negative contact might not only vary in their frequency and predictors, but on further, more qualitative dimensions (Dixon, Durrheim, & Tredoux, 2005). Hayward and her colleagues (2017) point out that only asking for the frequency of valenced contact experiences does not address the complex nature of intergroup contact adequately. Instead, they point out that “[c]ontact can, however, be experienced in a variety of ways, such as with outgroup friends, with strangers, or as a short conversation in passing” (Hayward et al., 2017, p. 348). These authors claim that the missing dimension, on which such valenced experiences additionally vary, is the individual’s subjective perception

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(Cohen 1992; Richard, Bond & Stokes-Zoota, 2003)
of the emotional intensity of the valenced experience. In their own research, Hayward and her colleagues asked for the frequency and subjectively perceived emotional intensity of 69 types of intergroup interactions. Of these 69, 37 tapped positive intergroup interactions (e.g., being hugged or the feeling of being included) and 32 negative intergroup interactions (e.g., being insulted, feeling rejected). This method contrasts with that of measuring contact in terms of frequency of interactions with the outgroup, or assessing the number of outgroup friends as has often been done in the past. While their data demonstrates that contact can indeed be experienced in very different occasions, which moreover vary on their frequency and perceived emotional intensity (assessed by asking how positively the participants rated each positive experience respectively), they only used items that were generated in a top-down process by the researchers themselves, without involving the participants, and thus might not tap the full range of intergroup contact situations.

To gain a better understanding of the nature of contact experiences on a day to day basis from a participant’s perspective, we conducted a 13-day diary study (Schäfer et al., 2019). During the study, 780 British White and 605 British Asian participants in ethnically mixed areas (\(M_{\text{age}} = 44.66, SD = 14.85\); female 59.3%, male 40.5%, other 0.2%) were asked to record each day how many times that day they had had overall, positive, and negative contact, using a scale ranging from 1 (0 times) to 22 (more than 20 times). Participants who reported having had at least some positive or negative contact were subsequently asked to think of the first positive and negative experience that came to mind and to note a few key words to describe the experience. Afterwards they were asked to rate the perceived intensity of valence (i.e., positivity or negativity) of the respective experience on a five-

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4 Our sample included 63.3% Asian British Indian, 27.4% Asian British Pakistani, 9.3% Asian British Bangladeshi. British Asians (largest sub-groups: Asian British Indian 33%, Pakistani 27% and Bangladeshi 10%) account for seven per cent of the UK population and constitute the largest ethnic minority group in Britain (Office for National Statistics, 2013) and face discrimination across a wide range of measures (e.g., Social Mobility Commission, 2016).
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point scale ranging from 1 (barely positive/negative) to 5 (extremely positive/negative); 84% of the participants reported having at least some contact with a member of the respective outgroup.

In line with the previous research reported above, positive contact was reported more frequently ($M = 4.67$, $SD = .08$) than negative contact ($M = 1.34$, $SD = 0.03, t(3602) = 39.39, p<.001, d_z = 0.66$). Over all interactions, Asians reported more (not valenced) contact ($M = 3.80$, $SD = 0.11$) than Whites ($M = 2.94$, $SD = 0.06$, $t(3771.27) = -7.02, p<.001, d_z = -0.57$). This difference was mostly due to more positive contact, which Asians experienced more often ($M = 5.24$, $SD = 0.15$) than Whites ($M = 4.34$, $SD = 0.10$, $t(2444) = -4.96, p<.001, d_z = -0.41$). Frequency of negative contact did not differ significantly between Asian ($M = 1.42$, $SD = 0.06$) and Whites ($M = 1.30$, $SD = .03$, $t(2260) = -1.95, p = 0.52, d_z = -0.16$). As in most previous studies in the field, positive and negative contact were only moderately correlated (Richard, et al., 2003) effect (Whites: $r = .167, p<.001$; Asians: $r = .182, p<.001$).

The mean completion period of diary entries was 4.8 days ($SE = 3.23$). Participants described positive contact in 3601 open answers and negative contact in 531 open answers. A qualitative content-analysis (Mayring, 2010) was used to analyse these open questions. Coders thereby take a bottom-up approach, generalizing the original statements in several rounds of coding. Each statement was thereby coded by at least two of three coders. A single diary statement could thereby end up in multiple categories. Two basic dimensions emerged, one concerned with where the contact happened (Table 1), the other specifying the positive (Table 2) and negative (Table 3) interactions.
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Table 1

*Incidence Rate of Different Places for Positive and Negative Contact Reported by Majority (White) and Minority (Asian) Participants.*

<table>
<thead>
<tr>
<th>Places for intergroup contact</th>
<th>Positive</th>
<th>Negative</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>White</td>
<td>Asian</td>
</tr>
<tr>
<td>Public institutions</td>
<td>68</td>
<td>28</td>
</tr>
<tr>
<td>Children related</td>
<td>59</td>
<td>31</td>
</tr>
<tr>
<td>Community</td>
<td>162</td>
<td>82</td>
</tr>
<tr>
<td>At home/with family</td>
<td>14</td>
<td>12</td>
</tr>
<tr>
<td>Work</td>
<td>356</td>
<td>212</td>
</tr>
<tr>
<td>Hobbies</td>
<td>54</td>
<td>21</td>
</tr>
<tr>
<td>Shopping etc.</td>
<td>464</td>
<td>202</td>
</tr>
</tbody>
</table>

*Note:* Single statements on contact situations might be included in more than one category.

As demonstrated in Table 1, the three most frequent categories of places for positive and negative contact, for both majority and minority members, were while going shopping or eating out (positive contacts: 464 majority answers, 202 minority; negative contact: 26 majority, 17 minority), at work (positive contact: 356 majority, 212 minority; negative contact: 23 majority, 27 minority) and in public spaces, like on the bus or in the park (positive contact: 162 majority, 82 minority; negative contact: majority 36, minority 22).

Table 2

*Incidence Rate of Different Occasions of Positive Contact Reported by Majority (White) and Minority (Asian) Participants.*

<table>
<thead>
<tr>
<th>Occasions for positive contact</th>
<th>White</th>
<th>Asian</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication</td>
<td>238</td>
<td>91</td>
</tr>
<tr>
<td>Nonverbal Communication</td>
<td>73</td>
<td>30</td>
</tr>
<tr>
<td>Small talk</td>
<td>475</td>
<td>310</td>
</tr>
<tr>
<td>Received help</td>
<td>115</td>
<td>58</td>
</tr>
<tr>
<td>Granted help</td>
<td>32</td>
<td>14</td>
</tr>
</tbody>
</table>

*Note:* Single statements on contact situations might be included in more than one category.
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The most frequent occasions of positive intergroup contact (Table 2) were coded as small talk, like simple greetings (majority 475; minority 310). These were followed by longer conversations, like talking to a friend (majority 238; minority 91), and receiving help (majority 115; minority 58). For negative contact (Table 3), the most frequent category is experiencing threatening behaviour, like being called names (majority 73; minority 30), followed by negatively experienced conversations, like discussion on political topics (majority 24; minority 14) and denied communication (majority 5; minority 7).

Table 3

<table>
<thead>
<tr>
<th>Occasions for negative contact</th>
<th>White</th>
<th>Asian</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication</td>
<td>24</td>
<td>14</td>
</tr>
<tr>
<td>Denied communication</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>Denied help</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>Observed negative contact</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>Being threatened/harmed</td>
<td>73</td>
<td>30</td>
</tr>
<tr>
<td>Physical harm</td>
<td>3</td>
<td>1</td>
</tr>
</tbody>
</table>

Note: Single statements on contact situations might be included in more than one category.

With regard to the perceived intensity of the respective instances of intergroup contact, our findings yielded interesting results. In line with Hayward et al. (2017), the instances of positive intergroup contact were rated more positively ($M = 3.57$, $SD = 0.95$)$^5$ than the negative instances were rated negatively ($M = 2.94$, $SD = 1.20$, $t(260) = 7.46$, $p < .001$, CI95% [0.46, 0.79], $d = 0.63$). In this situation of free recall of intergroup contact,

$^5$ Only 261 participants had answered positive and negative contact and could thus be included in the paired-sample t-test to test for significant differences between the ratings. The intensity of positive experiences was even higher in the overall sample ($N = 1076$, $M = 3.82$, $SD = .87$), while only 11 individuals reported having negative but no positive contact.
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negative intergroup contact recalled was of lower negativity then the freely recalled positive contact.

Summarizing the above results on descriptive and qualitative insights into positive and negative intergroup contact, it should be noted that negative contact is less frequent than positive contact, for both majority and minority members, and that positive and negative contact do not correlate strongly. Our findings generated in a bottom-up process with qualitative questions are thus in line with previous quantitative research (e.g., Hayward et al., 2017). Nevertheless, from the qualitative data, we learn that both positive as well as negative contact mostly occur in everyday settings like at work or while buying groceries. These findings extend the existing quantitative literature and provide an interesting insight into where potential interventions could address intergroup contact. Another important insight from the qualitative data could be that, in natural settings, even small gestures like greeting someone or not, can make a difference in whether the contact is experienced as positive or negative.

Joint effects of positive and negative intergroup contact

When it comes to joint effects of positive and negative contact the evidence is less straightforward than for the mere frequencies of intergroup contact. As an early response to Pettigrew and Tropp’s (2006) call to consider potentially negative factors, Paolini and her colleagues (2010) provided evidence from a laboratory experiment and a two-wave longitudinal study that negative contact increased category salience more than positive contact did. These findings imply that, because category salience is known to facilitate the generalization of intergroup contact effects to the whole group, negative contact might have stronger effects on intergroup attitudes than positive contact. Building on this theorizing, Barlow and her colleagues (2012) suggested a positive-negative asymmetry of intergroup contact effects, stating that negative contact has stronger effects on these outcomes than
positive contact. In their first study, they reviewed the results of seven independent samples, comprising 1476 individuals, testing whether contact quality (ranging from negative to positive) moderated the effects of contact frequency, and found that negatively valenced contact (-1SD) had stronger effects than positively valenced contact (+1SD). They followed this up with a second survey including separate measures of positive and negative contact frequency, replicating a larger prejudice increasing effect for negative contact, than a prejudice decreasing effect for positive contact.

Yet, evidence regarding this asymmetry is mixed – while several studies found evidence for a stronger effect of negative than positive contact (Alperin et al., 2014; Barlow et al., 2012; Dhont & Van Hiel, 2009; Graf et al., 2014; Labianca, Brass, & Gray, 1998; Paolini et al., 2010; Paolini et al., 2014; Techakesari et al., 2015), some studies found no substantial differences in the effects of positive and negative contact (Árnadóttir et al., 2018; Mazziotta, Rohmann, Wright, De Tezanos Pinto, & Lutterbach, 2015) and other studies even found larger effects for positive intergroup contact (Brylka, Jasinskaja-Lahtı & Mähönen, 2016; Mähönen, & Jasinskaja-Lahtı, 2016; Reimer et al., 2017). It should be pointed out though that most of this evidence does not rely on experimental settings and is merely cross-sectional, correlational (for longitudinal data see Reimer et al., 2017; Barlow et al., 2019) and thus does not allow causal interpretations of the observed effects (e.g., Granger, 1969; Heise, 1970).

Summarizing the results on joint effects of positive and negative intergroup contact, the research to date demonstrates that positive and negative contact influence intergroup attitudes, but is not conclusive on whether or when positive or negative contact yield larger effects on intergroup attitudes. The present work will address three explanations for these diverse findings, which are discussed in the current literature: (a) An asymmetry of valenced contact effects on different outcome measures, (b) the influence of intensity of
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valenced intergroup contact, and (c) possible interactions between positive and negative intergroup contact.

**Different effects of positive vs. negative contact on different outcomes**

The first explanation for the diverse findings on potential asymmetries of positive and negative contacts assumes that positive and negative contact might differentially affect different outcomes. In line with this idea, Hayward and colleagues (2017) found a stronger effect for negative than for positive contact on negatively valenced outcome measures, such as anti-outgroup attitudes, avoidance and anger, but equal sized effects, or even larger effects for positive contact (Hayward et al., 2017, Study 2), for positive outcomes such as empathy and positive evaluations. Yet, they did not replicate their findings in their third study, using an imagined contact paradigm, which instead supported a stronger effect for negative contact for positive as well as negative outcomes. However, further evidence for a stronger relation of positive contact with positive outcome measures and negative contact with negative outcome measures comes from a large German probability survey, where positive contact had a stronger relation with positive episodic emotions than negative contact, but negative contact had a stronger relation with negative episodic emotions (Kauff et al., 2017). Given the cross-sectional nature of this data, however, these results might also be explained by a latent tendency to answer differentially valenced items in a similar vain. Longitudinal evidence comes from a recent article by Barlow and her colleagues (2019), who postulate an “affect-matching” (p. 3) hypothesis: in line with the argument above, they demonstrate in a large ($N = 17,399$) four-wave survey among New Zealand majority and minority members that change in positive contact has a stronger relation to positive

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6 In addition, internal consistency of their combined contact measure, and thus reliability of their results, might be impaired by large amounts of missing data across the 69 instances of intergroup interaction they included in their contact measure (see Hayward et al., 2017, Supplementary Material).
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affects (i.e., outgroup warmth), while change in negative contact has a stronger relation to negative affects (i.e., outgroup anger).

Another differentiation between outcome measures is grounded in the research on positive intergroup contact. Building on a meta-analysis including 713 independent samples and an additional sample including differentiated measures of affective and cognitive prejudice, Tropp and Pettigrew (2005) provided convincing evidence that positive contact has a stronger relation to measures of outgroup favourability and emotions than to cognitive dimensions of prejudice. This finding can also be supported by our own research on contact effects on warmth and competence (Kotzur, Schäfer, & Wagner, 2018, Study 2). Warmth (i.e., assessing overall affective favourability and liking) and competence (i.e., a rating of the outgroups’ capabilities) describe two key dimensions of social perception (e.g., Cuddy, Fiske, & Glick, 2008) Participants who completed a short version of the fast friendship procedure (Aron, Melinat, Aron, Vallone, & Bator, 1997) with a confederate who was role-playing a refugee, afterwards reported more warmth towards refugees than participants who believed they interacted with an ingroup member, but we found no difference on competence. This of course might be due to the specific setting of the fast friendship procedure, which was specifically developed to increase liking. Additionally, this research only considered positive intergroup contact. Aberson (2015) instead used the differentiation between affective and cognitive measures and suggested that considering differential effects of valenced contact on these outcomes might help to explain the divergent results regarding an asymmetry of positive and negative contact effects. In his results positive and

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7 In a one-factor between-subjects design, 74 German born students were randomly assigned to either interact with a confederate who enacted an ingroup member (n=39), or a confederate playing a refugee (n=35). After participants followed a short version of Aron et al.’s “fast friendship procedure” (1997) with the confederate, participants answered a range of intergroup measures. The positive contact setting only influenced warmth (outgroup contact: M=5.42, SD=0.92, ingroup contact: M=4.87, SD= 0.87, t(72)=2.65, p=.01, d_Cohen=-.62), but not competence (outgroup contact: M=4.90, SD=1.08, ingroup contact: M=4.53, SD= 0.94, t(72)=1.6, p=.12, d_Cohen=-.37).
negative contact were equally strong predictors of affective measures of prejudice, while negative contact had a stronger relation to cognitive measures of prejudice. Yet, previous research considering person perception and rejection suggests that this asymmetry should be found in the opposite direction. Specifically, negative information tends to be more informative for individuals asked to rate another person’s morality, whereas for the rating of competence, positive information is more diagnostic (Martijn, Spears, Van der Pligt, & Jakobs, 1992; Skowronski & Carlston, 1987; Van der Lee, Ellemers, Scheepers, & Rutjens, 2017).

To summarize, there is evidence that contact effects vary between affective and cognitive outcomes, but the question whether negative contact yields stronger effects than positive contact on either remains unproven. The assumption that different outcomes yield different effects for positive and negative contact is not a primary focus of this thesis. But the question of whether positive and negative contact yield different effects on affective and cognitive dimensions is addressed in the Supplementary Material of Manuscript 1, which supplements the findings of warmth reported in the main manuscript with findings on competence.

**Intensity of positive and negative contact**

In line with the second explanation for the variety of results yielded for the asymmetry of valenced intergroup contact effects, I suggest it is important to go beyond different effects for different outcomes and to consider aspects of the contact situation, which might impact the effects of positive and negative contact differentially. As demonstrated with the qualitative data above, “[c]ontact can, however, be experienced in a variety of ways, such as with outgroup friends, with strangers, or as a short conversation in passing” (Hayward et al., 2017, p. 348). Considering qualitative aspects of the contact situation as a moderator of positive contact effects has a long theoretical tradition (e.g.,
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Allport, 1954; Pettigrew & Tropp, 2006). For valenced contact effects, Hayward and colleagues (2017) suggested that perceived intensity, thus the perceived degree of positivity or negativity, of those different contact experiences will help to explain the diversity in results on joint effects of positive and negative contact. As summarized above, they demonstrated that frequency and perceived intensity of intergroup interactions varied over 69 positive and negative intergroup interactions. Positive interactions were experienced more frequently and perceived as more intense than negative interactions, yet a combination of positive interactions’ frequency and intensity had a lesser impact on intergroup attitudes and emotions than the same combination for negative interaction, although these were reported with lesser frequency and intensity.

While these results shed first light on the importance of perceived intensity in intergroup contact, Manuscript #1 expands the idea that intensity can play a role in qualifying valenced intergroup contact effects with two key assumptions. First, as previous research has shown that subjective experience of intergroup contact does not necessarily correspond to the observable, objective quality of the contact situation (e.g., Dixon et al., 2005; Plant & Devine, 2003), we not only examined perceived intensity, but also manipulated the objective intensity of positive and negative contact. Second, we suggest that intensity should not have the same effects in the realm of positive as well as negative contact. Specifically, research on contagion suggests, that even minimal negative events already yield rather strong effects (e.g., Rozin & Royzman, 2001), as the effects of negative experiences rise very steeply (e.g., Cacioppo, Gardner, & Bernston, 1997). As a consequence, we suggest that increasing intensity should primarily be relevant for effects of positive intergroup contact, but to a lesser degree for the effects of negative contact.
Interactions of positive and negative contact effects

The third finding in the recent literature that can help to explain the mixed results on the joint effect of differently valenced intergroup contact focuses on potential interactions of positive and negative intergroup contact. While the second explanation above introduced an aspect of the contact situation (i.e., intensity) as a moderator that might differentially influence the effects of positive and negative contact, I argue that it is important to also consider differences between individuals that can influence intergroup contact effects. While previous research has started to consider individual differences, which are considered to be rather stable within persons, such as right wing authoritarianism (Dhont & Van Hiel, 2009), I will focus on the role of the individual’s history of valenced intergroup contact, which is one important difference between individuals, that is discussed to influence intergroup contact effects. In the literature, we find some evidence that supports the idea that previous experiences with the outgroup shape subsequent contact with the same group. For example, having outgroup friends, thus a positive history with the respective outgroup, increases the positive perception of interactions with the outgroup (Blascovich, Mendes, Hunter, Lickel, & Kowai-Bell, 2001; Page-Gould, Mendoza-Denton, & Tropp, 2008) and a history of valenced intergroup contact changes expectations toward further contacts’ quality (Plant & Devine, 2003).

For positive and negative contact, Paolini and her colleagues (2014) suggested that the history of intergroup contact might explain a positive-negative intergroup contact asymmetry following perceived fit mechanisms: they demonstrated that in negative interactions, people with a history of positive intergroup contact (i.e., low fit to their prior experiences) perceived lower levels of category salience. According to their argument, this should result in weaker effects of negative contact, following a history of positive contact. Such interactions of past and present contact might also help to explain interactions
between positive and negative contact as reported by, for example, Árnadóttir and her colleagues (2018). They demonstrate that participants with higher levels of positive contact have a lower relation between negative contact and attitudes. Yet, their analyses relied on a cross-sectional dataset, which limits the interpretation of the results (for further cross-sectional results see Hayward et al., 2017, Supplementary Material). Additional cross-sectional evidence is provided by Barlow and her colleagues (2019): In 15 of 16 cross-sectional analyses they found that positive contact predicted warmth more, if negative contact was also reported more and negative contact had a stronger relation with increased anger at low levels of positive contact (again in 15 of 16 analyses). Yet, when considering change scores instead of cross-sectional regressions, only two of 24 analyses found a significant interaction of a different direction: when change in negative contact was low (compared to high), positive contact predicted change in warmth more strongly. In another two-wave longitudinal dataset Ten Berge and his colleagues (2017) did not find any interactions between positive and negative intergroup contact. It should be pointed out though, that they only considered whether an increase in outgroup best friends would buffer the effects of having outgroup foes, which might not tap the full scale of positive and negative experiences.

In summary, the evidence regarding potential interactions of positive and negative contact effects is still scarce. Additionally, none of the evidence available to date, to my knowledge, acknowledges that a history of intergroup contact does not necessarily remain stable over time, but may rather be a dynamic construct, as the individual history changes after each new experience. Manuscript #2 adds to this current literature and examines how a positive or negative history of intergroup contact influences subsequent contact effects. In addition, we address the dynamic nature of the individual’s history. We thereby expect that a valenced history of intergroup contact indeed moderates subsequent contact effects and,
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given the diverse nature of the results, examine the nature of this interaction as an explorative question.

Methodological considerations for the present research

As demonstrated above, the present research expands the current theory in the emerging field of joint effects of positive and negative intergroup contact. Furthermore, I note that the empirical evidence used herein to test theoretical claims relies on sound methodological procedures, which address several critiques that intergroup contact research has faced in recent years. Three methodological features of the following manuscripts should be highlighted: (a) the use of experiments, (b) the provision of observational data on participants’ intergroup cooperation in Manuscript #2, and (c) a focus on repeated, single instances of intergroup interactions to study intergroup contact.

