Inaccurate group meta-perceptions drive negative out-group attributions in competitive contexts

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Abstract

Across seven experiments and one survey (N=4282) people consistently overestimated out-group negativity towards the collective behavior of their in-group. This negativity bias in group meta-perception was present across multiple competitive (but not cooperative) intergroup contexts, and appears to be yoked to group psychology more generally; we observed negativity bias for estimation of out-group, anonymized-group, and even fellow in-group members' perceptions. Importantly, in the context of American politics greater inaccuracy was associated with increased belief that the out-group is motivated by purposeful obstructionism. However, an intervention that informed participants of the inaccuracy of their beliefs reduced negative out-group attributions, and was more effective for those whose GMPs were more inaccurate. In sum, we highlight a pernicious bias in social judgments of how we believe 'they' see 'our' behavior, demonstrate how such inaccurate beliefs can exacerbate intergroup conflict, and provide an avenue for reducing the negative effects of inaccuracy.

Main

How we believe others perceive us—meta-perception—plays a critical role in how we interact with others[1–3]. In the context of intergroup interactions, these meta-perceptions may bring unpleasant, even harmful evaluations to mind[4–8]. For example, when individuals believe they are being negatively stereotyped by an out-group member, they experience increased negative emotions and lower self-esteem[4], suffer increased anxiety[9], and subsequently exhibit more intergroup bias[10].

Despite the important role that beliefs about how 'they' see 'us' (and our actions)[11–14], past work has focused primarily on person-to-person interactions across group boundaries or on estimates of extremity of and polarization in out-group attitudes[15–18]. As an example of the latter, findings in the domain of values and attitudes indicate that group members overestimate the level of disagreement and polarization between groups (though note that these constitute first order judgments, or "how I see X")[16–18]. Evidence from the intergroup literature, more broadly, suggests that group labels exacerbate inaccuracy in social judgments because they activate stereotypes that cause people to adjust their judgments away from their initial, more accurate anchors[12].

There is, in complement, a growing literature in the domain of second-order, intergroup meta-judgments (or "what I think they think about us"), which reveals that people tend to have overly negative and inaccurate judgments of out-group motives toward the in-group[11,14]. This foundational work on the effects of meta-perceptions in intergroup contexts raises two important questions: (i) are these meta-perceptions accurate?; and (ii) what happens when these judgments are made in response to collective action—when people consider how 'they' see 'our' (not my) behavior?

Here, we tackle a particular form of intergroup inaccuracy by examining group meta-perceptions (GMPs): how we believe our group's collective actions will be perceived by the out-group. In our view, GMPs represent an intergroup-context activated distortion of second-order judgments. This makes GMPs (i) distinct from first-order judgments and (ii) unique in that they should be sensitive to functional relations between groups (i.e., whether groups are cooperative, competitive, etc.) but relatively invariant to the focal event/act/behavior or the groups in question.

GMPs likely serve an important role in determining the course of group-on-group interaction because they allow us to make predictions about whether an out-group will be supportive or hostile towards our own group's efforts at cooperation; therefore, GMPs should also drive emotions, strategy, and policy preferences. For example, U.S. President George W. Bush, in his address to a joint session of Congress on September 20th, 2001 laid out in stark terms how he believed Al-Qaeda perceived the United States, and how these second-order judgments ought to compel US foreign policy[19]: "Americans are asking 'Why do they hate us?' They hate what they see right here in this chamber: a democratically elected government…They hate our freedoms: our freedom of religion, our freedom of speech, our freedom to vote and assemble and disagree with each other…We will direct every resource at our command—every means of diplomacy, every tool of intelligence, every instrument of law enforcement, every financial influence, and every necessary weapon of war—to the destruction and to the defeat of the global terror network….Every nation in every region now has a decision to make: Either you are with us or you are with the terrorists." President Bush used the belief that "they hate our freedoms" to motivate his call to war and his ultimatum to other countries that they are either "with us" or "with the terrorists." However, many have noted that this belief that Al-Qaeda "hate

our freedoms" wrongly diagnosed the motivations of Al-Qaeda and the complex socio-political forces which drove their perception of the United States[20,21]. Furthermore, this essentializing language served to dehumanize Muslims and drive support for the "War on Terror" among the American public[22].