The use of experiments in intergroup contact research remains an important, if overlooked, topic (Paluck et al., 2018). Although there is a huge amount of evidence supporting the positive effects of positive intergroup contact, even the important meta-analysis of Pettigrew and Tropp (2006) reported that most of the included studies built on cross-sectional survey data, constraining causal interpretation of the results. This problem is even more prominent in the emerging field on negative intergroup contact. To my knowledge, so far only one study (Hayward et al., 2017, Study 3) included an experimental manipulation of intergroup contact, but this involved imagined contact, which cannot be assumed to be equivalent to actual, face to face contact. Experimental data remains the strongest way to demonstrate causality (e.g., Granger, 1969; Heise, 1970). To address this lack of research, Manuscript #1 presents data on three experiments. In two experiments, participants interacted with a confederate enacting an outgroup member in an online environment. To address the critique that media-mediated contact might not have the same
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effects as in-person contact, one experiment replicated the same scenario in a face to face paradigm in the lab.

Manuscript#2 on the other hand relies on observed actual intergroup interactions during a behavioural game in the laboratory. It can be argued, however, that one major upside of observational data is that it is not necessary to deceive participants to gather data from positive and negative interactions (Berufsverbandes Deutscher Psychologinnen & Deutsche Gesellschaft für Psychologie, 2016; Pascual-Leone, Singh & Scoboria, 2010). In addition, when positive and negative contact are considered simultaneously, negative contact is consistently found to affect a range of outcome variables, like intergroup attitudes (e.g., Barlow et al., 2012; Hayward et al., 2017), intergroup emotions and anxiety (e.g., Kauff et al., 2017; Techakesari et al., 2015) and intergroup threat (e.g., Aberson, 2015; Mähönen, & Jasinkaja-Lahti, 2016). But to my knowledge, no measures addressing behavioural outcomes, other than collective action intentions (Reimer et al., 2017), have been considered in research so far. Indeed even the established research on positive intergroup contact, and indeed in research on social psychology overall, has faced critiques that actual behaviour is far too rarely considered (Baumeister, Vohs, & Funder, 2007). And although the behavioural game used for Manuscript #2 does not fully address the call by Baumeister and his colleagues to bring back behaviour to the ‘science of behaviour’ – as we are still using a highly structured setting in the laboratory – the behavioural game paradigm still allowed us to observe actual intergroup behaviour (i.e., cooperation with members of the in- and outgroup), which could influence the monetary reward participants received after the game.

Furthermore, the behavioural game allowed us to gather data on single interactions with in- and outgroup members. As our qualitative data highlights (section: Positive and negative contact – basic properties and content, p.9-12), intergroup contact can happen as
small-scale interactions with strangers. Yet, as MacInnis and Page-Gould (2015) point out, the current intergroup contact literature mostly employs overall measures of intergroup contact over undefined or large time spans (e.g., “On average, how frequently do you have POSITIVE/GOOD contact with Black people?”, Barlow et al., 2012, p. 1638). Following these authors, this approach might blur insights into the effects of single instances of intergroup contact and dynamics of repeated interactions. These issues might be better addressed by another strand of research concerned with potential outcomes if members of different groups come together in social interactions: literature on intergroup interactions.

In comparison with intergroup contact research, the intergroup interaction literature tends rather to address shorter interactions, typically with strangers, and as an interaction that is situated in the laboratory, using an experimental setup; intergroup contact even includes intergroup friendship as a possible contact measure, and tends to deal with contact over longer periods of time, and studied outside the lab, typically using surveys. While intergroup contact research in comparison thus presents results of higher external validity, research on intergroup interactions profits from the higher structure of intergroup settings in the laboratory and provides higher internal validity. Thus insights from the field of intergroup interaction might be expected to fill an important gap in the intergroup contact literature. Yet, to date, most research on intergroup interaction focuses on intra-personal outcomes, such as the individual’s perception of the interaction itself (e.g., Blascovich et al., 2001; Page-Gould, Mendoza-Denton, & Tropp, 2008), while most research on intergroup contact focuses on inter-group outcomes, such as intergroup attitudes and behaviours (e.g., Pettigrew & Tropp, 2006). As MacInnis and Page-Gould (2015) point out, combining these approaches would be especially useful to study dynamic effects of repeated intergroup encounters – as they might indeed be changing over time (e.g., Paolini et al., 2014). While both manuscripts in this work include intrapersonal outcomes as they
are found in the intergroup interaction literature (i.e., perceived quality of the interaction), and use highly structured settings to establish internal validity, especially Manuscript #2, with the behavioural game, explicitly follows up on MacInnis and Page-Gould’s (2015) suggestion to use paradigms involving short interactions to study the dynamic effects of intergroup contact over time.

**The present research**

The present research incorporates methods which are rare in the field of intergroup contact literature to expand the current theory in the emerging field of joint effects of positive and negative intergroup contact. Both manuscripts provide theoretical explanations supported from other fields of psychology in order to add to a more comprehensive understanding of intergroup contact, comprising both positive and negative experiences.

Specifically, Manuscript 1# tests the assumption that intensity should be especially important within the realm of positive, but not negative intergroup contact. We first provide evidence from a large survey among majority (\(N = 1520\)) and minority (\(N = 1474\)) members, which included subjective measures of intergroup contact frequency and intensity (Study 1). Second, we include an objective measure of valenced contact intensity in two online experiments (Study 2: \(N = 87\); Study 3: \(N = 169\)) and one in-person experiment (Study 4: \(N = 78\)).

Manuscript 2# examines the hypothesis that a history of valenced intergroup contact moderates intergroup contact effects. Individuals (\(N = 89\)), who were separated in two age groups, participated in person in one of four trials of a behavioural game, namely a continuous prisoners’ dilemma, which was played over multiple rounds. This allowed us to observe a series of 17 in- and outgroup expectations and intergroup behaviour, which are analyzed using models from the *dynamic structural equation modelling* (DSEM)
framework (Asparouhov, Hamaker, & Muthén, 2017), which accommodate for autoregressive as well as subject specific effects.
Manuscript #1:
Differential effects of positive versus negative contact intensity in survey and experimental research: Intensity modifies positive contact only

Manuscript ready for submission.
Differential effects for positive versus negative contact intensity

Differential effects of positive versus negative contact intensity in survey and experimental research: Intensity modifies positive contact only

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Differential effects for positive versus negative contact intensity

Abstract

Research on intergroup contact has only recently begun to consider the effects of both positive and negative intergroup contact on intergroup attitudes, and little is known about what factors may differentially influence these effects. We propose that differentiating not only between positive and negative contact (i.e., its valence), but also considering the intensity (i.e., low or high positivity/negativity) of contact valence is critical to understanding the impact of contact on attitudes. We specifically predict that intensifying positivity affects the impact of positive contact to a stronger degree than intensifying negativity affects the impact of negative contact. Evidence from a survey of majority and minority members ($N = 2994$) including a self-reported measure of intensity, and three experiments (two online: $N = 87$; $N = 169$; one in-person: $N = 78$) including manipulations of intensity and valence, supported our hypotheses. An internal meta-analysis summarizing our results confirmed that varying intensity adds to the effects of positive, but not of negative contact. Intensity of valenced intergroup contact may thus be a key factor to resolve inconsistencies in the current literature on valenced intergroup contact.

*Keywords (4-5):* intergroup contact; positive-negative asymmetry; contact valence; contact intensity; prejudice
Introduction

Building on a long tradition of research on intergroup contact theory (e.g., Allport, 1954) previous research has found that intergroup contact reduces prejudice and increases cooperation (e.g., Brown & Hewstone, 2005; Lemmer & Wagner, 2015; Pettigrew & Tropp, 2006). While most of this research has focused on positive forms of contact, negative forms of intergroup contact have only recently received attention as a vital form of intergroup contact to be studied (e.g., Barlow et al., 2012; Paolini, Harwood, & Rubin, 2010). Examining negative intergroup contact is important, because encounters with outgroup members may not be exclusively positively valenced, and because negative contact may undermine, even prevent, the beneficial effects of positive intergroup contact (e.g., Barlow et al., 2012).

Despite this much-needed recent focus on both positive and negative contact, we emphasise that contact experiences may not only vary in their valence (i.e., whether they are positive or negative), but also in the intensity of this valence (i.e., high or low positivity/negativity; see also Hayward, Tropp, Hornsey, & Barlow, 2017), a feature that may critically determine the effectiveness of contact in bringing about attitude change. The relevance of intensity of valenced intergroup contact as a potentially important variable in the link between contact and attitudes is easily grasped if we think about real-world occurrences of intergroup contact: How can we compare intense negative events, such as being physically harmed, to relatively more mundane positive events, such as pleasant and comfortable conversations with members of an outgroup? Hayward et al. (2017) demonstrated that although in their sample negative contact was experienced less frequently and perceived as less intense than positive contact, the combination of negative contact intensity and infrequency nonetheless had a larger impact on negative intergroup attitudes for both
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majority and minority members than the combination of frequency and intensity of experiences of positive contact, although positive contact was more frequent and intense than negative contact. We agree that an increase in intensity of the valence of the contact experiences is important. However, while Hayward et al.’s work has opened up important first insights into the importance of the intensity of intergroup contact, we address two important points that are missing in their considerations, which might help explain their results.

First, research from other areas of psychology suggests that increasing valence intensity differentially affects the effects of positive and negative events (e.g., Baumeister, Bratslavsky, Finkenauer, & Vohs, 2001; Rozin & Royzman, 2001). Specifically, the effects of negative experiences should rise more steeply than their positive counterparts. For example, approaching a negative event increases avoidance faster than approaching a positive event increases approach-tendencies (e.g., Cacioppo, Gardner, & Bernston, 1997), resulting in relatively strong negative effects, even for only mildly negative events (e.g., Rozin & Royzman, 2001). We thus propose that the increase in intensity of valenced contact experiences should primarily be relevant for effects of positive intergroup contact, since for negative contact even mildly negative experiences should yield strong effects.

Second, as pointed out above, Hayward et al. (2017) demonstrate that positive and negative contact vary differentially in their frequency and intensity. To test our assumption that an increase in intensity influences the effects of positive intergroup contact to a stronger degree than it influences the effects of negative contact, we need to be able to compare the effects of positive intergroup contact to the effects of negative contact of the same intensity. It is thus necessary to manipulate valence and intensity in an objective manner (Peeters & Czapinski, 1990). We used an adapted version of the indirect collaboration task (Fell, 2015;
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Wilder, 1984) to manipulate contact valence and intensity on an objective scale. An experimental examination of these effects additionally allows us to make causal claims.

To summarize, the aim of the present research is to examine whether intensity of valence moderates the effects of valenced contact on intergroup attitudes. Specifically, our aim is to test whether an increase in the intensity of valenced contact primarily affects the outcomes of positive, but not negative contact. Study 1 examines the effect of valence intensity of positive and negative contact experiences in a survey study using a large sample of British majority and ethnic minority members. We then move to an experimental framework in Studies 2-4. In Studies 2 and 3 we provide an objective manipulation of the intensity of the contact experience in an experimental setting online, while Study 4 implements the same paradigm in an offline setting. We subsequently summarize our experimental findings in an internal meta-analysis, to increase reliability and demonstrate robustness of our findings.

Positive and Negative Contact

While large-scale meta-analytic evidence finds strong support for the claim that positive contact is associated with lower levels of prejudice (Pettigrew & Tropp, 2006) – both under strict laboratory conditions, as well as in real world interventions (Lemmer & Wagner, 2015) – considerably less is known about the effects of negative contact. In recent years, however, significant advances have been made to address this gap. For example, we now know that negative contact is less frequent than positive contact (Graf, Paolini, & Rubin, 2014; Hayward et al, 2017). Negative contact is also associated with higher values on prejudice measures, and first experimental evidence supports a causal link with prejudice: as expected, negative contact increases prejudice (Hayward et al., 2017, Study 3), just as positive contact decreases it. This is in line with prior work showing that negative experiences, such as higher perceived intergroup threat (e.g., Aberson & Gaffney, 2008;
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Stephan et al., 2002), are associated with more negative attitudes; similar effects have been found in research on interpersonal impression formation (Vonk, 1993).

Comparing the overall effects of positive and negative contact, Barlow et al. (2012) suggested the “positive-negative asymmetry effect” (p. 3), whereby negative contact increases prejudice more than positive contact decreases it. To date, however, evidence for this effect is inconclusive: several studies support this asymmetry (Alperin, Hornsey, Hayward, Diedrichs, & Barlow, 2014; Barlow et al., 2012; Dhont, Cornelis, & Van Hiel, 2010; Graf et al., 2014; Labianca, Brass, & Gray, 1998; Paolini et al., 2010; Paolini et al., 2014; Techakesari, Barlow, Hornsey, Sung, Thai, & Chak, 2015), but some studies do not find substantially different effects of positive and negative contact (Árnadóttir, Lolliot, Brown, & Hewstone, 2018; Mazziotta, Rohmann, Wright, De Tezanos Pinto, & Lutterbach, 2015), and others even find larger effects for positive than for negative contact (e.g., Mähönen, & Jasinskaja-Lahti, 2016; Meleady, Seger, & Vermue, 2017; Pruett, Lee, Chan, Wang, & Lane, 2008). To date, potential explanations for these diverse findings remain incomplete.

We suggest that it is important to consider conditions of the contact experience that influence positive and negative contact effects: The intensity of positive and negative contact is one crucial, previously overlooked dimension of contact, which will help to qualify the differences in positive and negative contact effects, as we expect that intensity should primarily increase the effects of positive, but to a lesser degree decrease the effects of negative contact.

Effects of Intensity of positive and negative experiences

Contact can vary in terms of a wide range of conditions enumerated, first, by Allport (1954), including cooperation and equal status in the situation, as well as common goals and
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support of authorities, or even the majority’s support for equal status within the situation (e.g., Becker & Wright, 2011). Yet, as Dixon, Durrheim, and Tredoux (2005) point out, most research to date does not explicitly address this large variation in the conditions under which intergroup contact may occur (but see Islam & Hewstone, 1993). Assessing the intensity of intergroup contact will help to close the gap between real-world contact and contact commonly assessed in psychological science (Hayward et al., 2017). Hayward et al. (2017) therefore refer to the “participants’ subjective perceptions of the emotional intensity of these [positive and negative contact] experiences” (p. 348). While valence of contact refers to whether a situation was perceived to be positive or negative, intensity of the valenced contact refers to whether intergroup contact is perceived to be of high or low positivity (or negativity). A similar differentiation can be found in the work of Fiske (1980), who differentiates between negativity (i.e., valence) and extremity (intensity) in the realm of person perceptions. Fiske’s research demonstrates that an increase in intensity of the positivity or negativity of the description of a person’s behaviour did not directly translate into the evaluation of the respective person: reading a vignette of behaviour of strong negativity had a larger impact on likeability of a fictional person and provoked the longest looking time, than reading vignettes with lesser negativity or and high and low positivity. However, this research did not concern perceptions in an intergroup setting and, in addition, relied on stimulus material that categorized low and high positivity and negativity based on subjective ratings of valence and extremity. For the present work we choose to stay within the terminology used in the intergroup contact literature. We thus differentiate between the valence of intergroup contact (i.e., positive or negative) and intensity of valence of intergroup contact (i.e., contact of low or high positivity/negativity) as suggested by Hayward et al. (2017). In comparison to Hayward et al., we will not use the term emotional intensity, but rather intensity of valence, as the perceived intensity of valence (as operationalized by
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Hayward et al., 2017, as “how negatively they would rate the experience”, p. 349) might not only be influenced by emotional factors. The interplay of different factors (including, but not limited to emotional aspects) in predicting the perceived intensity of valenced contact is an interesting question, but is not a focus of the current paper.

To our knowledge, there has been no research explicitly examining the influence of the intensity of valenced intergroup contact on perceived intensity and intergroup attitudes. For positive contact, there is evidence that intimate intergroup contact (which might represent high positivity) has stronger effects on intergroup attitudes than superficial contact (which might represent low positivity): Cross-group friendship is a reliable predictor of prejudice reduction (Davies, Tropp, Aron, Pettigrew, & Wright, 2011; Pettigrew, 2008) and has stronger effects than other measures of positive contact (Pettigrew & Tropp, 2006). Moreover, measures of cross group friendship assessing actual engagement with the friend (which included, for example, the feeling of closeness, self-disclosure and spending time with outgroup friends, which might represent high positivity) tend to have the strongest effect on prejudice reduction (Davies et al., 2011). While intimate intergroup contact, like friendship, typically fulfills most of Allport’s conditions (with the exception of institutional support), friendship also tends to be an intense form of interaction, comprising aspects like closeness and companionship (e.g., Bukowski, Hoza, & Boivin, 1994). In line with this argument, Van Dick et al. (2004) suggested that intimate intergroup contact has stronger effects on prejudice, because it is perceived as more ‘important’ than superficial relations, which relates to our argument. Indeed, recent results from Graf et al. (Graf, Paolini, & Rubin, 2018) demonstrate that positive contact in intimate intergroup relationships leads to the most positive attitudes, compared to positive contact in more casual or formal relationships and negative contact in all forms of relationships. In the realm of negative contact, intimacy even had a protective function, and negative contact in intimate relationships had smaller effects on intergroup
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attitudes than negative contact in nonintimate relations. We suggest that these results provide initial support for the idea that increased intensity in the realm of positive contact leads to a stronger reduction of prejudice and that intensity differentially affects positive and negative contact.

To explain why increasing intensity should primarily increase effects of positive, but not of negative, contact we agree with Barlow et al. (2012) who argued that the “bad is stronger than good” (Baumeister et. al, 2001; Rozin, & Royzman, 2001) hypothesis is also relevant for intergroup contact research. This hypothesis refers to several phenomena in which a positive-negative asymmetry is observable. It should be noted, however, that most of these phenomena were not observed in an intergroup context, which might influence their generalizability to the context of intergroup contact. Most prominently, research shows that across multiple domains, such as in impression formation (e.g., Peeters & Czapinski, 1990), negative information is weighted more heavily than positive information, even if it is of equal magnitude on an objective scale (Baumeister et al., 2001; Peeters, & Czapinski, 1990). Thus, negative information, even if of lower intensity, has stronger effects. Additionally, Rozin and Royzman (2001) elaborate on the “greater steepness of negative gradients” (p. 298), whereby an increase in intensity should differentially affect positive and negative experiences. In line with this reasoning, some authors argue that there is a steeper increase in the consequences of negative events when objective intensity increases (e.g., Cacioppo, Gardner, & Bernstson, 1997). For adaptive reasons (e.g., Taylor, 1991), negative events should thus evoke more urgent reactions than positive events. Indeed, negative cues, like angry faces, are detected faster than their positive counterparts (e.g., Fox et al., 2000; Hansen & Hansen, 1988; Öhman et al., 2001) and evoke more immediate and elevated physiological reactions (e.g., Ito et al., 1998; Northoff et al., 2000; Taylor, 1991). Additionally, evidence from the field of contagion research suggests a relative dose insensitivity for negative stimuli, such that even very brief
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Contact with a small dose of a negative entity produces large effects (e.g., Rozin, Markwith, & Nemeroff, 1992). Following this line of thought, Rozin and Royzman (2001) argue that there might be a steeper increase in effects of negative compared to positive events, and that this increase should be very rapid, so that a maximum of negativity might be approached very fast. This idea receives support from research on diagnostic decisions, where amount and intensity of positive information are shown to increase diagnostic ability gradually, while negative information of low intensity already has high diagnostic value (e.g., Czapinski, 1986; Leyens & Yzerbyt, 1992). Extrapolating these ideas to intergroup contact, for negative contact we would thus expect that even mildly negative events on an objective scale should evoke immediate negative reactions, and, more specifically, a change in attitudes. In line with this reasoning, initial evidence suggests that even relatively mild negative contact, such as behavior that leads one to feel rejected, relates to increased levels of racism and avoidance of outgroups (Barlow, Louis, & Hewstone, 2009; Barlow, Louis, & Terry, 2009).

Building on these considerations we suggest that while increasing intensity of positive contact (for example, greeting someone vs. making a friend) should add to the effects of positive contact on attitudes, increasing intensity of negative contact (for example, feeling rejected vs. getting bullied by an outgroup member) should not increase the explained variance in attitudes to the same extent.

The present research

The present research is, to our knowledge, the first to examine the influence of intensity of contact (i.e., high or low positivity/negativity) as a dimension of valenced (i.e., positive and negative) intergroup contact. Furthermore, to our knowledge, this research is the first to examine experimentally negative contact between real groups.
Differential effects for positive versus negative contact intensity

Specifically, we expect that an increase of intensity will increase the effects of positive contact, while an increase of intensity in the realm of negative contact will not yield corresponding effects. We furthermore use our experiments to explore the relation between the intensity of valenced contact, manipulated in an objective way and perceived contact quality (see Study 2).

In Study 1, we analysed the effect of perceived intensity of positive and negative contact experiences in a large cross-sectional sample of British majority and ethnic minority members. In Studies 2 and 3, we implemented a manipulation of intensity and valence on an objective scale in two online experiments, measuring perceived contact quality and intergroup attitudes. In Study 4, we implemented the same paradigm in an offline version of the experiment. As all three of our experiments were designed in a very similar manner we finally integrated their main findings in an internal meta-analysis.

Study 1

The primary aim of Study 1 was to provide initial evidence for the influence of the intensity of positive but not negative intergroup contact. Data for Study 1 comes from a larger survey conducted in the context of intergroup relations between White British and Asian British participants in the UK. British Asians (largest sub-groups: Asian British Indian 33%, Pakistani 27%, and Bangladeshi 10%) account for seven per cent of the UK population and constitute the largest ethnic minority group in Britain (Office for National Statistics, 2013) and face discrimination across a wide range of measures (e.g., Social Mobility Commission, 2016). Previous research has shown that intergroup contact effects likely differ for majority and minority members (e.g., Tropp & Pettigrew, 2005b), which makes it necessary to consider majority and minority groups as a predictor in the analysis. As a manipulation of negative contact and contact intensity might be ethically questionable in a relevant intergroup
Differential effects for positive versus negative contact intensity

context, we instead used participants’ perception of contact intensity as a proximal indicator
to examine our predictions.

Method

Respondents

Two thousand nine hundred and four people (49% women, 51% men; \( M_{\text{age}} = 45.39, \ SD = 18.88 \)) participated in a larger twenty-minute survey involving White British \((N = 1520)\)
and Asian British \((N = 1474, \ 35.3\% \ \text{Asian British Indian}, \ 46.3\% \ \text{Asian British Pakistani},\)
15.3% Asian British Bangladeshi) participants from 290 British neighbourhoods. The survey
was conducted by a survey company (Ipsos MORI) and used a face-to-face random location
quota approach (e.g., Szolnoki & Hoffmann, 2013). The survey company maintains a
database of people who regularly participate in surveys for remuneration. All interviews were
conducted in English.

Measures

One item each assessed the frequency of positive and negative contact, respectively,
asking how often respondents had positive/negative contact with the respective outgroup
(Asian and Asian British/ White British). The scale ranged from 1 (never) to 6 (every day).

Perceived intensity of positive and negative contact was measured with two items (1 =
not at all to 5 = a great deal). These items made reference to the contact frequency items,
asking participants how positive or negative they would rate the respective contact\(^8\)\(^9\).

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\(^8\) Participants additionally stated how much these positive or negative contact experiences with the
other group typically affected them personally. These items yielded a similar pattern of results, but as the
positivity/negativity items are more similar to the items used by Hayward et al. (2017), results for these other
items can be requested from the first author.

\(^9\) Respondents only answered these questions if they had reported having some (i.e., more than none) of
the respective type of contact \((n=1523 \ \text{for negative contact}; \ n= 2914 \ \text{for positive contact})\).
Differential effects for positive versus negative contact intensity

To indicate their *outgroup attitudes*, participants rated the respective outgroups’ warmth (1 = *very cold* to 5 = *very warm*).  

**Results and Discussion**

Statistical analyses were conducted with SPSS Version 24.0 (IBM Corp., 2015). Only respondents who had reported at least some intergroup contact on the respective measures of positive and negative contact frequency were included for all analysis including perceived intensity of contact. Correlations between all scales are reported in the Appendix (Table 1 for the overall sample, Table 2 separated for majority and minority data). These results support the idea that intensity and frequency are indeed different concepts. The frequency of positive contact and intensity of positive contact are correlated only to a moderate degree ($r = .40$, $p < .001$), so are frequency and intensity of negative intergroup contact ($r = .33$, $p < .001$). As expected from previous research, group-status indeed moderated some of the effects of interest. Status moderated the effects of positive contact frequency on outgroup attitudes ($b = -0.07$, $SE = .03$, $p = .017$, CI95% [-0.12, -0.01]) as well as the effect of negative intensity on warmth ($b = 0.14$, $SE = 0.05$, $p = .003$, CI95% [0.05, 0.23]). We thus report majority and minority data separately.

We first ran some preliminary analyses examining the frequencies of positive and negative contact. A paired-sample t-test confirmed that both majority and minority members had more positive ($M = 5.03$, $SD = 1.19$) than negative ($M = 1.82$, $SD = 1.07$, $t(2978) = 108.53$, $p = .001$, CI95% [3.16, 3.27], $d_z = 1.99$) contact. Positive and negative contact frequencies were not related, $r(2978) = -.01$, $p = .55$. Perceived intensity was also rated higher for positive ($M = 3.59$, $SD = 0.09$) than for negative ($M = 2.32$, $SD = 0.97$, $t(1495) = 36.40$, $p < .001$, CI95% [1.198, 1.335], $d_z = 0.94$) contact. For positive contact, minority

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10 Participants also rated competence. The results for competence can be found in the Supplementary Material.
Differential effects for positive versus negative contact intensity

members reported more contact ($M = 5.23, SD = 1.05$) than majority members ($M = 4.83, SD = 1.28, t(2926) = -9.56, p < .001, CI95% [-0.49, -0.32], d = 0.34$), but for negative contact, minority members’ contact frequency ($M = 1.81, SD = 0.99$) did not significantly differ from majority members’ contact frequency ($M = 1.82, SD = 1.15, t(2946) = .26, p = .79, CI95% [-0.07, 0.09], d = -0.01$). Minority members also reported more intense positive contact ($M = 3.78, SD = 0.84$) than majority members ($M = 3.62, SD = 0.89, t(2914) = -5.06, p < .001, CI95% [-0.22, -0.10], d = .19$), and slightly more intense negative contact ($M = 2.39, SD = 0.99$) than majority members ($M = 2.28, SD = 0.97, t(1524) = -2.03, p = .043, CI95% [-0.20, -0.003], d = 0.11$).

Table 3 displays results for the influence of perceived intensity of contact on outgroup attitudes, addressing our main hypothesis for this study. For this analysis, intensity was coded as 0 for people who had reported no positive or negative contact, to avoid large amounts of missing data. All predictors were entered simultaneously for each group.

Table 3

<table>
<thead>
<tr>
<th>Contact valence</th>
<th>Contact frequency</th>
<th>Perceived intensity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>b (SE) CI 95%</td>
<td>b (SE) CI 95%</td>
</tr>
<tr>
<td>Majority</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive</td>
<td>0.13(0.02)**</td>
<td>0.22(0.03)**</td>
</tr>
<tr>
<td></td>
<td>[0.09,0.17]</td>
<td>[0.17,0.27]</td>
</tr>
<tr>
<td>Negative</td>
<td>-0.13(0.03)***</td>
<td>-0.03(0.03)</td>
</tr>
<tr>
<td></td>
<td>[-0.19,-0.07]</td>
<td>[-0.08,0.02]</td>
</tr>
<tr>
<td>Minority</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive</td>
<td>0.10(0.03)***</td>
<td>0.19(0.03)***</td>
</tr>
<tr>
<td></td>
<td>[0.05,0.15]</td>
<td>[0.13,0.24]</td>
</tr>
<tr>
<td>Negative</td>
<td>-0.09(0.03)**</td>
<td>-0.04(0.02)</td>
</tr>
<tr>
<td></td>
<td>[-0.16, -0.03]</td>
<td>[-0.08,0.01]</td>
</tr>
</tbody>
</table>

***$p < .001$, **$p < .01$, *$p < .05$
Differential effects for positive versus negative contact intensity

In line with previous research, for both majority and minority members an increase in the frequency of positive contact improved outgroups attitudes. For both groups an increase in the positivity of contact increased outgroup attitudes over and above the effects of positive contact frequency. For negative contact the frequency of negative intergroup contact decreased outgroup attitudes for majority as well as minority group members. In line with our predictions, increased negativity of contact had no significant effect on outgroup attitudes, beyond the effect of negative contact frequency, for both majority and minority members.

Study 1 provides initial evidence in support of our main hypothesis, that increasing intensity primarily plays a significant role in positive, but not negative contact effects. For positive contact, intensity of contact valence was associated with increased positive attitudes, whereas for negative contact, perceived intensity of valence did not emerge as a significant predictor of attitudes. These results are in line with our theoretical reasoning, relying on findings of research from other fields which suggest that even minimally intense negative events can exert profound effects (e.g., Peeters & Czapinski, 1990; Rozin & Royzman, 2001). Furthermore, we found that positive contact frequency yielded larger effects for majority than for minority members, which is in line with previous findings (Tropp & Pettigrew, 2005b). However, Study 1 only comprises cross-sectional data and, as such, we cannot make claims about causality. Moreover, respondents in this sample reported almost no negative events of very high intensity; potentially, more intense negative experiences might have changed the observed pattern of results. Nonetheless, this study was conducted in a context in which we might have expected to tap such experiences, as British Asians, the largest minority group in the United Kingdom, face considerable discrimination (e.g., Social Mobility Commission, 2016). It is additionally important to note, that in line with previous research (Hayward et al., 2018), we found that the negativity of negative events was lower, but varied more, than the positivity of positive events. For a thorough test of the effects of intensity of valence, it is
Differential effects for positive versus negative contact intensity
thus necessary to manipulate valence and intensity in an objective and comparable manner (Peeters & Czapinski, 1990).

**Study 2**

In order to establish a thorough manipulation to compare the effects of intensity under different valence, one crucial element is not only to provide an objectively positive and negative situation, but also to keep intensity comparable on an objective scale (see also Peeters & Czapinski, 1990). To address this issue we adapted the indirect collaboration task (Fell, 2015; Wilder, 1984), during which participants interact with a confederate, and receive bogus, differentially valenced, feedback on a task they have completed. Valence of the interaction in this task is varied on several feedback-scales, which allows systematic manipulation of the two dimensions of valence (positive vs. negative) and intensity (low vs. high positivity/negativity) on an objective scale of intensity (see Procedure, p. 41 for details).

To explore potential mechanisms driving the effect of valenced contact of different intensity on outgroup attitudes, we included further, exploratory variables\textsuperscript{12}. One potential variable to explain the mechanism driving our effects of intensity could be perceived contact quality. Previous research shows that an increase in intensity differentially affects the evaluation of positive and negative persons (Fiske, 1980), which might also apply to the perceived quality of contact experiences. Additionally, perceived contact quality has long been shown to predict outgroup attitudes (e.g., Barlow et al., 2012, Study 1; Paolini et al., 2010) and thus measured contact quality might be one mechanism to mediate the link in this study between the interplay of manipulated valence and intensity and measured outgroup attitudes.

\textsuperscript{12} We had included further measures to explore potential mechanisms explaining the link between our manipulation of valenced contact of high and low intensity and outgroup attitudes. Results for these measures (i.e., category salience, intergroup anxiety, and competence) can be found in the Supplementary Material.
Method

Participants and design

Ninety students from Germany’s only distance learning university took part in the study. At this university, students are older than typical non-distance learning university students, 80% are currently employed and only study part-time (Roth & Mazziotta, 2015). In a 2 (positive vs. negative) x 2 (low vs. high) between-subjects design participants were randomly assigned to one of four experimental conditions comprising differently valenced contact: high negativity vs low negativity vs low positivity vs high positivity. Three participants were excluded because they did not find the feedback credible at all (one from the highly positive, two from the highly negative condition). The final sample included 87 participants (66 females, 20 males, one person did not indicate their gender; $M_{\text{age}} = 37.02$, $SD = 10.51$). The number of participants per condition was almost equal (high negativity = 23, low negativity = 22, low positivity = 22, high positivity = 20). Participants entered a raffle for money and could receive course credit after participating. Participants were fully debriefed after the end of data collection.

Procedure

We adapted the indirect collaboration task (Fell, 2015; Wilder, 1984) to an online environment (Adobe Connect, Copyright © 2018 Adobe Systems Inc.), which uses false feedback to manipulate valence and intensity of valence in a highly structured and objective manner. For a flow chart of the procedure see Figure 1. Participants were recruited via

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13 In a simulation of data for moderated mediations, Preacher, Rucker and Hayes (2007) demonstrate that a sample size of 200 participants would provide sufficient power for a moderated mediation with medium sized regression coefficients. We had preregistered to stop data collection for Study 2 when 220 participants were recruited or on Christmas day 2016 with at least 20 participants per condition (The preregistered materials can be found at https://osf.io/6sjsz/?view_only=f7a3e95427d74474e99e39d865c32a5b1, yet the registration form including the research question and stopping rules for data collection could not be blinded, but can be assessed before publication (see Appendix, p.149). On Christmas day the positive condition included fewer than 20 participants, therefore four further participants were recruited for this condition to reach a minimum of 20 participants per cell (Simmons, Nelson, & Simonsohn, 2011).
Differential effects for positive versus negative contact intensity

several online platforms related to the respective distance learning university. A short text invited students to participate in an online experiment on cooperation competence in virtual environments. Participants were told they would either be teamed up with a student of their own distance learning university or with a student from a traditional university (the outgroup). They first answered a small pre-test questionnaire, which was mainly used to establish the cover story\textsuperscript{14}, before choosing individual appointments for the online meeting.

\textit{Figure 1}. Flow chart depicting the procedure of Study 2.

\textsuperscript{14} Due to large amounts of missing data on the code we had planned to use to match the pretest questionnaire in Study 2, the pretest data could only be matched to the participants' answers on the main outcomes for Study 3 and 4.
Differential effects for positive versus negative contact intensity

During this online meeting a confederate always acted out the role of an outgroup university student. A short introductory video explained the main properties of the online environment and the task to come. Subsequently, the confederate and participant were asked to introduce themselves to their partner by answering some questions about themselves. Participants were than told that they were randomly chosen to complete two small writing tasks in the first round, while their partner would give them feedback on these tasks – and that their turn to give feedback would come after they had finished these first two writing tasks. They thus continued with a short writing task about arguments that supported allowing smoking in bars and restaurants. Following this task, participants received the first bogus feedback from the confederate, which, according to one of the four possible conditions, was either of low or high positivity or of low or high negativity. After reading the feedback, participants continued with a second writing task, about arguments against smoking in bars and restaurants. Again, participants received bogus feedback in line with their respective condition. After this second round of feedback, participants were asked to answer some questions about their expectations and attitudes towards their partner’s group. Subsequently, all participants received positive feedback from the moderator. Following this final feedback, a false error message ended the experimental session, thus participants did not get to give feedback to the confederate.

The manipulation material consisted of two feedback sheets (see Supplementary Materials). This bogus feedback was symmetrically arranged around the midpoint of the scales employed, to provide a rigorous test of the influence of different levels of intensity. These scales on the feedback sheet stated, for example, the overall quality of the participant’s answers, or whether or not the participant should put more effort into answering these questions. All scales on the feedback sheet which differentiated between conditions used a 7-point scale, ranging from very poor (1) to excellent (7). To enhance the emotional impact on
Differential effects for positive versus negative contact intensity

the participants in an online environment (Wang, Zhao, Qiu, & Zuhu, 2014), emoticons were used as additional, ordinal scales on the feedback sheet. The full study material can be found in the Supplementary Material.

**Measures**\(^\text{15}\)

All scales used a 7-point Likert-type scale ranging from 1 (0 *do not agree*) to 7 (6 *fully agree*), unless specified below. Means and standard deviations for all scales are reported in the Appendix (Table 4). Correlations between all scales are reported in Table 5 in the Appendix.

To assess *outgroup attitudes*, participants rated outgroup members on three items. Participants were asked to describe the group of students their interaction partner belonged to and to choose their impression of the partner’s group on the dimensions likeable, warm and good natured (α = .88, adapted from Asbrock, 2010).

Participants rated *perceived contact quality* (Paolini et al., 2010) on six items (α = .80)\(^\text{16}\). These items asked them to rate how enjoyable, unpleasant, superficial, boring, pleasant and engaging the interaction in the online environment was. Instructions were adapted to match the given context and negative items were recoded. Higher scores indicate a more positive evaluation of the contact.

**Results and Discussion**

We used SPSS Version 24.0 (IBM Corp., 2015) and the PROCESS Macro for SPSS (Hayes, 2017) to test our hypotheses in Studies 2-4. A detailed summary of the results on the main outcomes for all experimental studies, including forest plots and graphs for the overall

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\(^\text{15}\) The full questionnaire can be found in the online materials. We additionally assessed a plausibility check for the manipulation, competence of the outgroup, category salience and anxiety. Result for these measures are reported in the Supplementary Material.

\(^\text{16}\) From the original eight items, we had already dropped the item “informal” from the scale during translation, and “formal”, was excluded from the analysis, to enhance reliability of the scale. See Supplementary Material for further results regarding the scale’s properties.
Differential effects for positive versus negative contact intensity

interaction effects, can be found following Study 4 under “Internal meta-analysis for Study 2 – 4” (p. 54).

**Outgroup Attitudes**

For outgroup attitudes a two-way analysis of variance (ANOVA) revealed a significant main effect for valence, \(F(1, 83) = 5.42, p = .022, \eta^2_p = .06\), as well as intensity, \(F(1, 83) = 10.29, p = .002, \eta^2_p = .11\), while the interaction yielded a small, but not significant effect, \(F(1, 83) = 2.73, p = .102, \eta^2_p = .03\). A subsequent examination of the simple effects revealed that an increase in intensity increased outgroup attitudes in the positive condition, \(F(1, 42) = 10.51, p = .002, \eta^2 = .21\), but did not reduce outgroup attitudes in the negative condition, \(F(1, 42) = 1.36, p = .249, \eta^2 = .03\).

**Perceived Contact Quality**

Using a two-way ANOVA we first tested whether intensity (0 = mild, 1 = more intense contact) moderated the effects of negative compared to positive contact (0 = positive, 1 = negative). There was a significant main effect of valence, \(F(1, 83) = 13.43, p < .001, \eta^2_p = .14\), but not of intensity \(F(1, 83) = 1.44, p = .233, \eta^2_p = .02\). Importantly, there was a significant interaction effect of valence and intensity, \(F(1,83) = 9.48, p = .003, \eta^2_p = .10\). An analysis of the respective simple effects revealed that an increase in intensity increased perceived contact quality in the positive, \(F(1, 42) = 6.79, p = .013, \eta^2 = .15\), but not the negative condition \(F(1, 42) = 2.54, p = .118, \eta^2 = .06\). To examine whether intensity of perceived quality mediated the effects of intensity for positive and negative contact, we ran a moderated mediation (PROCESS, Model 7), with negative vs. positive contact as a moderator. This allowed us to examine the indirect effects of intensity mediated via perceived contact quality on outgroup attitudes. An examination of the conditional indirect effects for intensity on outgroup attitudes revealed a significant indirect effect for positive (\(b = 0.38, \eta^2_p = .15\))
Differential effects for positive versus negative contact intensity

CI95% [0.06, 0.84]), but not for negative contact ($b = -0.17, \text{CI95\%} [-0.38, 0.05]$, index of moderated mediation $= -0.54, \text{CI95\%} [-1.10, -0.14]$).

Study 2 provides first experimental evidence that varying the intensity of the contact experience primarily affects the effects of positive but not of negative contact. As expected, increasing intensity increased outgroup attitudes for positive contact, but did not decrease outgroup attitudes for negative contact. These results are in line with our assumptions and results from Study 1. Additionally, the same pattern emerged for perceived quality of contact, which in turn mediated the effects of positive, but not negative, contact on outgroup attitudes. This finding is interesting, as it demonstrates that an increase in intensity, especially in the realm of negative contact, is not necessarily related to the perceived quality of contact, especially in the realm of negative contact (Fiske, 1980), although our findings do not show the same pattern demonstrated by Fiske, who found the most extreme evaluation of a target person when their behaviour was strongly negative. Our findings suggest that it takes rather strong positive contact to actually increase the perceived quality of intergroup contact. Yet, although our research included a minimum of 20 participants per cell (Simmons et al., 2011), power for this study was low, which might affect the reliability of the results. Moreover, while the simple effect analysis of the interaction effect on outgroup attitudes supported our hypotheses, the interaction effect itself only yielded a rather small effect, which did not reach significance. These results should thus be interpreted with caution, given the low power of this study which constrains the robustness of our findings. Furthermore, previous research demonstrates that having outgroup friends can influence both the perception of contact quality (Blascovich, Mendes, Hunter, Lickel, & Kawai-Bell, 2001; Page-Gould, Mendoza-Denton, & Tropp, 2008), as well as the resulting outgroup attitudes (Pettigrew & Tropp, 2006). As we did not assess previous intergroup experiences in Study 2, these might have influenced our results. To address this concern, results for Studies 3 and 4 were controlled for
Differential effects for positive versus negative contact intensity

previous experiences of positive intergroup contact. Moreover, interactions in an online
environment might be experienced differently from distance learning in the case of traditional
students, because the former are much more used to online evaluation. Study 3 thus aimed to
increase generalizability of our findings by swapping in- and outgroup, and to increase the
power achieved to test these effects.

**Study 3**

**Method**

**Participants and design**

We used a similar experimental design as in Study 2 (Figure 1). Participants were 174
German-speaking students from traditional universities (i.e., non-distance learning
universities) all over Germany and Austria; compared to Study 2. Thus, we swapped around
the in- and outgroup in this study, to consider students from distance learning universities as
the outgroup\(^{17}\). Five participants were excluded across all conditions, because they did not
find the feedback credible (high negativity: 1; low negativity: 2; low positivity: 1; high
positivity: 1). The final sample for Study 3 was almost equally distributed over conditions
(high negativity = 42, low negativity = 45, low positivity = 40, high positivity = 42) and
included 169 participants (108 females, 59 males, one participant used an additional gender
category, and one did not indicate gender; \(\text{M}_{\text{age}} = 23.86, \text{SD} = 3.48\)). Again, participants
entered a raffle for money after participating and this time had the chance of receiving a small
monetary payment. Participants were fully debriefed after the end of data collection.

\(^{17}\) For Study 3, we had again preregistered to aim for a final sample of 200 participants or to finish
data-collection before August 1st 2017. On the 1\(^{st}\) of August 174 persons had participated. Again, the
registration form including research question and stopping rules for data collection could not be blinded, but can
be assessed before publication (see Appendix, p.149). The preregistered materials can be found at
https://osf.io/6jsz?view_only=f7a3e95427d7474e99e39d865c32a5b1.
Differential effects for positive versus negative contact intensity

**Procedure**

The full study material for Study 3 can be found in the Supplementary Material. We retained the same paradigm used in Study 2, but implemented small changes to increase plausibility of the manipulation (see Supplementary Material). First, we slightly adapted the bogus feedback questionnaire to improve credibility of the feedback. Specifically, the anchors for the feedback sheet of Study 3 now ranged from very poor (-3) to excellent (3). Additionally, we chose slightly less intense emoticons. Again, participants were recruited on several online platforms, following the same procedure as implemented in Study 2.