This example highlights how inaccurate, and overly negative, beliefs about how the out-group perceives the behavior (and values) of one's own group can drive intractable intergroup conflict. When group leaders and other group members believe the out-group will react with animosity and perceive one's group in a highly negative fashion, they are likely to support antagonistic intergroup actions over cooperative and reconciliatory behaviors. For example, when people believe they are dehumanized by an out-group, they are more likely to dehumanize the out-group in return, which leads to increased support for war and out-group torture[7]. This dynamic can unfold in contexts as hostile as war between nations, but also legislative compromise across political parties, competitive sports, and interaction between organizations. Nonetheless, interventions which directly inform individuals of their inaccurate beliefs may be able to induce positive behavioral change[23,24].

To investigate the nature of GMPs we constructed a set of scenarios involving group-level conflict. For Experiments 1, 3, 4, 6 and Study 5 these scenarios pertained to the behavior of American political parties in a legislative context. In Experiment 2 the scenarios pertained to group-level conflict between men and women in educational and workplace settings. All scenarios presented instances where one group was attempting to pass a law or change a policy in a manner which would potentially disadvantage the other group (e.g., requiring a sitting governor of the opposing party to disclose their taxes), except for Experiment 3 where the behavior would potentially benefit the other group. Supplemental Experiment A is a direct

replication of Experiment 4 with a convenience sample, and Supplemental Experiment B is an exploratory follow up to Experiment 6.

Experiments 1-4 were designed to test for participant accuracy in GMPs. At the beginning of these experiments participants were asked to identify their political affiliation (or gender identity in Experiment 2) and were then randomly assigned to whether the group taking action in the scenario was their in-group or out-group. Those who read about their in-group taking action were asked for their GMPs (e.g., "How much do you believe an [out-group member] will dislike this action?"), whereas those who read about their out-group taking action against their in-group were asked for their actual perceptions (e.g., "How much do you dislike this action?"). In Experiment 4 we also asked about "in-group perceptions" (e.g., "How much do you believe an [in-group] member will dislike the [out-group] action?"). Across all experiments, the comparison of the GMP and actual perception conditions across groups (that is, Democrats vs. Republicans and men vs. women) allowed for a direct test of participant accuracy.

When reading the scenarios participants were asked, either as a meta-perception, actual perception, or in-group perception, their perceived dislike of, opposition to, and political/social unacceptability of the action being taken in the scenario, which they reported on sliding scales, with labels at the end of the scales (e.g., 1="Not Opposed", 100="Extremely Opposed"). After the ratings all participants, across all experiments and Study 5, completed a comprehension check which asked them to identify the group "taking action" in the scenario. Any participants who failed this check were excluded from all analyses. Lastly, all participants were asked their age, gender, and whether they had comments for the experimenters (except in Experiment 4 in which demographic questions were asked at the beginning of the experiment).

All materials, data, and analysis code for all experiments and studies, and preregistrations for Experiments 4 and 6, are available on OSF: https://osf.io/zhysa/

Results

Experiments 1-4 and Study 5 were analyzed using mixed-effects beta-regressions and Experiment 6 was analyzed using linear mixed-effects regression. All tests are two-sided. In Experiment 6 homoscedasticity and normality of errors was assumed but was not formally tested. Further details regarding the analyses can be found in the Methods section.

In Experiment 1 (N=408), participants were randomly assigned to the GMP condition (N=129), actual-perception condition (N=143), or an unlabeled and anonymized control group meta-perception condition (N=136) where participants were asked how "Party B" would perceive the behavior of "Party A." Within each condition, participants were randomly assigned to read one of five scenarios (we included multiple scenarios in each experiment and study to assess the robustness of our effects and modeled scenario as a random effect).