**Measures**\(^{18}\)

All scales used a 7-point Likert-type scale ranging (0 *do not agree*) to 7 (*fully agree*) unless specified otherwise. Means and standard deviations for all scales are reported in the Appendix (Table 6). Correlations between all scales are reported in Table 7 (in the Appendix).

*Outgroup attitudes* were assessed with the same three items, respectively, that were used in Study 2 (likeable, warm and good natured). We included outgroup attitudes both as a pre-test measure (*outgroup attitudes*\(_{pre}\) \(\alpha = .93\)) and as a measure in the final questionnaire (*outgroup attitudes*\(_{post}\) \(\alpha = .97\)).

Again, participants rated *perceived contact quality* (Paolini et al., 2010) on the same six items \(\alpha = .92\) as in Study 2. Negative items were recoded, such that higher scores indicate a more intense, positive evaluation of the contact.

\(^{18}\) Participants additionally rated competence, category salience, intergroup anxiety and a feeling thermometer. The full questionnaire can be found in the Supplementary Material.
Differential effects for positive versus negative contact intensity

Additionally, *previous experience of positive contact* was measured with one item asking how many of participants’ friends were outgroup members, ranging from 1 (*0 - none*) to 7 (*6 - all*).

**Results and Discussion**

To ensure successful randomization, we first ran a two-way ANOVA for our pretest measures of outgroup attitudes and previous experiences of positive contact. We found no results indicating that the randomization had not been successful: we found neither a main effect for valence of contact on pretest attitudes, \( F(1, 162) = 0.14, p = .705, \eta^2_p < .01, \) nor for intensity of contact, \( F(1, 162) = 1.97, p = .163, \eta^2_p = .01. \) We also found no significant interaction effect for the pretest measure of outgroup attitudes, \( F(1, 162) = 0.01, p = .925, \eta^2_p < .01. \) The results regarding previous experiences of positive contact also supported a successful random assignment: We did not find a main effect for either valence of contact, \( F(1, 163) = 0.54, p = .465, \eta^2_p < .01, \) or for intensity of contact \( F(1, 163) = 0.45, p = .451, \eta^2_p < .01. \) We also found no significant interaction effect for the pretest measure of outgroup attitudes, \( F(1, 163) = 1.39, p = .241, \eta^2_p = .01. \) Additionally, all reported results are controlled for previous contact experiences in Study 3 and 4.

**Attitudes**

In a two-way ANOVA valence had a main effect on outgroup attitudes, \( F(1, 161) = 5.25, p = .023, \eta^2_p = .03, \) and a main effect of intensity, \( F(1, 161) = 12.08, p = .001, \eta^2_p = .07. \) There was a small, but non-significant interaction effect of valence and intensity, \( F(1, 161) = 2.00, p = .158, \eta^2_p = .01. \) Examination of the simple effects revealed that an increase in intensity increased outgroup attitudes in the positive, \( F(1, 78) = 14.29, p < .001, \eta^2 = .16, \) but did not reduce outgroup attitudes in the negative condition \( F(1, 82) = 1.69, p = .197, \eta^2 = .02. \)
Perceived contact quality

We first tested whether intensity moderated the effects of negative compared to positive contact. A two-way ANOVA revealed a small main effect of valence, $F(1, 162) = 3.38, p = .068, \eta^2_p = .02$, and a main effect of intensity, $F(1, 162) = 11.69, p = .001, \eta^2_p = .07$. Importantly, there was a significant interaction effect of valence and intensity, $F(1, 162) = 4.42, p = .037, \eta^2_p = .03$. Examination of the simple effects revealed that an increase in intensity increased outgroup attitudes in the positive condition, $F(1, 79) = 14.86, p<.001, \eta^2 = .16$, but did not reduce outgroup attitudes in the negative condition, $F(1, 82) = 0.80, p = .375, \eta^2 = .01$. Again, to examine whether perceived contact quality mediated the effects of intensity for positive and negative contact, we ran a moderated mediation (PROCESS, Model 7), with negative vs. positive contact as a moderator, additionally controlling for the baseline measure of warmth and previous contact. This allowed us to examine the indirect effects of intensity mediated via perceived contact quality on outgroup attitudes. An examination of the conditional indirect effects for intensity on outgroup attitudes revealed a significant indirect effect for positive ($b = 0.39, \text{CI95\% [0.18, 0.64]}$), but not for negative ($b = 0.07, \text{CI95\% [-0.17, 0.29]}$) contact. However, this difference was not significant (index of moderated mediation $= -0.18, \text{CI95\% [-0.59, 0.23]}$).

Results from this second experiment with an objective manipulation of contact valence (negative vs. positive) and intensity (low vs. high intensity) replicated our main findings, suggesting that intensity of the contact experience differentially affects positive and negative contact experiences. Our results provide further evidence that positive contact in particular is affected by an increase in intensity, which is in line with our predictions, and with results from Study 2. As in Study 2, the interaction of valence and intensity had a significant effect on perceived contact quality and, again, perceived contact quality mediated the effects of contact on outgroup attitudes for positive, but not negative, contact. As in Study
Differential effects for positive versus negative contact intensity

The interaction effect on outgroup attitudes was small, yet again, inspection of the simple effects supported our hypothesis. Overall our results suggest that the online version of the collaboration and communication task provides an effective and highly standardized way for studying positive and negative intergroup contact. Nonetheless, the online context might be considered a very specific context and one that limits the extremity of intensity the researcher is able to introduce, because there is no face to face interaction. Further research should consider ways to increase the intensity of the manipulation, without compromising the plausibility of the paradigm. We therefore sought to replicate this paradigm in the lab, in person, in order to address any potential peculiarities of interactions in online environments. This would ensure that the results obtained from the online interactions would also generalize to offline interactions, and would further confirm the validity of findings from experiments conducted in a purely online environment.

Study 4

Method

Participants and design

Eighty students from a Dutch university, and a total of 25 disciplines (most prominent: veterinary studies n = 14, psychology n = 14, and sociology n = 8) took part in the experiment. Two participants were excluded because of extreme outliers on studentized deleted residuals (with values >± 3)\(^\text{19}\). This left a final sample of 78 participants (69 female, 9 male; \(M_{\text{age}} = 20.71, SD = 2.18\)), assigned to one of the four conditions: high positivity (n = 21), low positivity (n = 19), low negativity (n = 19), and high negativity (n = 19).

\(^{19}\) We had preregistered to exclude extreme outliers, detected with studentized deleted residuals, for Studies 2 and 3 which had not included any outliers. To keep the method consistent, we excluded the respective outliers here. Including them does not change the pattern of results.
Differential effects for positive versus negative contact intensity

**Procedure**

Overall, Study 4 followed the same procedure as in Study 2 (see Figure 1). The same feedback manipulation as in Studies 2 and 3 was used, except that Study 4 did not include emoticons, which had been included in Study 3 expressly for the online environment (see Supplementary Material). Participants were invited into the lab to perform the writing tasks and met a researcher and the confederate shortly before the experiment started. The confederate acted out the role of a student from a Dutch university of applied sciences. In this study, the group paradigm used differentiates between students of a ‘university’, the ingroup, and students of a ‘university of applied sciences’ (the outgroup). This paradigm was chosen to mirror the status difference in Study 2, as students from universities of applied sciences tend to be perceived as lower in status when it comes to written, academic tasks.

Participants were recruited on campus, mostly via flyers and by visiting lectures. The experiment was advertised as a study of cooperation and collaboration, with a specific focus on how to improve and standardize ways of giving feedback. Students who were willing to participate were able to sign up online, on which they were asked to fill out the online pre-test survey, and to agree a date for the experiment in an online calendar. Participants gave their written consent before the experiment started and were provided a full debriefing and small financial reimbursement after completion.

**Measures**

To assess *outgroup attitudes* participants rated the same three items each towards the outgroup used in Studies 2 and 3, except that items ranged from 0-100 ($\alpha_{pre} = .91$, $\alpha_{post} = .90$, ...
Differential effects for positive versus negative contact intensity

Participants rated *perceived contact quality* on six items, which asked participants how they had experienced the interaction (Paolini et al., 2010).\(^{20}\) Participants again rated the extent to which they had found the interaction, for example, enjoyable or pleasant (\(\alpha = .76\)).

*Previous experience of positive contact* was measured with one item asking how many of participants’ good friends were studying at a university of applied sciences (response options: ‘None’, ‘One’, ‘Two to five’, ‘Five to ten’, and ‘More than ten’).

**Results and Discussion**

Descriptive statistics for all the main variables, as well as the correlations between them, can be found in the Appendix (Tables 8 and 9, respectively). As in Study 3, we first ran a two-way ANOVA for our pretest measures of outgroup attitudes and previous experiences of positive contact. We found no evidence that outgroup attitudes differed between the conditions: neither valence of contact, \(F(1, 74) = 1.02, p = .316, \eta^{2}_p = .01\), nor intensity of contact, \(F(1, 74) = 0.44, p = .510, \eta^{2}_p = .01\), had an effect on pretest attitudes. We also found no significant interaction effect for the pretest measure of outgroup attitudes, \(F(1, 74) = 0.60, p = .441, \eta^{2}_p = .01\). The results regarding previous experiences of positive contact also confirmed successful random assignment: We did not find a main effect for either valence of contact, \(F(1, 76) = 0.01, p = .914, \eta^{2}_p < .01\), or intensity of contact, \(F(1, 76) = 1.40, p = .240, \eta^{2}_p = .02\). Also, we found no significant interaction effect for the pretest measure of outgroup attitudes \(F(1, 76) = 0.56, p = .456, \eta^{2}_p = .01\).

**Attitudes**

In a two-way ANOVA a main effect of valence emerged, \(F(1, 73) = 5.37, p = .023, \eta^{2}_p = .07\), but there was no significant main effect for intensity, \(F(1, 73) = .19, p = .666, \eta^{2}_p < .01\). A significant interaction effect of intensity and valence did emerge, \(F(1, 73) = 4.84, p =

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\(^{20}\) As in Studies 2 and 3, ‘formal’ was excluded. Additionally, ‘boring’ was also excluded. These two items did not load on the same factor.
Differential effects for positive versus negative contact intensity

.031, $\eta^2_p = .06$. Examination of the simple effects revealed that an increase in intensity increased outgroup attitudes in the positive condition, but only yielded a small effect that approached conventional levels of significance, $F(1, 37) = 3.68, p = .63, \eta^2 = .09$; it did not reduce outgroup attitudes in the negative condition $F(1, 36) = 2.01, p = .165, \eta^2 = .05$.

**Perceived contact quality**

In a two-way ANOVA a main effect of negative vs. positive valence emerged, $F(1, 73) = 4.78, p = .032, \eta^2_p = .06$, but there was no main effect of intensity, $F(1, 73) = 0.49, p = .484, \eta^2_p = .01$. The interaction of valence and intensity yielded a significant effect, $F(1, 73) = 13.91, p < .001, \eta^2_p = .16$. Examination of the simple effects revealed that an increase in intensity increased outgroup attitudes in the positive condition, $F(1, 38) = 9.90, p = .003, \eta^2 = .21$, but also had a small effect that approached conventional levels of significance in the realm of negative contact, $F(1, 36) = 3.37, p = .075, \eta^2 = .09$. We ran a moderated mediation to test whether perceived contact quality mediated the effects of intensity on outgroup attitudes and whether this relation is different for the realm of positive and negative contact. The indirect effect via perceived quality was significant in the positive ($b = 5.70$, CI95% [1.50, 11.19]), but not the negative ($b = -3.15$, CI95% [-9.02, 0.39]) index of moderated mediation = -8.85, CI95% [-17.80, -2.31]) condition, in a model including outgroup attitudes as a dependent variable and controlling for the pretest measure of outgroup attitudes as well as previous contact experiences.

This third experiment replicated the results of Studies 1, 2, and 3 with direct interactions taking place in person. In line with our hypothesis, increasing intensity had a higher impact on the effects of positive compared with negative contact and again, perceived contact quality mediated the effects of positive, but not negative contact. Due to difficulties in recruiting more participants in the preregistered time frame, and limited funding for further confederate hours, Study 4 also only included a rather small number of participants, which
Differential effects for positive versus negative contact intensity limited the power of this study. To address this issue, and to summarize the findings of our three experiments, we finally conducted an internal meta-analysis.

**Internal meta-analysis for Studies 2 – 4**

All three of our experiments were designed in a very similar manner and yielded results in the predicted direction based on our assumptions. To provide a more accurate picture of the effects of variables of interest, given issues of low power in some experiments, we integrated our results on the main outcome outgroup attitudes in an internal meta-analysis. As an internal meta-analysis yields an increase in power compared to the single studies, it increases reliability and demonstrates the robustness of our findings. A meta-analytic summary of results has the benefit of basing results on larger sample sizes and, while it cannot solve problems with methodically flawed studies (Nelson, Simmons, & Simonsohn, 2018), it still provides a good way to systematically summarize sound research with similar designs (Goh, Hall, & Rosenthal, 2016). We thus ran an internal meta-analysis to examine the overall results for the interaction of contact valence and intensity on outgroup attitudes. We computed Hedges’ g for the respective interaction effects and used R (R 3.5.2, The R Foundation for Statistical Computing, 2018) and the metafor (2.0-0) package to run fixed-effect models for an estimation of the summarized effects over all three experiments.

**Results of the internal meta-analysis**

As demonstrated by Figure 2, the interaction of valence and intensity also significantly predicted outgroup attitudes in the summary of all three studies, with a medium effect, $M_g = 0.45$, $SE = 0.11$, $p<.001$, CI95% [0.23, 0.67].

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21 Summarized results for further outcomes can be found in the Supplementary Material.
22 We followed the procedure suggested by Borenstein, Hedges, Higgins and Rothenstein (2009).
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Figure 2. Forest plot for the results of the internal meta-analysis regarding the interaction effect of valence and intensity on outgroup attitudes. Shows Hedges’ $g$ (and $SE$) for all Studies 2 to 4, as well as the average effect ($Mg$) in the fixed effect model (FE model).

To address the main hypothesis driving this work, the examination of the direction of this interaction was of particular interest. We therefore summarized the simple effects of intensity within the realm of positive, $Mg = 0.37$, $SE = 0.16$, $p = .020$, CI95% [0.231, 0.668], and negative, $Mg = 0.15$, $SE = 0.15$, $p = .131$, CI95% [-0.145, 0.453] contact in an internal meta-analysis. As illustrated in Figure 3, outgroup attitudes did significantly change with an increase of positivity, but not for negativity (Figure 3).
Differential effects for positive versus negative contact intensity

Figure 3. Bar chart for Hedges’g of the simple effects of an increase of positivity and negativity on outgroup attitudes, summarized for all experiments.

Building on the merits of a much larger sample size, the results of the internal meta-analysis support the hypothesis that intensity (i.e., low vs high) and valence (positive vs negative) interact in their effects on outgroup attitudes. It should be noted that Study 3 yielded non-significant results, which still supported the overall direction of the effect. One possible explanation for this difference of Study 3 could lie in the small changes of the manipulation material, where we tried to reduce extremity of the manipulation to increase plausibility of the feedback manipulation (see Supplementary Material). The summary of the simple effects (Figure 3) demonstrated that, in line with our hypothesis, intensifying positivity had a larger effect than intensifying negativity.

General Discussion

The current research advances prior work on valenced intergroup contact, to include intensity of contact as a key factor influencing the effect of intergroup contact on outgroup attitudes. We provide consistent evidence from one large cross-sectional survey (Study 1),
Differential effects for positive versus negative contact intensity

two online experiments (Studies 2 and 3) and one experiment in person (Study 4) and additionally, the subsequent internal-meta analysis provided a concise statistical integration of our main results. Our findings demonstrate that varying the intensity of contact influences the effects of contact on attitudes - though primarily those of positive, but not of negative contact. Intensity of the contact experience had a stronger influence on the effects of positive than of negative contact on outgroup attitudes, which is in line with our hypothesis. Our research thus supports the view that hypotheses derived from the assumption that “bad is stronger than good” (Baumeister et al., 2001) are also relevant in the context of valenced intergroup contact (see Paolini et al., 2012): Our findings are in line with research from other fields of psychology, like impression formation (e.g., Peeters & Czapinski, 1990) and contagion (e.g., Rozin et al., 1992), suggesting that positive and negative experiences are differentially affected by an increase in intensity (e.g., Fiske, 1980; Rozin & Royzman, 2001). The finding that the effects of positive and negative contact are differentially influenced by intensity provides a possible explanation for the mixed results of the literature to date. Our findings regarding the effects of objectively manipulated valenced contact on perceived contact quality yield interesting additional results. Again, an increase of valence mainly influenced the perception of positive contact, but to a much lesser degree of negative contact. Indeed, in our data, contact of strong positivity is required to result in a really positive perception of the contact.

Of additional interest, when considering factors that might decrease or increase contact opportunities, is the fact that in our survey data frequency of positive and negative contact were not related (see Table 1 & Table 2). This suggests that increasing contact opportunities per se does not necessarily increase positive and negative contact to a comparable extent. This leads us to conclude that policy makers interested in promoting intergroup tolerance should not only focus on measures that seek to increase the likelihood of
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intergroup contact (for example, through creating mixed housing areas), but should also pay attention to how positive contact within such shared spaces can be encouraged and negative contact reduced. Measures such as structured intergroup contact interventions, shared positive activities, as well as initiatives to foster interethnic friendships might help to support this aim.

To further increase the societal impact of this research, we suggest that future research should also consider outcomes other than outgroup attitudes. Especially when considering longitudinal effects of intergroup contact, which might change dynamically over time (Schäfer et al., 2019), our results suggest that even small instances of low negativity might cause effects on other outcomes, such as avoidance of subsequent intergroup contact. This is in line with previous research in the realm of intergroup contact demonstrating that even intergroup contact of low negativity, such as behaviour that leads one to feel rejected, relates to increased levels of avoidance of outgroups (Barlow et al., 2009). In the long run, this avoidance could result in a lack of opportunities for positive contact, especially for contact of high positivity like making outgroup friends, and thus a lack of opportunities to improve first negative impressions.

Notwithstanding its contributions, we acknowledge some limitations of our research that should be addressed in future research. First, we had no objective measure of intergroup contact in Study 1 at our disposal. In addition to this subjective rating of valence, the contact measure in Study 1 assessed frequency of contact, a dimension not available in the experiments, as we manipulated valence and intensity, but not frequency of intergroup contact. While all of our studies demonstrate evidence in line with our hypothesis, this difference in operationalization limits the comparability between the survey data and the subsequent experiments. A further limitation addresses the operationalization of perceived contact quality. Although this measure is established in the literature (e.g., Barlow et al., 2012; Paolini et al., 2010), and we want to emphasize that it is important to assess subjective
Differential effects for positive versus negative contact intensity

contact quality separately from the objective manipulation of contact quality to avoid circularity (Dixon et al., 2005), this is a continous measure of subjective contact quality. Further studies should consider whether the measurement of perceived quality might have to assess positive and negative perception seperately (Cacioppo et al., 1997). Including seperate measures for positive and negative perceived quality would have increased comparability between experimental Studies 2 - 4, on the one hand, and survey Study 1. Additionaly, different measures of perceived positive and negative contact quality would have allowed us to examine the impact of positive and negative intensity on perceived positivity and negativity more thoroughly.

It is important to point out, that while our theoretical assumptions mostly build on findings from other fields of research, which were not considering an intergroup context, we found the expected effects not only with regard to the evaluation of the respective contact situation (i.e., perceived contact quality) but also as an attitude that did not involve an evaluation of the interaction partner herself, but generalized toward the interaction partner’s group (i.e., outgroup attitudes). However, we cannot determine whether our findings regarding the stronger effect of increased intensity in the realm of positive than negative contact are specific to intergroup contexts, or might also be true in in-group interactions. Further research could address this by including interactions with ingroup members. Furthermore, while older studies suggest that having past experiences of positive contact (i.e. having ingroup friends) is relevant for the perception of intergroup contact (Blascovich et al., 2001; Page-Gould et al., 2008) recent work suggests that not only positive but also negative contact experience might influence subsequent intergroup contact effects(BLINDED FOR PEER REVIEW). As we only controlled for outgroup friends in our experiments, further research should consider the effects of a full (positive and negative) history of intergroup contact, by controlling for positive and negative experiences in the past.
Differential effects for positive versus negative contact intensity

A further limitation concerns the very specific context in which the three experiments were set. All experiments involved a university context with participants receiving feedback from a peer, and although the manipulation of valence and intensity was realized in an objective manner, anchors of how positive and negative feedback would look like in this specific context might have affected our results (especially because, among students, the norm would be to expect rather positive feedback from their peers). Future research should therefore consider using other paradigms and contexts to examine effects of intensity. Contexts in which people have more negative than positive experiences might be of special interest (e.g., police officers’ contact with immigrants; see Dhont, et al., 2010) – as in such contexts, contact of low positivity might have a larger impact compared to environments where negative interactions are rare. It is important to keep in mind, however, that a manipulation of negative intergroup contact always has to consider ethical questions, especially in politically relevant contexts. In our own research we have recently proposed the use of behavioural games in order to observe positive and negative interactions between groups, without using manipulations that involve deception (Schäfer et al., 2019). Behavioural games thereby provide an objective measure of valenced interactions (i.e. amount of cooperation), which can be positive or negative and could thus also be used to address the influence of increased positivity and negativity for intergroup contact effects.