Across all scenarios, participants in the GMP condition substantially overestimated the negative perceptions of out-group participants (i.e., out-group members in the actual-perception condition) on our three measures: action dislike (unstandardized log-odds regression coeffient (*b)*=1.51, 95% confidence interval (CI)=[1.19,1.83], odd-ration (OR)=4.53, *Z*-score (z)=9.27, $P < 0.001$), opposition to the action (*b*=1.40, 95% CI=[1.09,1.72], OR=4.08, z=8.78, $P < 0.001$), and political unacceptability of the action (*b*=1.36, 95% CI=[1.04,1.67], OR=3.89, z=8.46, $P < 0.001$). Similarly, participants in the control meta-perception condition overestimated the negative perceptions of those in the actual-perception condition: dislike (*b*=1.32, 95% CI=[1.02,1.62], OR=3.74, z=8.55, $P < 0.001$), opposition (*b*=1.22, 95% CI=[0.93,1.52], OR=3.40, z=8.15, $P < 0.001$), and political unacceptability (*b*=1.13, 95% CI=[0.83,1.42],

OR=3.08, z=7.45, $P < 0.001$). Pairwise post-hoc tests indicate no statistically significant difference between responses in the control meta-perception condition vs. the GMP condition: dislike (*b*=-0.19, 95% CI=[-0.54,0.15], OR=0.83 *t*(402)=-1.30, *P*=0.40), opposition (*b*=-0.18, 95% CI=[-0.52,0.16], OR=0.83, *t*(402)=-1.24, *P*=0.43), and political unacceptability (*b*=-0.23, 95% CI=[-0.58,0.11], OR=0.79, *t*(401)=-1.58, *P*=0.26). We also examined the main effect of accuracy by party, modeled as a categorical fixed effect with two groups: "Democrat Accuracy"—Democrats in the GMP and control conditions compared with Republicans in the actual-perception condition—and "Republican Accuracy"—Republicans in the GMP and control conditions compared with Democrats in the actual-perception condition (see Methods for model details). This approach allowed the main-effect to appropriately contrast meta/control vs. actual perceptions (the baseline in the analyses) across parties, rather than within party. Indeed, there was no statistically significant main effect of party accuracy: dislike (*b*=-0.04, 95% CI=[-0.29,0.21], OR=0.96, z=-0.32, *P*=0.75), opposition (*b*=-0.00, 95% CI=[-0.25,0.24], OR=1.00, z=-0.03, *P*=0.98), and political unacceptability (*b*=-0.02, 95% CI=[-0.27,0.23], OR=0.98, z=-0.18, *P*=0.85). Finally, pairwise post-hoc tests found no statistically significant differences when examining whether Democrats and Republicans differed in their actual perceptions of the scenarios: dislike (*b*=0.00, 95% CI=[-0.61,0.61], OR=1.00, *t*(400)=0.02, *P*=1.00), opposition (*b*=0.15, 95% CI=[-0.45,0.74], OR=1.16, *t*(400)=0.72, *P*=0.98), and political unacceptability (*b*=0.11, 95% CI=[-0.49,0.71], OR=1.11, *t*(399)=0.51, *P*=1.00). See Figure 1 for a visualization of the raw data by condition.

As predicted, GMPs in Experiment 1 were more negative than participants' actual perceptions of the out-group's behavior. This was true even when we removed party labels. Thus, merely invoking the political intergroup context was enough to engender inaccuracy,

supporting our proposition that GMPs are an intergroup-context activated distortion, invariant to the groups in question. Furthermore, we found no credible evidence that this effect was moderated by participants' party membership. This suggests that Democrats and Republicans were equally pessimistic, and therefore inaccurate, in judging how members of the other party perceived the collective behavior of their own party.

To further examine the generalizability of our findings, Experiment 2 (N=286) utilized a design similar to that of Experiment 1, but in the context of gender relations. There were two changes from the design of Experiment 1. First, participants were assigned to one of three scenarios regarding group-level gender conflict (e.g., integrating a single-gender school choir), rather than five scenarios regarding political conflict. Second, we did not include an anonymized-group control condition. As with Experiment 1, participants were randomly assigned to the GMP condition (N=128) or actual perception condition (N=158), read only one scenario, and responded to items regarding perceived dislike of, opposition to, and social unacceptability of the action in the scenario.

Results indicated a statistically significant condition (actual vs. meta perception) by gender-accuracy interaction (i.e., a fixed effect similar to "party accuracy" in Experiment 1, contrasting accuracy across gender rather than within gender), indicating that one gender had less inaccurate GMPs than the other: dislike *(b*=0.78, 95% CI=[0.22,1.34], OR=2.18, z=2.73, *P*=0.006*),* opposition *(b*=0.74, 95% CI=[0.18,1.30], OR=2.09, z=2.59, *P*=0.010*),* and social unacceptability (*b*=0.65, 95% CI=[0.09,1.21], OR= 1.92, z=2.27, *P*=0.023). Pairwise post-hoc tests revealed that female participants had highly negative and inaccurate GMPs, replicating Experiment 1: dislike *(b*=-1.13, 95% CI=[-1.66,-0.59], OR=0.32, *t*(280)=-5.42, *P* < 0.001*),* opposition *(b*=-1.07, 95% CI=[-1.60,-0.54], OR=0.34, *t*(280)=-5.22, *P* < 0.001*),* and social

unacceptability *(b*=-1.02, 95% CI=[-1.56,-0.49], OR=0.36, *t*(280)=-4.93, *P* < 0.001*)*. However, male participants' GMPs were not significantly different from the actual perceptions of female participants: dislike *(b*=-0.35, 95% CI=[-0.86,0.17], OR=0.71, *t*(280)=-1.74, *P*=0.30*),* opposition *(b*=-0.33, 95% CI=[-0.85,0.20], OR=0.72, *t*(280)=-1.69, *P*=0.33*),* and social unacceptability *(b*=-0.37, 95% CI=[-0.89,0.14], OR=0.69, *t*(280)=-1.87, *P*=0.24*).* This interaction was driven by gender differences in actual perceptions. Pairwise post-hoc tests indicated that male and female participants' GMPs were not significantly different across dislike *(b*=0.29, 95% CI=[-0.25,0.82], OR=1.33, *t*(280)=1.39, *P*=0.51*),* opposition *(b*=0.19, 95% CI=[-0.34,0.73], OR= 1.21, *t*(280)=0.91, *P*=0.80*),* and social unacceptability *(b*=0.52, 95% CI=[-0.02,1.07], OR=1.69, *t*(280)=2.49, *P*=0.063*)*. However, women's (relative to men's) actual perceptions of the behaviors were significantly more negative across disliking *(b*=1.07, 95% CI=[0.56,1.58], OR=2.91, *t*(280)=5.39, *P* < 0.001*),* opposition *(b*=0.93, 95% CI=[0.42,1.43], OR=2.53, *t*(280)=4.75, *P* < 0.001*),* and social unacceptability *(b*=1.18, 95% CI=[0.66,1.69], OR=3.24, *t*(280)=5.91, *P* < 0.001*)*.

Thus, while we found no credible evidence that men's group meta-perceptions about how upset women would be were inaccurate, women's GMPs were inaccurate and overly negative, replicating the results from Experiment 1 in the domain of gender. It is important to reiterate, however, that the men's 'accuracy' result was driven by differences in male and female participant's actual-perceptions. In other words, men's GMPs were closer to women's actual perceptions because women reported being more upset about the policy changes than men did. This pattern is likely the result of real-world power differences between the genders: men may be marginally less impacted and therefore less upset by disadvantageous policies in the contexts featured in our scenarios. More generally, Experiments 1 and 2 demonstrated GMP inaccuracy,

but only as it pertained to the out-group in competitive or zero-sum contexts. To examine whether GMPs reflect a negativity bias or a valence-independent extremity bias, Experiment 3 contrasted GMPs versus actual-perceptions in response to cooperative rather than competitive behaviors.

Experiment 3 (N=499) utilized the same design as the GMP and actual-perception conditions from Experiment 1. While the scenarios pertained to the same political content, the nature of the behaviors was inverted such that the groups were taking cooperative actions, which either benefited the other group or disadvantaged the group taking the action. For example, instead of trying to make equal a partisan redistricting board controlled by the other party, in Experiment 3 the party taking action was trying to make equal a partisan redistricting board controlled by their own party. Participants in the GMP (N=233) and actual-perception (N=266) conditions were asked for their positive perceptions (e.g., 1="Not Supportive", 100="Extremely Supportive"), rather than negative perceptions. Otherwise the procedure was the same as Experiment 1, including the between-subjects random assignment to both condition and scenario.