Finally, almost none of our participants reported negative events of high intensity, even in Study 1, which had high external validity as it dealt with positive and negative contact between White British and Asian British adults. This lack of extremely negative experiences might also explain why we do not find the same pattern of results as suggested by Fiske (1980), who finds the strongest effects in the case of person evaluations (rather than generalizations to outgroups) for extremely negative situations. Although it is heartening to find that intense negative events between members of these groups are rather scarce, a sample
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including, for example, victims of large-scale intergroup violence might change the presented results. Considering such contexts should be a goal for further research examining the relevance of intensity for positive and negative contact. Finally, although we acknowledge that the reliability of Studies 2 and 4 might be impaired by their rather low sample sizes, we replicated the same pattern of results across all studies.

To conclude, our research – which exploited the benefits of laboratory experiments allied to a large-scale, representative general population survey – shows that varying intensity of contact experiences has different effects for positive compared to negative contact experiences. Although negative contact experiences tend to be rare, such experiences might not need to be strong to cause strong negative effects. For positive contact, on the other hand, rather than simply having superficial intergroup contact, more intense positive experiences (such as making outgroup friends) are likely to yield greater benefits than merely having a few positive, but superficial interactions with outgroup members.
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https://doi.org/10.1002/ejsp.651


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Differential effects for positive versus negative contact intensity


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IBM Corp. Released 2013. IBM SPSS Statistics for Windows, Version 22.0. Armonk, NY:

IBM Corp.


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Differential effects for positive versus negative contact intensity


Differential effects for positive versus negative contact intensity


Differential effects for positive versus negative contact intensity


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Appendix

Table 1

*Correlations between all Items of Study 1, Overall Sample (N = 2994)*

<table>
<thead>
<tr>
<th></th>
<th>Positive contact frequency</th>
<th>Negative contact frequency</th>
<th>Positive contact intensity</th>
<th>Negative contact intensity</th>
<th>Outgroup attitudes</th>
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</thead>
<tbody>
<tr>
<td>Positive contact frequency</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Negative contact frequency</td>
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<td>-</td>
<td>-.18**</td>
<td>-</td>
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<td>Positive contact intensity</td>
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<td>-.18**</td>
<td>-</td>
<td>-.07**</td>
<td>-</td>
</tr>
<tr>
<td>Negative contact intensity</td>
<td>-.07**</td>
<td>.33**</td>
<td>-.07</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Outgroup attitudes</td>
<td>.29**</td>
<td>-.23**</td>
<td>.32**</td>
<td>-.31**</td>
<td>-</td>
</tr>
</tbody>
</table>

***p<.001, **p<.01, *p<.05
Differential effects for positive versus negative contact intensity

Table 2

*Correlations between all Items of Study 1, Minority Sample (N = 1474) below the Diagonal, Majority Sample (N = 1520) above the Diagonal*

<table>
<thead>
<tr>
<th></th>
<th>Positive contact frequency</th>
<th>Negative contact frequency</th>
<th>Positive contact intensity</th>
<th>Negative contact intensity</th>
<th>Outgroup attitudes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive contact frequency</td>
<td>-</td>
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<td>.41**</td>
<td>-.13**</td>
<td>.35**</td>
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<td>.44**</td>
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<td>Positive contact intensity</td>
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<td>-</td>
<td>-.15**</td>
<td>.35**</td>
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<td>Negative contact intensity</td>
<td>-.03</td>
<td>.22**</td>
<td>-.02</td>
<td>-</td>
<td>-.22**</td>
</tr>
<tr>
<td>Outgroup attitudes</td>
<td>.21**</td>
<td>-.17**</td>
<td>.27**</td>
<td>-.07</td>
<td>-</td>
</tr>
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</table>

***p<.001, **p<.01, *p<.05
Differential effects for positive versus negative contact intensity

Table 4

*Means and Standard Deviations for all Constructs of Study 2*

<table>
<thead>
<tr>
<th>Variables</th>
<th>Negative Contact</th>
<th>Positive contact</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>High negativity (n=23)</td>
<td>Low negativity (n=22)</td>
</tr>
<tr>
<td>Contact quality</td>
<td>3.38, 1.00</td>
<td>3.81, 0.78</td>
</tr>
<tr>
<td>Outgroup attitudes</td>
<td>3.88, 1.06</td>
<td>3.50, 1.14</td>
</tr>
</tbody>
</table>
Differential effects for positive versus negative contact intensity

Table 5

Correlations between all Constructs of Study 2 (N = 87)

<table>
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<tr>
<th></th>
<th>M</th>
<th>SD</th>
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<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Contact quality</td>
<td>3.99</td>
<td>1.18</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Outgroup attitudes</td>
<td>3.96</td>
<td>1.24</td>
<td>.36**</td>
<td></td>
</tr>
</tbody>
</table>

***p<.001, **p<.01, *p<.05
Differential effects for positive versus negative contact intensity

Table 6

Means and Standard Deviations for all Constructs of Study 3

<table>
<thead>
<tr>
<th>Variables</th>
<th>Contact quality</th>
<th>Outgroup attitudes (pretest)</th>
<th>Outgroup attitudes</th>
<th>Previous contact</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>High negativity (n=42)</td>
<td>4.20</td>
<td>1.71</td>
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<td>1.11</td>
</tr>
<tr>
<td>Low negativity (n=45)</td>
<td>3.92</td>
<td>1.58</td>
<td>4.80</td>
<td>1.15</td>
</tr>
<tr>
<td>Low positivity (n=40)</td>
<td>4.23</td>
<td>1.76</td>
<td>4.86</td>
<td>1.32</td>
</tr>
<tr>
<td>High positivity (n=42)</td>
<td>4.83</td>
<td>1.37</td>
<td>5.13</td>
<td>0.99</td>
</tr>
</tbody>
</table>
Differential effects for positive versus negative contact intensity

Table 7

*Correlations between all Constructs of Study 3 (N = 169)*

<table>
<thead>
<tr>
<th></th>
<th>M</th>
<th>SD</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Contact quality</td>
<td>4.29</td>
<td>1.63</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Outgroup attitudes (pretest)</td>
<td>4.95</td>
<td>1.14</td>
<td>.64**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Outgroup attitudes</td>
<td>4.37</td>
<td>1.59</td>
<td>.79**</td>
<td>.73**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Previous contact</td>
<td>2.53</td>
<td>1.89</td>
<td>.70**</td>
<td>.56**</td>
<td>.63**</td>
<td></td>
</tr>
</tbody>
</table>

***p < .001, **p < .01, *p < .05
Differential effects for positive versus negative contact intensity

Table 8

*Means and Standard Deviations for all Constructs of Study 4*

<table>
<thead>
<tr>
<th>Variables</th>
<th>Negative Contact</th>
<th>Positive contact</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>High negativity</td>
<td>Low negativity</td>
</tr>
<tr>
<td></td>
<td>(n=19)</td>
<td>(n=19)</td>
</tr>
<tr>
<td>Contact quality</td>
<td>3.59 0.92</td>
<td>4.10 0.63</td>
</tr>
<tr>
<td>Outgroup attitudes (pretest)</td>
<td>67.78 12.94</td>
<td>68.60 14.80</td>
</tr>
<tr>
<td>Outgroup attitudes</td>
<td>60.53 18.13</td>
<td>66.84 16.12</td>
</tr>
<tr>
<td>Previous contact</td>
<td>1.63 0.83</td>
<td>1.68 0.89</td>
</tr>
</tbody>
</table>
Differential effects for positive versus negative contact intensity

Table 9

*Correlations between all constructs of Study 4 (N = 78)*

<table>
<thead>
<tr>
<th></th>
<th>M</th>
<th>SD</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Contact quality</td>
<td>4.04</td>
<td>0.80</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Outgroup attitudes (pretest)</td>
<td>70.00</td>
<td>13.40</td>
<td>.08</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Outgroup attitudes</td>
<td>67.99</td>
<td>16.18</td>
<td>.40**</td>
<td>.48**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Previous contact</td>
<td>1.67</td>
<td>0.86</td>
<td>.02</td>
<td>.12</td>
<td>.05</td>
<td></td>
</tr>
</tbody>
</table>

***p<.001; **p<.01; *p<.05
Supplementary Material (additional analysis) for:

Intensifying positivity matters: Differential effects of positive versus negative contact intensity in survey and experimental research.
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Additional analysis Study 1

One further attempt to explain differential findings regarding the asymmetry of intergroup contact effects suggests that positive and negative contact might have different effects on different outcomes (e.g. Aberson, 2015; Barlow et al., 2019; Kauff et al., 2017). We decided to include a measure of competence as a second key dimension of social perception (e.g., Cuddy, Fiske, & Glick, 2008) in our studies, as competence be affected differentially from liking by intergroup contact (e.g., Kotzur, Schäfer, & Wagner, 2018).

**Effects of intensity on competence**

Therefore, participants rated competence (1 = very incompetent to 5 = very competent) on one item each. Outgroup attitudes (warmth) and competence were moderately positively correlated ($r = .51$, $p < .001$).

Table 1

*Effects of frequency and perceived intensity of valenced contact on competence among majority and minority members.*

<table>
<thead>
<tr>
<th>Contact valence</th>
<th>Contact frequency</th>
<th>Perceived intensity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$b$ (SE) CI 95%</td>
<td>$b$ (SE) CI 95%</td>
</tr>
<tr>
<td>Majority</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive</td>
<td>0.02 (0.02) [-0.02, 0.06]</td>
<td>0.07 (0.03)** [0.02, 0.12]</td>
</tr>
<tr>
<td>Negative</td>
<td>-0.07 (0.03)* [-0.13, -0.004]</td>
<td>-0.01 (0.03) [-0.06, 0.05]</td>
</tr>
<tr>
<td>Minority</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive</td>
<td>0.04 (0.03) [-0.01, 0.09]</td>
<td>0.10 (0.03)** [0.04, 0.19]</td>
</tr>
<tr>
<td>Negative</td>
<td>-0.02 (0.04) [-0.09, 0.05]</td>
<td>-0.01 (0.02) [-0.06, 0.03]</td>
</tr>
</tbody>
</table>

***$p<.001$; ** $p<.01$, * $p<.05$

Table 1 displays results for the influence of intensity of contact on competence of the respective outgroup. As in the main article, for this analysis, intensity was coded as 0
for people who had reported no positive or negative contact, to avoid large amounts of missing data\(^{23}\). All predictors were entered simultaneously for each group.

**Interactions of positive and negative intergroup contact**

Árnadottir et al. (2018) suggested that positive and negative intergroup contact interact. In our data, the interaction of the frequency of positive and negative contact is not significant, neither for majority \((p = .314 \text{ CI95\% [-0.01, 0.04]})\), nor minority members \((p = .313 \text{ CI95\%[-0.02, 0.06]})\). In the same manner, positive and negative intensity did not interact for majority \((p = .283 \text{ CI95\%[-0.03, 0.10]})\), nor minority members \((p = .652 \text{ CI95\% [-0.05, 0.08]})\).

**Test for asymmetry of intergroup contact**

To test for an asymmetry of intergroup contact, we compared the correlation coefficients for positive and negative contact frequency with outgroup attitudes and competence\(^{24}\). Correlations for outgroup attitudes can be found in the main paper in Table2 in the appendix. Competence in the minority sample correlated with positive contact frequency \((r = .093, p<.01)\) but not with negative contact frequency \((r = -.050, p = .ns)\). In the majority sample positive contact frequency was correlated with competence \((r = .083, p<.01)\), so was negative contact frequency \((r = -.125, p<.01)\). For outgroup attitudes \((z = 2.10, p = 0.018)\), positive contact had a larger effect than negative contact, while the correlation between positive and negative contact and competence did not significantly differ \((z = 1.19, p = .120)\) for minority members, or for competence. Among majority

---

\(^{23}\) Participants were only asked this question if they reported at least some intergroup contact. To avoid the loss of data, we recoded the missing data for participants who reported no intergroup contact as 0. The pattern of results does not change if missing data is deleted.

\(^{24}\) Calculations were run with https://www.psychometrica.de/correlation.html#dependent, who refer to Eid et al., 2011, S. 548 f., by comparing the absolute value of the correlation between the relevant variables (see Table 2, main paper).
members the correlation between positive and negative contact frequency on outgroup attitudes ($z = 1.15, p = .125$) and competence ($z = -1.19, p = .120$) did not significantly differ.

**Additional analysis for Study 2-4**

**Further analysis regarding perceived contact quality**

An exploratory main-factor analysis with oblimin rotation was conducted to examine whether positive and negative items of the contact quality scale loaded on one factor. Scree plots from Study 2 and Study 3 suggested a one-factor solution, while 2 factors emerged for Study 3, which did not differentiate between positive and negative contact. Full results can be requested from the first author. Across the three studies, the interaction of valence (1 = negative, 0 = positive) and intensity (1 = high, 0 = low) had a significant effect on perceived contact quality ($b = 0.75, SE = 0.12, p < .001, CI95% [0.521,0.974]$), which is illustrated by the according forest plot Figure 1).

<table>
<thead>
<tr>
<th>Study</th>
<th>Observed Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study 2</td>
<td>1.31 [ 0.85, 1.77]</td>
</tr>
<tr>
<td>Study 3</td>
<td>0.19 [-0.12, 0.49]</td>
</tr>
<tr>
<td>Study 4</td>
<td>1.66 [ 1.15, 2.17]</td>
</tr>
<tr>
<td>FE Model</td>
<td>0.75 [ 0.52, 0.97]</td>
</tr>
</tbody>
</table>

*Figure 1:* Forest plot for the results of the internal meta-analysis regarding the interaction effect of valence and intensity on perceived contact quality
**Further measures in Study 2-4**

In all of our three experiments, we had included further measures of interest in the current field of intergroup contact research. As in Study 1, we additionally assessed competence of the outgroup as a further dimension of attitudes. Furthermore, we assessed *category salience* and *intergroup anxiety*. Category salience was prominently proposed to explain the larger impact of negative contact by Paolini, Harwood, and Rubin (2010). Intergroup anxiety is an established mediator of intergroup contact effects on attitudes (Pettigrew & Tropp, 2008). We additionally included a check of plausibility of the manipulation.

*Plausibility of the manipulation* was checked with four items (1 = 0, *not at all*; 7 = 6, *very much*): whether the feedback was adjusted to the participant’s answer; whether they took the feedback seriously; whether they tried to implement the feedback; and whether the feedback was reliable ($\alpha_{\text{Study2}} = .88$, $\alpha_{\text{Study3}} = .87$, $\alpha_{\text{Study4}} = .90$).

*Category salience* was measured using 4 items adapted from Paolini, Harwood and Rubin (2010) ($\alpha_{\text{Study2}} = .63$, $\alpha_{\text{Study3}} = .67$, $\alpha_{\text{Study4}} = .79$), for example asking for how aware participants were that his interaction partner is part of a different group.

*Competence* was measured after the experiment using 3 items (competent, competitive, and independent; $\alpha_{\text{Study2}} = .81$, $\alpha_{\text{Study3}} = .84$, $\alpha_{\text{Study4}} = .75$ Asbrock, 2010). In Study 3 and 4 competence was also measured in the pretest ($\alpha_{\text{Study3}} = .80$, $\alpha_{\text{Study4}} = .81$).

*Intergroup Anxiety* was measured using 10 items ($\alpha_{\text{Study2}} = .78$, $\alpha_{\text{Study3}} = .92$, $\alpha_{\text{Study4}} = .75$, Birtel & Crisp, 2012).

We will first report the results for the plausibility of the feedback for all experiments and subsequently show the results for the test of interaction on other outcome measures summarized in an internal meta-analysis. Finally, we will present results testing for potential asymmetries of positive and negative contact.
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**Results for plausibility check**

To gauge the plausibility of the experiment in an online setting, we examined feedback credibility. Results from an analysis of variance (ANOVA) revealed a significant difference between the four conditions, $F(3,83) = 25.94, p<.001$. LSD post-hoc tests indicated that the feedback was rated significantly more plausible in the mildly negative ($M = 3.50, SD = 1.17$) than in either the mildly positive ($M = 4.28, SD = 1.19, p = .022, d_{Cohen} = -0.66$) or the positive ($M = 6.08, SD = 0.81, p<.001$) conditions. For negative feedback ($M = 3.37, SD = 1.21$), perceived plausibility did not differ compared to mildly negative feedback ($p = .696, d_{Cohen} = -0.11$), but did differ compared to the two positive conditions. Positive and mildly positive feedback differed in the plausibility of the feedback ($p<.001, d_{Cohen} = -1.74$).

We thus slightly adjusted the manipulation (see main article) for Study 3 to improve the plausibility of the manipulation overall. For Study 3, results from an ANOVA revealed a significant difference between the four conditions, $F(3,164) = 8.21, p<.001$. LSD post-hoc tests revealed higher plausibility ratings in the very positive condition ($M = 5.57, SD = 1.06$) than the three other conditions (comparison with the most similar category, mildly positive, $M = 4.77, SD = 1.29, p = .007, d_{Cohen} = .68$); for Study 3, plausibility scores were overall higher than the absolute midpoint of the scale, indicating satisfactory plausibility of the task and an improvement of the manipulation compared to Study 2.

For Study 4 results from an ANOVA, $F(3,76) = 19.873, p<.001$, revealed a significant difference across conditions. LSD post-hoc tests showed that the negative condition ($M = 2.95, SD = 1.29$) was rated as less plausible than the other three conditions (compared to the most similar category mildly negative, $M = 4.04, SD = 1.20, p<.001$). The positive condition ($M = 5.65, SD = 0.67$) was rated as more plausible than the other three conditions (compared to the most similar category mildly positive, $M = 4.04, SD = 1.28$,
The perceived plausibility of the mildly positive and mildly negative conditions did not differ.

We had preregistered to exclude participants scoring lower than the midpoint of the plausibility check. Thereby, we had not considered that it is common occurrence in feedback research that negative feedback loses its credibility (e.g., Steelman, & Rutkowski, 2004). Our check of plausibility is thus highly related to perceived contact quality. To avoid systematic exclusion of participants, we thus decided to only exclude participants not believing the feedback at all. Furthermore, we checked open comments to ensure that no participant guessed the experimental set up.

### Results of a internal meta-analysis for the additional measures

#### Competence

In Study 2 a two-way ANOVA revealed a significant main effect of valence on competence, $F(1, 83) = 4.28, p = .042, \eta^2_p = .05$ and of intensity, $F(1,83) = 8.73, p = .004, \eta^2_p = .10$, in addition, the interaction of valence and intensity also yielded a significant effect $F(1,83) = 10.51, p = .002, \eta^2_p = .11$.

In Study 3, we did again find a main effect for valence, $F(1, 161) = 11.56, p = .001, \eta^2_p = .067$, and for intensity, $F(1, 161) = 12.32, p = .001, \eta^2_p = .07$, but no significant effect for the interaction of valence of intensity $F(1, 161) = 0.19, p = .890, \eta^2_p <.01$.

In Study 4, we did not find a main effect for valence, $F (1, 73) = .76, p = .387, \eta^2_p = .01$, and none for intensity, $F(1, 73) = 1.01, p = .318, \eta^2_p = .01$, and a small, non-significant effect for the interaction of valence of intensity $F(1, 73) = 2.58, p = .113, \eta^2_p = .03$.  

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The results of an internal meta-analysis revealed that the interaction of valence (1 = negative, 0 = positive) and intensity (1 = high, 0 = low) did have a significant effect on competence when combining the three experiments ($M_g = 0.40$, $SE = 0.11$, $p < .001$, CI95% [0.18, 0.63]), which is illustrated by the according forest plot Figure 2). These results for competence demonstrate the same pattern of effects observed for outgroup attitudes in the main paper.

Figure 2. Forest plot for the results of the internal meta-analysis regarding the interaction effect of valence and intensity on competence.

**Category Salience**

In Study 2, no significant results were found in a two-way ANOVA for the outcome of category salience. No main effect for valence, $F(1,83) = 0.75$, $p = .388$, $\eta^2_p = .01$, none for intensity, $F(1,82) = 0.22$, $p = .642$, $\eta^2_p < .01$, and no significant effect for the interaction of valence of intensity $F(1,83) = 0.30$, $p = .587$, $\eta^2_p < .01$.

In Study 3, no significant effects emerged for category salience. No main effect for valence, $F(1,162) = 2.35$, $p = .128$, $\eta^2_p = .014$, none for intensity, $F(1,162) = 1.21$, $p =
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.273, η²_p = .01, and no significant effect for the interaction of valence of intensity F(1,162) = 0.35, p = .852, η²_p<.01.

Again, in Study 4, no significant effects emerged for category salience. No main effect for valence, F(1,73) = 1.70, p = .196, η²_p = .02, none for intensity, F(1,73) = 1.21, p = .107, η²_p = .04, and no significant effect for the interaction of valence of intensity F(1,73) = 0.35, p = .435, η²_p = 0.01.

---

**Figure 3.** Forest plot for the results of the internal meta-analysis regarding the interaction effect of valence and intensity on category salience.

For category salience the interaction of valence (1 = negative, 0 = positive) and intensity (1 = high, 0 = low) did not have a significant effect across all experiments (Mg <-0.01, SE = 0.11, p = .989, CI95% [-0.22,0.21]), which is illustrated by the according forest plot Figure 3). The negative interaction effect here implies the larger reduction of anxiety in the positive condition.

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Intergroup anxiety

In Study 2, a two-way ANOVA revealed a significant main effect for valence $F(1, 83) = 6.88, p = .010, \eta^2_p = .08$ but a non-significant effect of intensity, $F(1, 83) = 0.13, p = .724, \eta^2_p <.01$, while the interaction yielded a small, but significant effect $F(1, 83) = 7.66, p = .007, \eta^2_p = .09$.