In contrast to Experiments 1 and 2, Experiment 3 found no credible evidence for GMP inaccuracy in cooperative contexts across the support (b=-0.02, 95% CI=[-0.25,0.21], OR=0.98, z=-0.20, P=0.84), liking (b=0.12, 95% CI=[-0.11,0.35], OR=1.13, z=1.02, P=0.31), or political acceptability (b=-0.05, 95% CI=[-0.28,0.18], OR=0.95, z=-0.42, P=0.67) measures. There was a main effect (but never an interaction) of party-accuracy for support (b=0.44, 95% CI=[0.20,0.67], OR=1.55, z=3.69, $P < 0.001$), liking (b=0.48, 95% CI=[0.25,0.71], OR=1.61, z=4.05, $P < 0.001$), and political acceptability (b=0.52, 95% CI=[0.29,0.75], OR=1.69, z=4.46, $P < 0.001$), such that Democrats' positive reactions were slightly higher than those of Republicans. GMPs for both parties accurately tracked this mean-level difference. The findings from

Experiment 3 parallel other work demonstrating that dyadic meta-perceptions are more accurate when two people are cooperative, but less so when competing[25]. Broadly, Experiment 3 also provides evidence that GMP inaccuracy represents specifically a negativity bias in competitive contexts, rather than an extremity bias in how we believe the out-group will react to the in-group's actions in general.

Experiments 1, 2, and 3 are limited in several notable ways. First, they all utilize convenience samples (i.e., Mechanical Turk workers), and as such do not represent general population GMPs and actual-perceptions. Second, the previous experiments do not tell us whether people are inaccurate specifically about how the out-group sees the in-group's behavior or, more generally, how any group sees any other group's behavior. Experiment 4, a preregistered (see OSF: https://osf.io/atck5) extension of Experiment 1, utilized a nationally-representative sample and included an in-group perception condition to addressed these limitations.

Experiment 4 (N=536) featured the same scenarios from Experiment 1. Participants were randomly assigned, between-subjects, to the actual perception condition (N=170), GMP condition (N=206), both of which were the same as Experiment 1, or a new condition called the in-group perception condition (N=160). Participants in the in-group perception condition read the same scenarios as those in the actual perception condition, but instead of being asked for their individual perceptions they were asked how they believed "another [in-group member]" would perceive the scenarios. In contrast to Experiment 1, participants read and responded to all five scenarios (a repeated-measures factor, modeled as a random effect for participant).

Experiment 4 revealed statistically significant differences between all three conditions on all three outcome measures (see Figure 2 for raw data distributions). Actual perceptions were

lower than in-group perceptions for opposition (*b*=-0.26, 95% CI=[-0.43,-0.09], OR=0.77, z=-2.93, *P*=0.003), unacceptability (*b*=-0.25, 95% CI=[-0.43,-0.07], OR=0.78, z=-2.72, *P*=0.007), and disliking (*b*=-0.34, 95% CI=[-0.52,-0.17], OR=0.71, z=-3.93, $P < 0.001$). GMPs were higher than in-group perceptions for opposition (*b*=0.51, 95% CI=[0.35,0.68], OR=1.67, z=6.10, $P < 0.001$), unacceptability (*b*=0.43, 95% CI=[0.25,0.60], OR=1.53, z=4.87, $P < 0.001$), and disliking (*b*=0.41, 95% CI=[0.24,0.57], OR=1.50, z=4.83, $P < 0.001$). The pairwise post-hoc contrasts between actual-perceptions and GMPs were also significant for opposition (*b*=-0.77, 95% CI=[-0.97,-0.58], OR=0.46, *t*(2669)=-9.27, $P < 0.001$), unacceptability (*b*=-0.67, 95% CI=[-0.87,-0.47], OR=0.51, *t*(2669)=-7.83, $P < 0.001$), and disliking (*b*=-0.75, 95% CI=[-0.95,-0.56], OR=0.47, *t*(2669)=-9.04, $P < 0.001$), directly replicating the main finding of inaccurate GMPs from Experiment 1, but this time in a nationally representative sample. We also performed a direct replication of Experiment 4 using a convenience sample (again Mechanical Turk workers) and found practically identical results (see "Supplemental Experiment A").

Critically, the differences between in-group perceptions and GMPs indicate that our inaccuracy findings for Experiments 1 and 2 cannot be explained entirely by the difference in referents across the actual perception judgments ("how would you feel") versus GMP ("how would an out-group member feel") judgments. In Experiment 4 the in-group judgment also uses a group-level referent ("how would an in-group member feel about the out-group's action") but is still significantly less negative than the GMP judgments.

Study 5 (N=212) tested whether inaccurate GMPs are consequential by examining the relationship between GMPs and negative motive attributions towards the out-group. In this study, participants completed the GMP condition from Experiment 1. They then reported how much they agreed with the statement "[Out-group members] are purposefully obstructing the

process surrounding the [specific scenario topic]" (1-100 slider scale, "Strongly Disagree" to "Strongly Agree"). Analyses indicated a significant positive linear association between the belief that the out-group is obstructionist and negative GMPs of disliking *(b*=2.12, 95% CI=[1.40,2.84], OR=8.34, z=5.76, *P* < 0.001*),* opposition *(b*=1.95, 95% CI=[1.19,2.70], OR=7.00, z=5.06, *P* < 0.001*),* and political unacceptability *(b*=1.66, 95% CI=[0.96,2.35], OR=5.24, z=4.69, *P* < 0.001*).* There was no significant main effect of party identification on disliking *(b*=-0.04, 95% CI=[-0.37,0.30], OR=0.96, z=-0.22, *P*=0.83*),* opposition *(b*=-0.11, 95% CI=[-0.44,0.23], OR=0.90, z=-061, *P*=0.55*),* or political unacceptability *(b*=-0.08, 95% CI=[-0.42,0.26], OR=0.92, z=-0.47, *P*=0.64*).* Thus, the more negative (and therefore inaccurate) participants' GMPs were, the more likely they were to believe the out-group is motivated by obstructionism. See Figure 3 for visualization of raw data and Pearson correlations.

Experiment 6 (N=1122) sought to reduce the perception that the out-group is motivated by obstructionism by utilizing a preregistered intervention (see OSF: https://osf.io/jhnsb). Building upon Study 5's design, after participants provided their three GMP ratings in response to one of the five political scenarios, participants were randomly assigned, between-subjects, to one of three conditions before reporting their perceived out-group obstructionism: the control (N=396), "truth intervention" (N=358), or "hypocrisy prevention intervention" (N=368) conditions. In the control condition participants were simply reminded of the GMP ratings they had provided on the previous page (i.e., no new information). In the truth intervention, participants were provided with the information from the control condition plus the true value for their out-group's actual perceptions (the mean of the representative sample responses from Experiment 4) for that same scenario. This allowed participants to see the (in)accuracy of their GMPs. Recall that in Experiment 4 we also found that participants inaccurately believed their in-

group would react less negatively than their out-group to the same behavior. Therefore, in the hypocrisy prevention intervention participants received all the information in the truth intervention while also receiving the exact true values for their in-group's actual perceptions (also drawn from Experiment 4), for the same scenario. As such, the hypocrisy intervention additionally prevented participants from anchoring on an inaccurate belief that the in-group's negativity would still be lower than the out-group's in the same scenario. This allowed us to test whether there was an added benefit to highlighting participants' (in)accuracy regarding the extent to which their in-group and out-group were similar in their actual perceptions.

As hypothesized, participants who were assigned to the truth intervention condition had lower ratings of out-group obstructionism than did the control group (b=-4.08, 95% CI=[-7.67,-0.48], β=-0.155, t(1114)=-2.22, P=0.027). Those assigned to the hypocrisy prevention intervention also had lower obstructionism ratings relative to control (b=-4.64, 95% CI=[-8.22,-1.08], β=-0.177, t(1114)=-2.55, P=0.011). However, post-hoc pairwise comparisons indicated no statistically significant difference in obstructionism between the hypocrisy prevention and truth interventions (b=-0.57, 95% CI=[-4.96,3.82], t(1115)=-0.304, P=0.95), suggesting the hypocrisy prevention intervention provided no additional benefit above the truth intervention. There was also a main effect of party identification on obstructionism, with Democrats rating Republicans as higher on obstructionism that Republicans rated Democrats (b=-3.84, 95% CI=[-6.88,-0.79], β=-0.146, t(1114)=-2.47, P=0.014); however, further analysis indicated no statistically significant party by condition interaction for either the truth intervention (b=4.44, 95% CI[-2.97,11.88], t(1113)=1.17, P=0.24), or hypocrisy intervention (b=0.83, 95% CI[-6.59,8.26], t(1112)=0.22, P=0.83). In other words, the interventions were not more effective at reducing negative motive attributions among one party relative to the other.