In Study 3, results from a two-way ANOVA yielded no significant main effect for valence $F(1, 162) = 1.80, p = .182, \eta^2_p = .01$, a small effect with marginal significance for intensity, $F(1, 162) = 3.79, p = .053, \eta^2_p = .02$, and no significant effect for the interaction of valence of intensity $F(1, 162) = 0.17, p = .682, \eta^2_p <.01$.

![Forest plot for the results of the internal meta-analysis regarding the interaction effect of valence and intensity on intergroup anxiety](image)

Figure 4. Forest plot for the results of the internal meta-analysis regarding the interaction effect of valence and intensity on intergroup anxiety

For Study 4, a two-way ANOVA revealed a significant main effect for valence $F(1,73) = 18.15, p<.001, \eta^2_p = .20$ but a non-significant effect of intensity, $F(1,73) = 2.00, p = .162, \eta^2_p = .03$, while the interaction yielded a significant effect $F(1,73) = 9.34, p = .003, \eta^2_p = .11$. 

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Across the three studies, the interaction of valence (1 = negative, 0 = positive) and intensity (1 = high, 0 = low) had a significant effect on perceived contact quality ($M_g = -0.46$, $SE = 0.12$, $p < .001$, CI95% [-0.69, -0.23]), which is illustrated by the according forest plot Figure 4). The negative interaction effect here implies the larger reduction of anxiety in the positive condition and replicates the results observed for outgroup attitudes in the main paper.

**Results for the test of a positive/negative asymmetry in Study 2-4**

To probe for the positive-negative asymmetry of intergroup contact in Study 2, we ran one sample t-tests comparing combined values of the two positive and two negative conditions to baseline values of outgroup attitudes, measured via warmth ($M = 4.48$, $SD = 0.97$) and competence ($M = 4.62$, $SD = 1.00$); these baseline values were obtained from an independent assessment, separate from the current study, but using the same student population ($N = 366$). For outgroup attitudes, negative contact had a stronger effect, $t(44) = -4.47$, $p < .001$, $d_z = -0.10$, than positive contact, $t(41) = -1.18$, $p = .245$, $d_z = -0.03$; for outgroup competence, however, positive contact, $t(41) = 2.50$, $p = .016$, $d_z = 0.06$, had a stronger effect than negative contact, $t(44) = 0.33$, $p = .774$, $d_z = -0.01$. Thus, while for outgroup attitudes concerned with liking we found evidence supporting Barlow and her colleagues’ (2012) claim for a positive-negative asymmetry with a larger effect of negative contact, for outgroup competence we found an asymmetry in favour of positive contact.

For Study 3 and 4, baseline measure regarding warmth and competence were available. To test for an asymmetry of positive and negative contact we first ran a 2 (valence: negative vs. positive) x 2 (time: pre vs. post) ANCOVA\textsuperscript{25}. Results revealed a

\textsuperscript{25} Unlike similar studies (e.g., Keryvn, Bergsieker, Grignard, & Yzerbyt, 2016) our scales used a one dimensional assessment of outgroup attitudes, we thus did not recode any variables.
significant difference of change within persons depending on the valence of the intergroup contact for outgroup attitudes, $F(1, 162) = 8.02, p = .005, \eta^2_p = .05$, and competence, $F(1, 162) = 6.31, p = .013, \eta^2_p = .04$. Results from Study 4 revealed the same pattern for outgroup attitudes, $F(1, 73) = 3.99, p = .049, \eta^2_p = .05$, but did not find a significant difference for the change in competence depending on valence, $F(1, 73) = 2.36, p = .852, \eta^2_p < .01$. To further understand these differences we followed the steps suggested by Borenstein, Hedges, Higgins and Rothenstein (2009) to compute Hedges’ $g$ for pre and post scores. For outgroup attitudes, operationalized as warmth, negative contact yielded larger effects in Study 3 ($g_{Hedges} = -0.51, SE = 0.09$) and Study 4 ($g_{Hedges} = -0.02, SE = 0.15$), than positive contact did in Study 3 ($g_{Hedges} = -0.25, SE = 0.08$) and Study 4 ($g_{Hedges} < 0.00, SE = 0.17$). For competence, in Study 3 positive contact had a smaller effect ($g_{Hedges} = 0.06, SE = 0.11$) than negative contact ($g_{Hedges} = -0.29, SE = 0.10$), while we did not find a significant difference for Study 4.
References for the additional analysis in the Supplementary Material


Manuscript #2:

Dynamic contact effects: Influence of an individual's history on the effects of positive and negative intergroup contact in a behavioural game

Manuscript ready for submission.
Dynamic contact effects

Dynamic contact effects: Influence of an individual's history on the effects of positive and negative intergroup contact in a behavioural game

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Dynamic contact effects

Dynamic contact effects: Influence of an individual's history on the effects of positive and negative intergroup contact in a behavioural game

Positive contact between members of different groups reduces prejudice and increases cooperation. Yet in real world settings not only positive, but also negative intergroup contact occurs, which has opposing effects. To date little is known about whether and how an individual’s valenced history of intergroup contact influences contact effects and how this dynamic change happens during specific instances of intergroup contact. We address this lack of research using a behavioural game, which allowed us to observe a sequence of 17 in- and out-group interactions and their behavioural outcomes ($N = 89$). As expected, quality of the respective previous intergroup interaction predicted intergroup expectations and behavior. Furthermore, the history of contact quality moderated contact effects. Specifically, negative contact after a history of positive contact had the strongest prejudice increasing effect, while having a history of negative intergroup contact decreased positive contact effects. The importance of considering the valenced history of intergroup contact, as well as new research questions on intergroup contact that can be addressed with this novel contact paradigm, are discussed.
Introduction

Improving intergroup attitudes and behaviour has long been a core objective of social psychology. Ever since its emergence in the 1950s, intergroup contact theory has been amongst the most important approaches seeking to improve intergroup relations (e.g., Brown & Hewstone, 2005; Pettigrew, Tropp, Wagner, & Christ, 2011). Intergroup contact theory predicts that positive contact between members of different groups improves intergroup attitudes. This hypothesis has received broad empirical support from a range of studies, including a large meta-analysis (e.g., Pettigrew & Tropp, 2006), longitudinal research (e.g., Swart, Hewstone, Christ, & Voci, 2011), as well as contact interventions outside the lab (Lemmer & Wagner, 2015).

Only recently, however, has this area of research begun to acknowledge that in real-world intergroup settings not only positive, but also negative contact occurs (e.g., Hayward, Tropp, Hornsey, & Barlow, 2017). This recent research has already provided new insights into why it is important to consider negative contact: Several authors find similar or larger effects for negative than for positive intergroup contact (e.g., Barlow et al., 2012), suggesting that negative contact may even “curb contact’s ability to reduce prejudice” (Paolini, Harwood, & Rubin, 2010, p.1724). Furthermore, initial evidence suggests that positive and negative contact might not be independent in their influence on intergroup attitudes. Instead, initial research findings suggest that the effects of positive contact on attitudes vary depending on whether an individual has also experienced negative contact (Árnadóttir, Lolliot, Brown, & Hewstone, 2018; Hayward et al., 2017; but see Ten Berge, Lancee, & Jaspers, 2017).

To date, only a few studies have examined whether positive and negative contact interact, and the evidence thus far remains preliminary and mixed. Moreover, the sparse
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evidence available relies mostly on cross-sectional data with self-reported measures for intergroup contact and attitudes (Árnadóttir et al., 2018; Hayward et al., 2017) and does not include any behavioural outcomes. Additionally, as is true for most contact research (MacInnis & Page-Gould, 2015), the existing studies assess overall frequencies of contact over larger timespans, which makes it difficult to understand the dynamics of individuals experiencing multiple instances of intergroup contact. Furthermore, while some studies examine whether interactions with an outgroup member influences outgroup attitudes to a stronger extent than interactions with an ingroup member influence outgroup attitudes (e.g. Kotzur, Schäfer, & Wagner, 2018), to our knowledge there is no research demonstrating that the effect of contact on generalized attitudes towards the interaction-partner’s group is outgroup specific.

To address these limitations and fill the gap in the literature, the present research adopts a novel paradigm to analyse not merely perceptions of the outgroup, but also in- and outgroup-behavior during a sequence of 17 interactions of varying valence using a behavioural game approach. This article examines how a valenced (i.e., positive vs. negative) history of intergroup contact influences subsequent effects of intergroup contact. By considering not only a cognitive component of intergroup attitudes, namely expectations towards the behavior of changing in- and outgroup partners, but also actual behavior, specifically the amount of cooperation in the behavioural game, in a dynamic framework the present research makes novel contributions to the nascent study of valenced intergroup contact. Comparing effects of interactions with partners, who are always new and who belong either to the ingroup or the outgroup additionally allows us to test whether effects detected are specific to contact with an outgroup member. Using a behavioural games approach to study intergroup contact effects opens up new frontiers for intergroup contact research. Moving the focus from broad overall ratings of intergroup contact over larger timespans to
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the importance of specific intergroup encounters, this research highlights the importance of acknowledging dynamic and interactive aspects of intergroup contact.

**Interactions of positive and negative intergroup contact**

Initial studies including measures of positive and negative contact assumed an additive model of valenced contact effects (e.g., Barlow et al., 2012). These studies discussed whether the adverse effects of negative contact outweighed the beneficial effects of positive contact. Yet, first research suggests that, instead, positive and negative contact might interact in their effect on outgroup attitudes. The idea of a potential interaction of intergroup contact effects builds on work by Paolini and her colleagues (2014), who examined the effects of a history of positive contact on subsequent valenced contact effects on category salience. In one cross-sectional and three experimental studies, they demonstrated that people with a history of positive intergroup contact perceived a lower level of category salience in negative interactions. Following their argument, prior positive contact should result in a weaker effect of subsequent negative contact on prejudice, which is described as ‘buffering’ the effect of negative contact (see Árnadóttir et al., 2018). Unfortunately, however, they did not include any measure of outgroup attitudes in their studies. Three more recent studies examined these possible interactions of positive and negative intergroup contact on intergroup relations in greater detail.

First, in the most detailed assessment of the nature of valenced contact to date, Hayward, Tropp, Hornsey, and Barlow (2017) asked White, Black, and Hispanic Americans how often they had experienced 69 specific instances of positive (37 items) and negative (32 items) contact, and how positively or negatively the respective situation was experienced. In their supplementary material they report evidence for so-called ‘exacerbating’ effects (see Árnadóttir et al., 2018), thus a stronger effect of negative contact after a history of positive
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contact, for the outcome measures of both empathy and avoidance among minority members, and only empathy among majority members. On the other hand, they found evidence of buffering effects for the outcome measure of anger among majority members and of outgroup evaluations among minority groups. These mixed results might be caused by the wide range of interactions used as indicators for overall positive and negative contact, for which no measure of statistical reliability is provided (Hayward et al., 2017, Supplementary Material).

Second, Árnadóttir et al. (2018) provided cross-sectional evidence from a survey among Icelandic majority members. They found significant interactions between positive and negative intergroup contact on outgroup attitudes, trust, and crime estimates. Specifically, negative contact only yielded significant effects on attitudes and trust if the participant had reported low levels of positive intergroup contact. Positive contact thus buffered negative contact effects. From the reverse perspective, positive contact had stronger effects if participants also reported more negative contact experiences. However, the cross-sectional nature of both Hayward et al.’s and Árnadóttir et al.’s papers makes it impossible to test whether positive contact moderated negative contact effects or negative contact affected positive contact effects.

Third, in a two wave longitudinal dataset comprising 4,238 pupils in the Netherlands, Ten Berge and colleagues (2017) tested whether an increase in outgroup best friends would buffer the effects of having outgroup foes, but did not find any interaction between gaining outgroup friends and foes. Having best friends and foes might not, however, tap the full scale of positive and negative experiences, which also led to very low reports of negative experiences in this sample, where, especially at wave 2 of the dataset, only 5% of the pupils reported having any outgroup foes (hence the variance of negative contact was restricted).
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Overall, the little research available on potential interactions of positive and negative contact does not yield unequivocal evidence whether, and if so how, positive and negative contact interact in their effects on intergroup attitudes. Additionally, these studies assessed overall levels of intergroup contact over large time-spans (MacInnis & Page-Gould, 2015), and even when analysing longitudinal datasets, these might not adequately address the change of attitudes that may occur after discrete instances of intergroup contact on an individual level (Hamaker, Kuiper, & Grasman, 2015).

Previous experiences shape subsequent ones

Even though, to date, the evidence for interaction effects of valenced intergroup contact specifically is scarce, research from other areas of psychological research suggests that previous experiences should indeed shape responses to subsequent ones. Paolini and her colleagues (2014) refer to the Perceived Fit Hypothesis, which predicts the strongest negative effects when negative experiences fit expectations based on a history of negative contact. Conversely, this could lead to the expectation that a history of positive contact could buffer against the adverse consequences of negative contact (Paolini et al., 2014). This perceived fit hypothesis receives further empirical support from studies on intergroup interactions which demonstrate that an individual’s history of positive intergroup contact (i.e., having outgroup friends) leads to a more positive perception of interactions with the outgroup (Blascovich, Mendes, Hunter, Lickel, & Kowai-Bell, 2001; Page-Gould, Mendoza-Denton, & Tropp, 2008). As an increase in perceived positivity increases the effects of positive contact, this in turn should result in a larger effect following positive intergroup contact (blinded for peer review).

In contrast, another established paradigm, Adaptation-Level-Theory, suggests that events and entities are judged relatively to previous experiences (e.g., Helson, 1964), such
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that the neutral point of experience should dynamically adapt to previous experience. This adaption has been demonstrated in a range of fields, for example with regard to visual (e.g., Helson, 1948) and auditory (Bevan, Pritchard, & Reed, 1962) effects, but also with regard to job satisfaction (e.g., Ritter, Matthews, Ford, & Henderson, 2016). For the realm of intergroup contact, this adaptation-level effect would, for example, result in the strongest adverse effects of negative contact following a history of positive contact, thus an exacerbation effect. Although leading to opposite predictions regarding the direction of the outcome, the Perceived Fit Hypothesis and Adaptation-Level-Theory both suggest that positive and negative contact effects should interact, but they don’t differentiate their predictions depending on the valence of the previous experiences.

Other accounts instead assume that the valence of previous experience matters. Evidence on impression formation shows that change in personality impressions depends on whether prior impressions were positive or negative, with negative first impressions being especially hard to change (e.g., Briscoe, Woodyard, & Shaw, 1967; Cusumano & Richey, 1970; Freedman & Steinbruner, 1964; Reeder & Cooverst, 1986; Ybarra, 2001). Research on the violation of expectations also suggests a larger change if initial expectations were positive (Burgoon, 1993). In an experiment in which participants were instructed to expect more or less money, those who expected most and received most had the largest positive change in positive moods – even more than those who received more than they had initially expected. In contrast, those who expected most also had the largest decline in positive mood, if receiving less than expected (Austin & Walster, 1997).

In sum, generalizing these results to the field of intergroup contact, we expect that positive and negative intergroup contact interact. Yet, evidence of whether a history of negative or positive contact would increase or decrease subsequent contact effects remains
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uncompelling. To test whether, and examine how, a history of positive or negative contact experiences would shape subsequent contact effects, we used multiple rounds of a behavioural game, which allowed us to observe real interactions between individuals representing different groups, and to analyse the impact of dynamic changes in the valence of interactions on behavior.

Using behavioural games to study intergroup contact

Behavioural games, used in a range of disciplines including psychology, economics and sociology, “provide a substantive model of many actual encounters” (Murnighan & Wang, 2016, p. 80) where actual behavior can be directly observed. Behavioural games are usually played with multiple players, whose decisions to cooperate with the other players or defect are analysed (Julmi, 2012). For example, they have been used to demonstrate that separating groups even by minimal criteria leads to an ingroup-bias in cooperation and expectations (e.g., Balliet, Wu, & de Dreu, 2014). For the present paper, we used a prisoner’s dilemma. The Prisoner’s Dilemma is one of the most common social dilemmas used as a behavioural game (e.g., Van Lange, Joireman, Parks, & Van Dijk, 2013). In a prisoner’s dilemma, two players decide how much they want to cooperate, whereby unilateral defection results in the highest gains for the individual, but cooperation of both players yields the largest shared outcome. Underlying motives for high cooperation in a prisoner’s dilemma are trust, fairness, altruism and social welfare, whereas low cooperation is motivated by fear, greed and competitiveness (Thielmann, Böhm, & Hilbig, 2015). Behavioural games not only provide us with an opportunity to observe multiple, repeated interactions between different members of different groups in a setting that still provides high internal validity; they can also provide a novel approach to the targeted investigation of negative (compared with positive) contact in a controlled setting: Behavioural games provide the opportunity to observe positive and negative interactions without exposing participants to deception, an
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ethical concern that may arise when, for example, exposing participants to any bogus
negative experience, which may even have the consequence of increasing prejudice and
discrimination.

Surprisingly, to our knowledge, behavioural games have rarely been used to test
hypotheses derived from intergroup contact theory. In the only study we know of that
employed a behavioural game paradigm in the context of intergroup contact research,
Dorrough, Glöckner, Hellmann, and Ebert (2015) found that experiences with an outgroup
member from the previous round predicted expectations in the next round, even though
participants were playing with a new partner each round. They thereby operationalized
contact quality, thus the experience of interacting with an outgroup member within each
round of the game, as the difference between participants’ expectations of what they will
receive and what they actually receive from their partner.

In sum, a behavioural game paradigm thus provides an opportunity to actually observe
several instances of valenced in- and outgroup contact and their attitudinal outcomes (i.e.,
expectations). In addition, participants’ expectations in such games predict actual behavior
(i.e., cooperation; Pletzer et al. 2018). This allows us to demonstrate that intergroup contact
not only affects cognitive evaluations of the outgroup, but also actual cooperative behavior.
For the present study participants played a continuous prisoner’s dilemma with stranger
matching, with members of their own and a different age group (i.e. younger vs. older
students). Stranger matching thereby means that over the 17 rounds analyzed, participants
never played twice with the same person. Participants thereby stated for each round, how
much they expected from the respective (anonymous) in- or outgroup member, and expressed
cooperation by sending more or less money. We specifically predict that:
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Participants expect to receive more from and cooperate more with their own than with the other group (Hypothesis 1).

Contact quality during an interaction with an outgroup member predicts expectations towards another outgroup member in the subsequent round (Hypothesis 2).

The individual’s history of valenced intergroup contact affects subsequent effects of contact valence on expectations with the outgroup (Hypothesis 3). We furthermore explore the nature of this interaction, to compare the effects of valenced contact after a history of positive and negative contact.

In addition, we assume that expectations, in turn, predict the amount of cooperation within the respective round (Hypothesis 4).

Method

Pilot Study

We conducted a pilot study to confirm Dorrough and her colleagues’ (2015) assumption that the difference score between expectations and actual received amount could indeed be used as a reliable indicator for contact quality. Therefore, we examined whether this difference score between received amount and expectation predicted perceived contact quality. Within the same behavioural game setting used in the main study, described below, in each of 17 rounds participants ($N = 40, 680$ data points) played with outgroup or ingroup members. They rated the perceived quality of the interaction on a 7-point scale, ranging from 1 (negative) to 7 (positive). In line with Dorrough et al.’s (2015) assumptions, contact quality (received minus expected amount), was highly correlated with perceived contact quality ($r = .58, p < .001$). Additionally, and in line with violation-of-expectations theory (e.g., Austin & Walster, 1997), we found that perceived quality was highest when high expectations were
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met, whereas receiving less than one’s expectations yielded the most negative perception of the interaction outcome \((b = 0.03, SE = 0.01, p < .001)\).

**Participants**

Participants were recruited in three face-to-face seminars, which were held at a distance learning university in [blinded for review]. Students at this university are older than typical university students, which allowed us to study intergroup behaviour between age groups, 80% are currently employed and study part-time (Roth & Mazziotta, 2015). They only attend two face-to-face seminars during their undergraduate studies. A total of 107 students participated in the assessment, but only 89 played the same sequence of ingroup and outgroup interactions (based on two categories of ‘older’ and ‘younger’ students, see procedure for further details) and were thus included in the final analysis. No one participated twice. In this final sample, age ranged from 18 to 74, with a mean age of 32.38 \((SD = 11.50)\), and was comprised of 68 (76.4%) female, and 21 (23.6%) male participants. These 89 participants were then grouped, for the purpose of the behavioural game, into 44 ‘older students’ \((M_{age} = 41.20, SD = 10.08)\) and 45 ‘younger students’ \((M_{age} = 23.76, SD = 3.33)\).

**Procedure**

*General set up.* In three seminars, participants were asked to line up according to their age. The group was subsequently split at each seminar’s age median and participants were guided to the laboratory. For each trial of the five trials of data collection, 10 to 12 individuals from each of the two different age groups played with each other (thus 20 to 24 participants per trial). If the seminar included more than one trial, participants were randomly assigned which one they would participate in. At their assigned computer, participants were

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26 Due to the random matching procedure, some participants had to play ingroup interactions in some of the rounds in which the majority of participants was playing intergroup interactions and were thus removed from analysis as this data structure would have hindered the multilevel analysis of the data.
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first asked, offline, to read through the basic rules of the game and to generate a code to guarantee anonymous handling of their data. Afterwards they were asked to start the computer assessment (which was programmed in oTree; Chen, Schonger, & Wickens, 2016). Participants were first reminded of their respective age-group membership. Additionally, they read a short text informing them about positive and negative influences of age on learning achievements, to make age group membership more salient. They then stated their age, gender, and completed ratings of their identification with their respective age-group and in-as well as outgroup attitudes. Following these questions, participants read through an explanation of the game’s rules before starting the behavioural game. This study was fully preregistered (see Appendix, p.161) and all materials, including data and program are available at https://osf.io/u4gfy/?view_only=6171d7504e9b477399e9013289c6394f.