Further analysis revealed statistically significant interactions of condition on GMP inaccuracy (operationalized as the mean difference between participants' GMPs and the true values, such that higher values = more inaccurate and negative). We found that GMP inaccuracy moderated the effectiveness of the hypocrisy prevention intervention (b=-0.17, 95% CI=[-0.33,-0.01], β=-0.144, t(1112)=-2.09, P=0.037), and truth intervention (b=-0.27, 95% CI=[-0.43,-0.12], β=-0.23, t(1113)=-3.39, $P < 0.001$), relative to control. In other words, the interventions were more effective at reducing obstructionism for participants whose GMPs were relatively less accurate and more negative. There was also a linear association between inaccuracy and perceived obstructionism (b=0.44, 95% CI=[0.32,0.56], β=0.37, t(1114)=7.33, $P < 0.001$), replicating the finding from Study 5. See Figure 4 for visualization of the effect of the interventions at one standard deviation above and below the mean of accuracy (see Supplementary Figure 4 for raw data distributions). As an exploratory measure, we followed up with participants one week after they completed Experiment 6 to see if the effect of the intervention persisted over time. We had a 73% response rate, but found no credible evidence for a continued effect of the intervention on a rating of general out-group obstructionism (see "Supplemental Experiment B").

The results of Experiment 6 provided support for the hypothesis that negative motivational attributions towards the out-group, such as obstructionism, were driven in part by inaccurate beliefs regarding how negatively the out-group perceived the collective behavior of one's in-group. They also suggest that simply providing individuals with concrete information regarding their inaccurate, and overly negative, GMPs can help reduce downstream negative attributions towards the out-group. However, we found no credible evidence that the hypocrisy prevention intervention provided additional benefit above the truth intervention, which suggests

that participants were not anchoring on inaccurate beliefs about how the in-group would react to the same behavior. Given the central role motive attributions play in intergroup relations[26,27], our findings highlight a potential avenue for future attempts at reducing intergroup hostility and conflict, and an avenue for further understanding the antecedents of negative and inaccurate motive attributions[9,12].

Discussion

Across seven experiments and one survey we found that group meta-perceptions were consistently inaccurate and negatively biased across a variety of competitive intergroup contexts, scenarios, and participant samples. Theoretically, our findings of negative and inaccurate GMPs across multiple intergroup domains—even in the absence of group labels as in the control condition of Experiment 1—parallel research on the interindividual-intergroup discontinuity effect (IIDE), which demonstrates that intergroup interactions are more hostile and competitive then interindividual interactions[28,29]. Importantly, the IIDE is observed both in actual behavior and in expectations of behavior, in that people expect future intergroup interactions to be more hostile than interpersonal interaction[30]. If people assume that intergroup interactions are going to be more hostile, this may partially explain why GMPs are overly negative and associated with negative motive attributions, although it does not explain why GMPs are so inaccurate. Similarly, while recent evidence suggests that perceptions of political party polarization in the US have become more negative and inaccurate over the past four decades[18,31], this does not explain inaccurate GMPs in the domain of gender, why there is no evidence for GMP inaccuracy in cooperative political contexts, and why there is no evidence that inaccurate GMPs vary across the scenario content or party of the perceiver.

Several limitations in these experiments highlight fruitful avenues for future research. One assumption embedded in these studies is that actual perceptions represent ground truth. An alternative source of GMP inaccuracy may be actual perceivers downplaying their reactions to these events. For example, in Experiment 2, men might have been underreporting their dissatisfaction with losing resources, which would make women's GMPs look more inaccurate than they are. Furthermore, the use of random-probability sampling would be superior to the quota-matching methods we used in Experiment 4 for estimating the true population 'actual-perceptions' of our scenarios. Second, we did not measure confidence in participants' own judgments, which should be related to GMP (in)accuracy as it is in other meta-perception research[32]. Third, we found no statistically significant effect of our intervention on negative motive attributions one week after it was administered, though we hasten to note that we specifically designed our intervention to minimize the likelihood that our results were driven by demand effects. Furthermore, the attrition-rate of participants meant our follow-up measurement one week later was likely underpowered. Future research should vary the strength and nature of any such interventions in order to understand better which qualities provide more (if any) benefit over time.