**Behavioural Game.** We used a continuous prisoner’s dilemma with stranger matching, which was played over several rounds between members of two groups. At the beginning of each round, participants were paired with someone they had not played with before, and informed whether they were playing with a member of their in- or outgroup, and how many rounds remained until the end of the game. Additionally, if they were matched with an outgroup member on a given round, the background of the screen turned from white to blue. It is important to note, that during the game, pairing was entirely anonymous, thus while participants knew that they would never play twice against the same person, they did not know with whom specifically they were playing, which controls for potential retaliation effects. Every player received an endowment of 10 units of the game’s currency. One unit equalled 2 Euro-Cents. Next, participants stated how much they expected to receive from the other player. Subsequently, participants could transfer any integer between 0 and 10 from their own to their current partner’s account. The amount they did not send remained in their own account and the sent amount was doubled and transferred to the partner’s account.
Finally, the interaction partners simultaneously learned about what their partner had sent them and thus how much was booked on their account at the end of this round. If both players sent all ten of their currency points, both ended up with 20 points in their account. In this way, cooperation led to a collective gain of twice the original amount. Yet, if one player decided to send nothing, and the other sent everything, the free-riding partner would end up with a maximum individual outcome of 30, while the sending partner received nothing. The prisoner’s dilemma was played over 19 to 23 rounds, depending on the total number of participants in the trial. All of the 89 participants included in the analysis played the same sequence for the first 17 rounds. These participants first played two rounds with someone from the ingroup, followed by blocks of three outgroup and three ingroup interactions which were played subsequently. This procedure was chosen to keep group membership salient, as previous research suggests that especially the change between in- and outgroup interactions leads to an ingroup bias (Dorrough et al., 2015). After their last round, participants answered some questions assessing outgroup attitudes, before they entered their bank account details to receive the money they had won during the game.

Measures. The behavioural game allowed us to observe actual computer-mediated inter- and intragroup contact, expectations about behavior and actual behavior in a highly standardized setting. The expected amount was assessed at the beginning of each round and scaled from 0 to 10 of the games’ currency ($M = 4.61, SE = 2.33$). Cooperation refers to the amount each player sent during each round and also ranged from 0 to 10 ($M = 4.77, SE = 3.23$). Contact quality and history of contact were both calculated for all interactions and for ingroup and outgroup interactions separately. The contact quality of the previous round was computed by subtracting the expected amount from the previous round from the amount the participant had actually received in the respective round. This measure thus ranged from -10 to 10, where negative scores indicate negative contact quality and positive scores indicate
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Positive contact quality (for overall quality, $M = 0.14, SE = 3.89$; for ingroup contact quality, $M = 0.16, SE = 3.84$; for outgroup contact quality, $M = -0.04, SE = 3.94$). The history of intergroup contact was calculated as the mean of all contact quality ratings up to the second to last interaction (for example in the third round, only the contact quality of the first round was included as a measure of contact history, while for the 17th round, the mean score included all contact experiences from the first to the 15th round), to account for all contact experiences an individual had made so far (for overall history, $M = 0.20, SE = 1.94$; for ingroup contact history, $M = 0.33, SE = 2.20$; for outgroup contact history, $M = -0.00, SE = 2.40$).

Results

We used Mplus 8 (Muthén & Muthén, 1998 – 2017) to estimate models from the dynamic structural equation modelling (DSEM) framework (Asparouhov, Hamaker, & Muthén, 2017), which accommodates autoregressive as well as subject specific effects. DSEMs are estimated with Bayesian methods, the Markov chain Monte Carlo (MCMC) procedure and the potential scale reduction (PSR) criterion. For the purpose of this paper we used uninformative priors. The data was clustered over 89 participants, and each of the 17 time points (nine for all analyses regarding outgroup interactions only) was regressed on the previous time point for our time-dependent variables, namely expected amount and actual amount of cooperation. To achieve sufficient power to test our research question, we analysed fixed effects (Schultzberg & Muthén, 2018). If cooperation was included, expected amount was estimated to predict the cooperation on the between level. In general, on the between level, individuals expecting more also cooperated more (e.g., for a model including all interactions $b = 1.46, SD = 0.22$ CI95% [1.07, 1.93]). All reported results held if the models were additionally controlled for age and gender of the participants. For a conceptual diagram of the full model see Figure 1.
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![Conceptual diagram for the full model on the between and within level, including only outgroup interactions. The third time point (T3) was the first outgroup interaction. The same pattern is repeated over all time points (Ti) that assessed outgroup interactions, up to the 17th round.](image)

Expected amount and cooperation were modelled with lagged effects and cooperation was regressed on the expected amount in the same round. Quality of the last outgroup interaction as well as the history of intergroup contact were entered as predictors of expected amount and cooperation on the within level.

**Ingroup bias.** To ensure a successful implementation of the behavioural game in the intergroup context, we first tested whether participants showed ingroup bias (Balliet et al., 2014), i.e., whether they expected more from and cooperated more with other players of their own compared to the other group (Hypothesis 1). We therefore included data from all 17 rounds of the prisoner’s dilemma. On the within level, we regressed expected as well as sent
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amount on themselves as well as on each other at the previous time point. Additionally, we regressed expected and sent amount on a dummy variable on the within level, coding whether the participant was interacting with an outgroup (0) or an ingroup (1) member in the respective round. We found an ingroup bias for the amount expected \((b = 0.40, SD = 0.11, p < .001. CI95\% [0.19, 0.62])\) as well as for the sent amount \((b = 0.20, SD = 0.10, p = .024. CI95\% [0.002, 0.40])\).

![Mean expectations](image1)

![Mean cooperation](image2)

**Figure 2.** Mean of expectations (top) and cooperation (bottom) over 17 rounds of ingroup (black bars) and outgroup (grey bars) contact.

Mean expectations and cooperation over the 17 included rounds can be found in Figure 2. To test whether this effect was time-dependent (as suggested by Dorrough et al., 2015), we tested whether time moderated this effect. Neither the ingroup bias for the
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expected amount ($b = 0.01, SD = 0.02, p = .344. CI95% [-0.03, 0.05]) nor for the money sent ($b = -0.02, SD = 0.03, p = .203. CI95% [-0.07, 0.03]) was moderated by time.

**Outgroup contact.** For the test of a general intergroup contact effect (Hypothesis 2) and the moderation of the contact effect by the individual’s history of intergroup contact (Hypothesis 3) we only included data of rounds played with an outgroup member. As expected, contact quality predicted expectations in the subsequent round ($b = 0.22, SD = 0.02, p<0.001, CI95% [0.17, 0.26]). In line with Hypothesis 3, we found that a history of valenced intergroup contact effects moderated this relationship ($b = 0.02, SD = 0.01, p = .008, CI95% [0.003, 0.03]). We subsequently examined the simple slopes for this interaction.
Figure 3. Expectations depending on the contact quality of the previous round for a positive (+1SD) history of intergroup contact (thick dashed line) and a negative (-1 SD) history of contact (thick black line). Figure includes upper and lower credible intervals (respective thin lines). Note that the interaction on the within level is plotted with the grand mean of expectations (4.50).

As demonstrated in Figure 3, a negative history of contact experiences (-1SD, thick black line) resulted in a weaker effect of contact on expectations ($b = 0.17$, $SD = 0.03$, $p<0.001$, CI95% [0.12, 0.23]), than a positive history (+1SD, dashed line line) of contact experiences ($b = 0.26$, $SD = 0.03$, $p<0.001$, CI95% [0.20, 0.32]).

In line with Hypothesis 4, the change in expectations in turn affected the behavioural outcome, cooperation, depending on the history of contact ($b = 0.17$, $SD = 0.01$, $p = .009$, ...
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CI95% [0.002, 0.03]). Again, a smaller indirect effect of intergroup contact on cooperation mediated by expectations emerged if the history of contact was negative ($b = 0.08, SD = 0.02, p<.001, CI95% [0.05, 0.11]) than if it was positive ($b = 0.12, SD = 0.02, p<.001, CI95% [0.09, 0.15])]. Additionally, in a model which did not include the interaction term, the history of intergroup contact did not have a main effect on either expectations ($b = 0.04, SD = 0.04, p = .190, CI95%[-0.04, 0.13]) or cooperation ($b = 0.05, SD = 0.05, p = .156, CI95%[-0.04, 0.14])).

**Ingroup effects.** To demonstrate that the history of intergroup contact is specifically relevant in interactions with outgroup members (MacInnis & Page-Gould, 2015) we additionally estimated the same model for interactions with the ingroup only, to test for contact effects and the interaction of history of contact. As for outgroup interactions, quality of the previous contact predicted expectations of ingroup interactions also ($b = 0.22, SD = 0.02, p<.001, CI95% [0.17, 0.26]). However, entering the interaction term of history of contact and quality of the previous contact for ingroup interactions, we did not find an interaction of history of intergroup contact and previous contact for interactions with ingroup members ($b = 0.01, SD = 0.01, p = .227, CI95% [-0.01, 0.02]).

**Discussion**

The current paper demonstrates that a history of intergroup contact influences subsequent contact effects on expectations and cooperation with the outgroup. More specifically, we found that a history of negative contact reduced the effect of subsequent intergroup contact on expectations towards the outgroup, while a history of positive contact increased the effects of contact: Thus, positive contact after a history of positive contact increased expectations and cooperation with the outgroup more, than positive contact following a history of negative contact. On the other hand, negative contact after a history of
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negative contact did not reduce expectations and cooperation as much as negative contact following a history of positive intergroup contact. Our findings extend the emerging research on positive and negative intergroup contact in two key ways. First, using a behavioural game in the context of intergroup contact research allowed us to observe a sequence of behaviors with an ingroup or outgroup member, thereby providing a first step in addressing calls both to address the temporal dimension of contact (MacInnis & Page-Gould, 2015) and to bring back behavioural measures into “the science of behavior” (Baumeister, Vohs, & Funder, 2007, p.396), at least by observing individuals’ interactions. Second, this procedure allowed us to model the change of expectations and cooperation within individuals over distinct instances of intergroup contact, whereas most studies on intergroup contact use overall measures of contact over larger time-spans; most studies on short-term intergroup interactions also focus on aspects such as nonverbal behaviour, and neglect intergroup measures in their outcomes (MacInnis & Page-Gould, 2015). We now discuss the main issues arising from this research, acknowledge some limitations, and identify areas for future research.

Our finding that a history of intergroup contact moderates contact effects is in line with our assumptions and previous research (e.g., Árnadóttir et al., 2018; Paolini et al., 2014). With regard to the nature of this interaction (i.e. a stronger effect of intergroup contact following a history of positive contact, compared to a history of negative contact) between members of ingroup and outgroup, our results on the exacerbation of negative effects are in line with some previous research in the realm of intergroup contact (e.g., Hayward et al., 2017), but contradict previous accounts reporting buffering effects (e.g., Árnadóttir et al., 2018). This contradiction may, however, be more apparent than real – as pointed out above, previous studies assessed intergroup contact with measures reporting overall contact over larger time spans, whereas the present study looked at distinct instances of valenced intergroup contact in a sequential manner. Nonetheless, these previous studies were limited in
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their number of waves of available data, which constrained appropriate ways to analyse the date, and they might not have appropriately differentiated between changes within and between persons (Hamaker et al., 2015). Our results cannot be explained by theoretical accounts that do not differentiate between the valence of previous experiences, such as Adaptation-Level-Theory (Helson, 1948; Ritter et al., 2016) or Perceived-Fit Hypotheses (Paolini et al., 2014). Instead, our results suggest, that the valence of previous experiences matters: The stronger effect of negative intergroup contact following a history of positive contact is, in line with results from research on impression formation (e.g., Briscoe et al., 1967) and expectation violations (e.g., Austin & Walster, 1974). In addition, we replicated an ingroup bias in behavioural games (e.g., Balliet et al., 2014), and went beyond that by demonstrating that the core assumption of intergroup contact theory, namely the increase in cooperation after positive contact (e.g., Pettigrew & Tropp, 2006), holds using this paradigm. Additionally, we demonstrated this effect on measures of cooperative behaviour, and not just more positive outgroup perceptions. These findings support Murnighan and Wang’s (2016) claim that behavioural games “provide a substantive model of many actual encounters” (p. 80) and confirm that behavioural games provide a novel paradigm for studying intergroup contact, and one which includes the typically missing dynamic and reciprocal nature of contact. Additionally, we only found interactions of the valenced history of intergroup contact with subsequent contact effects for outgroup, but not ingroup, contact. This difference might be explained by a greater perceived similarity between outgroup than ingroup members (e.g., Crump, Hamilton, Sherman, Lickel, & Thakkar, 2010), leading to higher expectations of consistent behavior towards the out-, but not the ingroup.

Analysing observed intergroup interactions in a behavioural game allowed us to address the concern that social psychology has largely neglected actual behavior (e.g., Baumeister et al., 2017), and provided a highly standardized measure of contact quality,
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which addresses critiques by MacInnis and Page-Gould (2015) and provided a robust test of our assumptions. Notwithstanding this novel contribution to intergroup contact research, we acknowledge some limitations of this research, which point towards future research that should be conducted. First, while we argue that this paradigm provides a good model for intergroup contact, the highly standardized procedure may limit external validity. For example, more complex, real-world intergroup interactions might be evaluated positively and negatively at the same time (Cacioppo, Gardner, & Berntson, 1997). Second, a history of contact could differentially affect subsequent positive and negative instances of intergroup contact (Schäfer et al., 2019), two aspects we could not address in this research, as our assessment of contact quality did not provide different measures of positive and negative contact. Third, our repeated instances of contact happened over a relatively short time span; longitudinal research covering greater time spans might yield different results. Fourth, future research could use behavioural games other than the prisoner’s dilemma, which could also address other underlying motivations (e.g. Thielmann et al., 2015).

Future research should also consider using dynamic structural equation models with random rather than fixed effects (Asparouhov et al., 2017) to analyze interindividual differences in these effects; this however requires much higher numbers of participants (Schultzberg & Muthén, 2018). This would also allow researchers to include differences between participants and in this way might help to close the gap with previous studies on intergroup contact, which report overall measures of contact, often using cross-sectional data. Furthermore, our pilot study regarding the relationship between expectations and perceived quality suggests that perceived quality might be a crucial variable to explain how a history of valenced contact moderates contact effects. Further studies might consider including this potential mediator to test the full model; however, we wish to point out that explicitly asking about the perceived quality for each interaction would affect both the duration and likely the
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experience of the game, and in turn might change the results, for example by sensitizing participants to the hypotheses being tested and hindering the group experience. Additionally, further studies should test whether perceived similarity between outgroup but not ingroup members explains why we only find a moderation of a history of contact for outgroup, but not for ingroup contact. In this line of thought, increasing the probability that during the game individuals might interact with another player for more than once (which in our case, given the stranger matching, was not possible), would be an interesting extension to further research. Furthermore, experimental games could easily be used to additionally manipulate the status of the groups (i.e. majority/minority), which might also affect intergroup contact effects (Tropp & Pettigrew, 2005).

Overall, we argue that using behavioural games for intergroup contact research provides a wide range of opportunities to study dynamic aspects of intergroup experiences. Some research questions which might be addressed with this design include possible effects of ingroup behavior on expectations toward the outgroup and vice-versa (Locksley, Ortiz, & Hepburn, 1980), the importance of the first encounters with outgroup members, and the question of how many intergroup contact experiences it might take to cancel out the experience of contact of the other valence.

To conclude, our results add to the valid concern that negative contact may curb positive contact effects (e.g., Barlow et al., 2012; Paolini et al., 2010), and provide a new paradigm in which to explore associated research questions. These findings also highlight the importance of recognizing that positive as well as negative contact can be influenced by the full history of valenced contact, which for the individual, can change over time, and which we should be modeling in our experiments.
Dynamic contact effects

References


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General Discussion

The present work demonstrates across five studies that negative contact is indeed an important predictor of intergroup attitudes. In addition, our results increase the understanding of joint effects of positive and negative intergroup contact. In line with our assumptions we provide further evidence that differences in the effects of intergroup contact vary on different outcomes and that both intensity of the valenced contact as well as an individual’s history of intergroup contact can influence valenced intergroup contact effects.

More specifically, Manuscript #1 demonstrated that positive and negative intergroup contact experiences are differentially influenced by the intensity of the situation. While an increase in intensity augments the effects of positive intergroup contact, it did not influence the effect in the realm of negative contact. With regard to different effects of contact on different outcomes, the evidence reported in the Supplementary Material of Manuscript #1 suggested that a stronger effect of negative contact is primarily found for measures of warmth, but not of competence, while positive contact might have stronger effects on competence compared to warmth. While Manuscript 1# demonstrated that differences in the contact situation can moderate contact effects, the second manuscript focused on how previous contact can make a difference for intergroup contact effects. Manuscript #2 provides evidence that positive and negative intergroup contact effects depend on the individual’s previous experiences with intergroup contact: The effects of intergroup contact were stronger after a history of positive contact, while a history of negative contact poisoned contact effects. Thus the most negative effect was found for negative experiences following a history of positive contact, while positive contact following a history of positive contact yielded stronger contact effects than positive contact following a history of negative contact.
Understanding the Effects of Positive and Negative Intergroup Contact

Both manuscripts thereby address Pettigrew and Tropp’s (2006) call to advance the field of positive and negative intergroup contact both theoretically and empirically. The theoretical assumptions are informed not only by research on intergroup contact specifically, but also by other fields of psychology in general. Empirically, both manuscripts present studies that rely on experimental or observed behavioural data in highly standardized settings and thus provide high standards of objectivity and internal validity. Furthermore, external validity is ensured in Study 1 of Manuscript 1, through a large survey among majority and minority group members in a highly relevant context.

Manuscript #1 extends the work of Hayward and her colleagues (2017), who suggested that perceived intensity might be a crucial dimension when examining valenced intergroup contact. While these authors only considered a combined score of valenced contact frequency and intensity, our results demonstrate that instead, intensity differentially influences positive and negative contact effects – an assumption that has not been tested before. Research from other areas of psychology additionally provided a theoretical foundation for these findings. To understand that an increase in intensity does not make a difference in the realm of negative contact, but that increasing intensity in the realm of positive contact increases the positive effects of positive intergroup contact, is an important finding with regard to the ongoing discussion about a potential positive-negative asymmetry of intergroup contact effects (Barlow et al., 2012). Previous research (e.g., Graf et al., 2014) did not consider intensity of contact, or only used a combined score (Hayward et al., 2017) and might thus have led to biased conclusions. Our results demonstrate that including intensity of intergroup contact as a factor influencing valenced contact effects, as suggested by Hayward and her colleagues (2017), is indeed a fruitful endeavour.

In a similar manner, Manuscript #2 extends the idea that was suggested by Paolini and her colleagues (2014), that a history of intergroup contact could influence subsequent contact
effects and thereby adds to the growing discussion of whether and how positive and negative intergroup contact interact (Árnadóttir et al., 2018). Breaking up intergroup contact to observable repeated instances of intergroup interaction allowed us to study how positive or negative contact in the past influences subsequent contact effects. To date, this high resolution perspective on intergroup contact is rather rare in intergroup contact research (MacInnis & Page-Gould, 2015). Most importantly, these findings demonstrate that the negative effects of negative contact with outgroup members go beyond the immediate impairment of intergroup relations, and might also reduce the efficacy of future positive contact to have positive effects. The focus on isolated instances of intergroup contact also made it possible to relate our research to other fields of psychology, most importantly research on impression formation (e.g., Briscoe, Woodyard, & Shaw, 1967; Cusumano & Richey, 1970; Ybarra, 2001), and on violated expectations (Burgoon, 1993). As the small-scale pre-test in Manuscript #2 demonstrates, expectations might indeed be an important predictor of perceived contact quality, which in turn might drive intergroup contact effects.

It should be noted, however, that our findings concerning the direction of the moderation of a history of intergroup contact oppose some recent findings on the interactions of positive and negative intergroup contact (e.g., Fell, 2015). It is thereby important to point out that Manuscript #2 is strictly focused on change within a person over several short term interactions. While this is one of the strengths of the study, other research using traditional measures of intergroup contact frequency might yield different results – as they focus on larger time spans and additionally might not sufficiently differentiate between differences and changes within and between persons. Nonetheless, by discussing the role of perceived quality of the interaction, both manuscripts provide a starting point to build bridges between the previously isolated literatures on intergroup interactions and intergroup contact (MacInnis & Page-Gould, 2015). Indeed, taken together, Manuscript #1 highlights the important role of
Understanding the Effects of Positive and Negative Intergroup Contact

perceived contact quality for intergroup outcomes, whereas Manuscript #2 provides a discussion on how perceived quality might be explained.

**Limitations and future research**

Notwithstanding the contributions of this research, I acknowledge several limitations which should be addressed in future research. First, all but one (Manuscript 1#, Study 1), of my studies relied on the participation of students and were clearly framed in terms of higher education topics. All experiments of Manuscript #1 were designed as interactions between students in an academic environment, and the grouping for Manuscript #2 was based on age as a crucial variable in success in higher education. Future studies should thus consider including other samples and intergroup contexts to increase generalizability of the results. This future research should not only include populations other than students, but also consider different experimental settings as well as a larger variety of groups.

Additionally, the range of intergroup contact experiences in all of the studies was limited in their intensity. It is thus possible that extremely negative or positive intergroup contact could change our pattern of results. While this is, of course, especially relevant with regards to Manuscript #1 with the explicit focus on intensity, it might also impact the results yielded in the behavioural game (Manuscript 2#). While ethical considerations limit the possibilities to manipulate stronger forms of negative contact, especially with regard to societally relevant and already stigmatized groups, one solution for further research will be to rely on self-reported contact experiences from areas of high conflict.

It should also be acknowledged, that while we demonstrate in Manuscript #1 that varying intensity influences positive and negative contact differentially, Manuscript #2 still uses a single continuous measure assuming a one-dimensional association from very negative to very positive contact and assumes a linear relation between contact and intergroup
Understanding the Effects of Positive and Negative Intergroup Contact

outcomes. Further research could address this by using discrete measures of positive and negative contact, as positive and negative might not represent the extremes of a single dimension (Cacioppo et al., 1997), or by increasing the number of participants, in order to be able to model more complex relationships.

Increasing the number of participants for the second manuscript would also provide the opportunity to model random slopes (Schultzberg & Muthén, 2018). Random slopes address the possibility that intergroup contact may have different effects for different people. This would allow researchers to extend the current focus on change within a person and to include differences between persons which might influence intergroup contact effects. Besides between-person differences in contact experiences this would also allow research to test for other potential moderators. For example, initial research considering not only positive but also negative intergroup contact, found that people with high levels of prejudice related generalized attitudes (e.g., right-wing-authoritarianism and social-dominance-orientation) not only profited more from positive intergroup contact, but also showed stronger negative reactions to negative intergroup contact (Dhont & Van Hiel, 2009). Future research should consider including those personal differences.

Furthermore, future research should not only address other potential moderators, but also a range of other outcomes that can be highly relevant in intergroup relations and also might influence the relations we assumed for the current work. With regard to the history of intergroup contact not only expectations towards and cooperation with the other group are relevant. Future studies could, for example, include the motivation to approach or avoid further contact (Ron, Solomon, Halperin, & Saguy, 2016). Further important extensions that emerge from the present work are built on our findings regarding the perceived quality of intergroup interactions in both manuscripts: Manuscript 1# demonstrated that perceived quality is an important factor especially in the realm of positive contact. Future research
should thus explore possibilities to influence the perceived quality of positive interactions. For example, affective forecasting (e.g., Mallett, Wilson, & Gilbert, 2008), might be one promising variable in this context, as our preliminary study reported before the main study of Manuscript #2 demonstrated that perceived quality depends on the individual’s expectations concerning the forthcoming interaction. Perceived quality was found to be highest for those who expected most and experienced a positive contact. Furthermore, we demonstrated that expectations are shaped by previous contact. This suggests an interesting mediated moderation (e.g., Kwan & Chan, 2018), which future research should examine in a full model: (1) Intergroup contact shapes expectations towards the outgroup, which in turn (2) affect the perceived quality of subsequent interactions, and (3) the perceived quality should in turn predict attitudinal measure or further expectations, at least in the realm of positive contact.

Moreover, our finding that even mildly negative events have effects on intergroup attitudes emphasizes the recognition of a further branch of intergroup contact research: less direct forms of intergroup contact, which might still have a large effect on intergroup attitudes in the realm of negative contact. These forms of contact could, for example, be extended contact (e.g., Christ et al., 2010; Mazziotta et al., 2015) or vicarious contact (e.g., Joyce & Harwood, 2014; Mazziotta, Mummendey, & Wright, 2011; Vezzali, Hewstone, Capozza, Giovannini, & Wölfer, 2014). Indeed, first studies demonstrate, that the effect of direct and extended contact might vary depending on the valence of the intergroup contact (Wölfer et al., 2017, Study 3). Additionally, although our own and previous research (e.g., Graf et al., 2014; Hayward et al., 2017) has demonstrated the heartening finding, that direct negative contact is rather scarce, negative contact might be more frequent among these other forms of intergroup contact. Furthermore, even living in a context where individuals tend overall to have more positive contact, and controlling for individual levels of contact, yielded
prejudice-reducing effects (Christ et al., 2014) and it will be interesting to see, whether these results also translate to negative contact.

Conclusion

Given that large scale migration is a fact all over the world (e.g., Sanjek, 2003) it remains of crucial relevance to study effects of people from different groups meeting each other: intergroup contact. The present research emphasizes Allport’s (1954) concern that reducing prejudice through intergroup contact is not as easy as simply bringing people from different social groups together. The research reported in this thesis demonstrated that an increase in intensity increases the effects of positive intergroup contact, while even mildly negative contact had effects matching those of more intense negative contact (Manuscript #1). Furthermore, negative contact had the strongest effects for people with a history of positive intergroup contact – but having a history of negative intergroup contact resulted in smaller effects for positive contact. Our results emphasize the importance of acknowledging the occurrence of negative intergroup contact experiences, which may occur independently of positive contact, or alongside such positive experiences. The research reported herein demonstrated that it is important to consider the differences in individual contact histories, as they might qualify the effectiveness of intergroup contact. Interventions aiming to successfully reduce intergroup prejudice have to be aware that even small negative intergroup experiences might increase intergroup tensions.
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References


Alperin, A., Hornsey, M., Hayward, L., Diedrichs, P., & Barlow, F. (2014). Applying contact hypothesis to anti-fat attitudes: contact with over-weight people is related to how we interact with our bodies and others. *Social Science and Medicine, 123*, 37-44. https://doi.org/10.1016/j.socscimed.2014.10.051


https://doi.org/10.1177/0146167297234003
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https://doi.org/10.3389/fpsyg.2017.01449


https://doi.org/10.1037/met0000160


MacInnis, C. C., & Page-Gould, E. (2015). How can intergroup interaction be bad if intergroup contact is good? Exploring and reconciling an apparent paradox in the
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Appendix
Preregistrations for Manuscript #1

The full study material can be found under the following link:

https://osf.io/6jsz/?view_only=f7a3e95427d7474e99e39d865c32a5b1
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Preregistration Study 2.

Participating Authors. (Up to 5).

Oliver Christ oliver.christ@fernuni-hagen.de University of Hagen

Sarina Schäfer sarina.schaeferfer@fernuni-hagen.de University of Hagen

Have any data been collected for this study already?

No.

Hypothesis. What’s the main question being asked or hypothesis being tested in this study?

Within the context of two competing universities, the main aim is to test whether there is a stronger effect of negative than positive contact within an online environment on both category salience and intergroup attitudes; and whether this effect is moderated by intensity.

Dependent Variable. Describe the key dependent variable(s) specifying how they will be measured.

All variables are measured on a 7-point scale, using German versions.

Category salience is measured using 4 items adapted from Paolini, Harwood and Rubin (2010).

Attitudes are measured using 6 items (Asbrock, 2010), with 3 items measuring warmth and 3 items measuring competence.

Intergroup Anxiety is measured using 10 items (Birtel & Crisp, 2012).

Conditions. How many and which conditions will participants be assigned to?
Understanding the Effects of Positive and Negative Intergroup Contact

Using a 2x2 Between Subjects Factorial Design, participants will be assigned to one of four conditions (strongly negative contact, moderate negative contact, strongly positive contact, moderate positive contact).

**Analyses.** Specify exactly which analyses you will conduct to examine the main question/hypothesis.

SEMs, regressing category salience and intergroup attitudes on contact valence and intensity and their interaction. Intergroup Anxiety should partially mediate these effects.

**More analyses.** Any secondary analyses?

We will examine whether our baseline variables Consciousness and Extraversion, Diversity believes, and In & Out-Group friends influence the relation between condition and DV and manipulation checks.

**Sample Size.** How many observations will be collected or what will determine sample size?

To be able to detect small to medium sized effects we will aim for a final sample of 200 participants, 50 participants per cell (Simmons, Neson, & Simonsohn, 2013). As we are anticipating about 10% dropout due to failed manipulation checks and multivariate outliers (see data exclusion) we will aim to run the experiment 220 times. We will at least include 20 participants per cell (Simmons, Nelson, & Simonsohn, 2011) and finish data-collection before 24\(^{th}\) Dezember 2016.

**Other.** Anything else you would like to pre-register?

We include further measures to the main questionnaire and a baseline questionnaire for manipulation checks, as filler items and for exploratory reasons:
Understanding the Effects of Positive and Negative Intergroup Contact

Main questionnaire: Contact valence, 8 items (Paolini, Harwood, & Rubin, 2010), Feedback valence: 3 items adapted from Fell (2015), Effort put into the experimental task: 2 Items, and credibility of feedback 4 items.

Baseline variables: HEXACO-60, 19 items measuring Consciousness and Extraversion, Diversity believes, 3 items, and In & Out-Group friends, single item each.

Data exclusion: Participants who don’t believe the feedback (scoring lower than midpoint of the scale), can’t recall the valence of the feedback correctly, or state to have guessed the real purpose of the study will be excluded, as well as cases with outliers in DVs using studentized deleted residuals.

For this experiment we are cooperating with Eva Jaspers, Mathijs Kros, Miles Hewstone and Benjamin Fell.

Name. Give a title for this AsPredicted pre-registration

Positive-negative asymmetry of intergroup contact: A dynamic approach – Experimentally testing effects of contact valence and intensity using the indirect communication and collaboration task online.
Preregistration Study 2 updated version.

Participating Authors. (Up to 5)

Oliver Christ oliver.christ@fernuni-hagen.de University of Hagen

Sarina Schäfer sarina.schaeferfer@fernuni-hagen.de University of Hagen

Have any data been collected for this study already?

No.

Hypothesis. What’s the main question being asked or hypothesis being tested in this study?

Within the context of two competing universities, the main aim is to test whether there is a stronger effect of negative than positive contact within an online environment on both category salience and intergroup attitudes; and whether this effect is moderated by intensity.

Dependent Variable. Describe the key dependent variable(s) specifying how they will be measured.

All variables are measured on a 7-point scale, using German versions.

Category salience is measured using 4 items adapted from Paolini, Harwood and Rubin (2010).

Attitudes are measured using 6 items (Asbrock, 2010), with 3 items measuring warmth and 3 items measuring competence.

Intergroup Anxiety is measured using 10 items (Birtel & Crisp, 2012).

Conditions. How many and which conditions will participants be assigned to?

Using a 2x2 Between Subjects Factorial Design, participants will be assigned to one of four conditions (strongly negative contact, moderate negative contact, strongly positive contact, moderate positive contact).

Analyses. Specify exactly which analyses you will conduct to examine the main question/hypothesis.
Understanding the Effects of Positive and Negative Intergroup Contact

SEMs, regressing category salience and intergroup attitudes on contact valence and intensity and their interaction. Intergroup Anxiety should partially mediate these effects.

**More analyses.** Any secondary analyses?

We will examine whether our baseline variables Consciousness and Extraversion, Diversity believes, and In & Out-Group friends influence the relation between condition and DV and manipulation checks.

**Sample Size.** How many observations will be collected or what will determine sample size? (No need to justify decision, but be precise about exactly how the number will be determined)

To be able to detect small to medium sized effects we will aim for a final sample of 200 participants, 50 participants per cell (Simmons, Neson, & Simonsohn, 2013). As we are anticipating about 10% dropout due to failed manipulation checks and multivariate outliers (see data exclusion) we will aim to run the experiment 220 times. We will at least include 20 participants per cell (Simmons, Nelson, & Simonsohn, 2011). As in one condition only 18 persons participated until 24th Dezember 2016, we had to extend the deadline to reach 20 participants per cell (Simmons, Nelson, & Simonsohn, 2011).

**Other.** Anything else you would like to pre-register? (e.g., data exclusions, variables collected for exploratory purposes, unusual analyses planned?)

We include further measures to the main questionnaire and a baseline questionnaire for manipulation checks, as filler items and for exploratory reasons:

Main questionnaire: Contact valence, 8 items (Paolini, Harwood, & Rubin, 2010), Feedback valence: 3 items adapted from Fell (2015), Effort put into the experimental task: 2 Items, and credibility of feedback 4 items.

Baseline variables: HEXACO-60, 19 items measuring Consciousness and Extraversion, Diversity believes, 3 items, and In & Out-Group friends, single item each.

Data exclusion: Participants who don’t believe the feedback (scoring lower than midpoint of the scale), can’t recall the valence of the feedback correctly, or state to have guessed the real purpose of the study will be excluded, as well as cases with outliers in DVs using studentized deleted residuals.
Understanding the Effects of Positive and Negative Intergroup Contact

For this experiment we are cooperating with Eva Jaspers, Mathijs Kros, Miles Hewstone and Benjamin Fell.

Name. Give a title for this AsPredicted pre-registration (Suggestion: use the name of the project, followed by study description.

Positive-negative asymmetry of intergroup contact: A dynamic approach – Experimentally testing effects of contact valence and intensity using the indirect communication and collaboration task online.
Preregistration Study 3.

Participating Authors. (Up to 5)

Oliver Christ oliver.christ@fernuni-hagen.de University of Hagen

Sarina Schäfer sarina.schaefer@fernuni-hagen.de University of Hagen

Franziska Spannbauer franziska.spannbauer@students.fernuni-hagen.de University of Hagen

Have any data been collected for this study already?

We started data collection a week ago. Up to now, about 20 persons participated.

Hypothesis. What’s the main question being asked or hypothesis being tested in this study?

Within the context of two competing universities, the main aim is to test whether there is a stronger effect of negative than positive contact within an online environment on both category salience and intergroup attitudes; and whether this effect is moderated by intensity.

Dependent Variable. Describe the key dependent variable(s) specifying how they will be measured.

All variables are measured on a 7-point scale, using German versions.

Category salience is measured using 4 items adapted from Paolini, Harwood and Rubin (2010).

Attitudes are measured using 6 items (Asbrock, 2010), with 3 items measuring warmth and 3 items measuring competence and 1 item for the feeling thermometer.

Intergroup Anxiety is measured using 10 items (Birtel & Crisp, 2012).

Conditions. How many and which conditions will participants be assigned to?

Using a 2x2 Between Subjects Factorial Design, participants will be assigned to one of four conditions (strongly negative contact, moderate negative contact, strongly positive contact, moderate positive contact).

Analyses. Specify exactly which analyses you will conduct to examine the main question/hypothesis.
Understanding the Effects of Positive and Negative Intergroup Contact

SEMs, regressing category salience and intergroup attitudes on contact valence and intensity and their interaction. Intergroup Anxiety should partially mediate these effects.

**More analyses.** Any secondary analyses?

We will examine whether our baseline variables Diversity believes, and In & Out-Group friends influence the relation between condition and DV and manipulation checks.

**Sample Size.** How many observations will be collected or what will determine sample size?

To be able to detect small to medium sized effects we will aim for a final sample of 200 participants, 50 participants per cell (Simmons, Neson, & Simonsohn, 2013). As we are anticipating about 10% dropout due to failed manipulation checks and multivariate outliers (see data exclusion) we will aim to run the experiment 220 times. We will at least include 20 participants per cell (Simmons, Nelson, & Simonsohn, 2011) and finish data-collection before August 1st 2017.

**Other.** Anything else you would like to pre-register?

We include further measures to the main questionnaire and a baseline questionnaire for manipulation checks, as filler items and for exploratory reasons:

Main questionnaire: Contact valence, 8 items (Paolini, Harwood, & Rubin, 2010), Feedback valence: 3 items adapted from Fell (2015), Effort put into the experimental task: 2 Items, and credibility of feedback 4 items.

Baseline variables: Warmth and Competence, 6 items, Feeling Thermometer, 1 Item, Diversity believes, 3 items, and In & Out-Group friends, single item each and a scale to assess team-work in university-settings (7 items).

Data exclusion: Participants who don’t believe the feedback (open question), can’t recall the valence of the feedback correctly, or state to have guessed the real purpose of the study will be excluded, as well as cases with outliers in DVs using studentized deleted residuals.

For this experiment we are cooperating with Eva Jaspers, Mathijs Kros, Miles Hewstone and Benjamin Fell.
Understanding the Effects of Positive and Negative Intergroup Contact

Name. Give a title for this AsPredicted pre-registration

Positive-negative asymmetry of intergroup contact, second trial: A dynamic approach – Experimentally testing effects of contact valence and intensity using the indirect communication and collaboration task online.
Understanding the Effects of Positive and Negative Intergroup Contact

Preregistration Study 4.

Authors. (Up to 5)

Mathijs Kros m.kros@uu.nl University of Utrecht

Have any data been collected for this study already?

No, no data have been collected for this study yet

Hypothesis. What’s the main question being asked or hypothesis being tested in this study?

The main aim is to test whether negative contact has a stronger effect on outgroup attitudes than positive contact. We will further test whether this asymmetrical effect can be explained via intergroup anxiety, and whether the main effects of positive and negative intergroup contact are moderated by category salience and contact extremity.

Dependent Variable. Describe the key dependent variable(s) specifying how they will be measured.

Category salience is measured using 4 items adapted from Paolini, Harwood and Rubin (2010).

Outgroup attitudes are measured using 6 items (Asbrock, 2010), with 3 items measuring warmth and 3 items measuring competence.

Intergroup Anxiety is measured using 10 items (Birtel & Crisp, 2012).

Conditions. How many and which conditions will participants be assigned to?

Participants will be assigned to one of four conditions (strongly negative contact, moderately negative contact, strongly positive contact, moderately positive contact).

Analyses. Specify exactly which analyses you will conduct to examine the main question/hypothesis.

We will use SEM to regress outgroup attitudes on the conditions, mediated via intergroup anxiety, and moderated by category salience and contact extremity. We will further compare effect sizes across conditions to see whether there is a positive-negative asymmetry in relation.
Understanding the Effects of Positive and Negative Intergroup Contact

**More analyses.** Any secondary analyses?

- 

**Sample Size.** How many observations will be collected or what will determine sample size?

We aim to include 150-200 participants

**Other.** Anything else you would like to pre-register?

The pre-test and post-test questionnaires contain several filler items in line with the cover story, as well as questions about participants personality (HEXACO) and cross-group friendships. The post-test questionnaire also asks participants to grade their own work and effort, and requires them to judge how believable the feedback (manipulation) was.

The mainpulation checks included in the post-test will also guide our decisions to exclude certain participants.

For this experiment we are cooperating with Oliver Christ, Sarina Schaefer, Miles Hewstone and Benjamin Fell.

**Name.** Give a title for this AsPredicted pre-registration

Experimental test of the positive-negative contact asymmetry.
Preregistration for Manuscript #2

The full study material can be found under the following link:

https://osf.io/u4gfy/?view_only=6171d7504e9b477399e9013289c6394f
Understanding the Effects of Positive and Negative Intergroup Contact

**Pregression for Study 1.**

*Participating Authors* (Up to 5)

Sarina Schäfer sarina.schaeferfer@fernuni-hagen.de University of Hagen

Oliver Christ oliver.christ@fernuni-hagen.de University of Hagen

*Have any data been collected for this study already?*

Yes, 42 persons already participated.

*Hypothesis.* What’s the main question being asked or hypothesis being tested in this study?

This study explores the interactions of positive and negative contact. Buffering, poisoning and positive and negative augmentation are theoretically possible.

*Dependent Variable.* Describe the key dependent variable(s) specifying how they will be measured.

Dependent variables in this paradigm are expectations and collaboration in subsequent rounds.

*Conditions.* How many and which conditions will participants be assigned to?

All participants will participate under the same condition, yet participants will be grouped into older and younger students.

*Analyses.* Specify exactly which analyses you will conduct to examine the main question/hypothesis.

Multilevel models will be used to analyze interactions between contact experiences (received – expected amount) in round x-1 and contact experiences in round x to predict
expectations and collaboration in the subsequent round $x +1$, if all of these rounds are played against the outgroup.

**More analyses.** Any secondary analyses?

If a sufficient number of participants is reached, we’ll use Dynamic Structural Equation modeling to address the questions above. We will additionally examine the interaction of current contact experiences and the mean of all previous contact experiences of the same group.

**Sample Size.** How many observations will be collected or what will determine sample size?

We will stop data collection if a number of 200 participants (Schultberg & Muthén, 2017) is reached, or at the 28th of February 2018.

**Other.** Anything else you would like to pre-register?

We additionally assessed feeling thermometers towards the in- and outgroup before and after the repeated prisoners’ dilemma, and ingroup identification before starting the rounds, and warmth and competence toward the outgroup after the rounds of prisoners’ dilemma.

**Name.** Give a title for this AsPredicted pre-registration

Positive-negative asymmetry of intergroup contact: A dynamic approach with repeated social dilemmas

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Formalia
Deutsche Zusammenfassung.

Erklärung über den Umfang des eigenen Beitrags.

Hiermit erkläre ich den Umfang meines eigenen Beitrags (in Prozent) für Manuskript #1 (Tabelle 1) und Manuskript #2 (Tabelle 2):

Tabelle 1

*Umfang der Beiträge der Autoren nach Beitragsbereichen in Prozent (pro Bereich müssen 100 % abgedeckt werden) für Manuskript #1*

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<th>Miles Hewstone</th>
<th>Katharina Schmid</th>
<th>Benjamint F. Fell</th>
<th>Eva Jaspers</th>
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*Anmerkung:* Pro Bereich müssen 100 % abgedeckt werden.
### Tabelle 2.

**Umfang der Beiträge der Autoren nach Beitragsbereichen in Prozent (pro Bereich müssen 100 % abgedeckt werden) für Manuskript #2**

<table>
<thead>
<tr>
<th>Bereiche mit relevantem Beitrag</th>
<th>Sarina J. Schäfer</th>
<th>Eva Jaspers</th>
<th>Mathijs Kros</th>
<th>Miles Hewstone</th>
<th>Katharina Schmid</th>
<th>Benjamin F. Hewstone</th>
<th>Angela R. Dorrough</th>
<th>Andreas Glöckner</th>
<th>Oliver Christ</th>
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*Anmerkung:* Pro Bereich müssen 100 % abgedeckt werden.
Erklärung der Autorin.


Ort, Datum, Unterschrift