Conceptually, future research ought to examine the relationship between GMPs and other second-order judgments in intergroup contexts. Here we operationalized GMPs as judgments regarding out-group members' reactions to collective in-group behaviors, but GMPs can be measured along many features, including attitude[33] and trait[34] attributions (i.e., "how they see us"), dehumanization[7] (i.e., "how human they think we are"), judgments of intent[35], even group emotions[36]. Understanding how GMPs across these judgments relate to, and are distinct from, one another will be critical in building theory around the dynamics of and outcomes associated

with GMPs in intergroup contexts. Lastly, future work should also seek to take advantage of current events as they are unfolding in order to see how inaccuracies in GMP are shaped during real world events related to issues with which people are very familiar.

Our findings highlight a consistent, pernicious inaccuracy in social perception, along with how these inaccurate perceptions relate to negative attributions towards out-groups. More broadly, inaccurate and overly negative GMPs exist across multiple competitive intergroup contexts, and we find no evidence they differ across the political spectrum. This suggests that there may be many domains of intergroup interaction where inaccurate GMPs could potentially diminish the likelihood of cooperation and instead exacerbate the possibility of conflict. However, our findings also highlight a straight-forward manner in which simply informing individuals of their inaccurate beliefs can reduce these negative attributions.

Methods

All studies were approved by Harvard University's Institutional Review Board, and all participants gave their informed consent before participating. All participants, except those in Experiment 4, were collected on Amazon's Mechanical Turk platform ("Mturk"), and were located in the United States. Participants in Experiment 4 were collected through Qualtric Survey Panels, and the sample was quota-matched to US census data distributions of the following variables in the general population: age, gender, ethnicity, education, and income (see supplemental materials for demographic breakdown and quotas). All surveys were administered via the Qualtrics survey platform.

Participants. Samples from Experiments 1, 3, 4, 6 and Study 5 consist of self-identified Republicans and Democrats, and the sample of Experiment 2 consists of self-identified men and

women. Experiment 1 (N=408) and Experiment 2 (N=286) had sample sizes of 170 per condition determined a priori with the goal of attaining 144 per condition after excluding participants who failed comprehension checks (see Exclusions section below). An a priori power analysis indicated that 144 per condition was necessary to detect a small effect size of f=0.15 with 80% power within a three condition between-subjects ANOVA framework. Expecting to observe a reduced effect size in Experiment 3 (N=499) relative to Experiment 1, we increased the sample size to a target of 275 per condition, and collected 675 in the hopes of reaching 550 after exclusions. We did not conduct a formal power analysis for Experiment 3. Experiment 4 had a preregistered sample size of N=500 (selected via a priori power analysis to detect standardized b = 0.20 with 80% power; see preregistration for details); Qualtrics purposefully oversampled to ensure a minimum of 500 quality responses (hence final N=536). For Study 5 (N=212) we selected an a priori sample size of N=300, with the goal of attaining approximately N=250 after exclusions, the sample size at which small correlations stabilize[37]. Experiment 6 (N=1122) had a preregistered sample size of N=1510, in the hopes of obtained 1260 after exclusions (selected via a priori power analysis to detect standardized b = 0.20 with 80% power; see preregistration for details)

Exclusions: In Experiment 1 we removed 12 responses due to three separate participants taking the study multiple times (all their responses were removed). A further 89 participants failed the comprehension check, and one participant was excluded for not completing the dependent variable ratings, leaving a final N=408 (mean age (M_{age}) = 35.2, 239 Women). In Experiment 2 we removed two responses due to one participant completing the study twice, another response due to a participant not providing their gender identity, and 56 participants who failed the comprehension check, leaving a final N=286 (M_{age} = 36.2, 156 Women). In

Experiment 3, 165 participants failed the comprehension check, and 12 responses were removed due to duplicate IP addresses, leaving a final N=499 (M_{age} = 35.1, 293 Women). In Experiment 4, 364 participants failed the comprehension check, and the Qualtrics manager continued collecting data until 536 participants (273 Women, Age Brackets: 165 in ages 18-34, 189 in ages 35-54, 182 in ages 55+), who met our demographic quotas, completed the study. In Study 5, 86 participants failed the comprehension check, and two participants were removed for not completing the dependent variable rating, leaving a final N=212 (M_{age} = 35.89, 120 Women). In Experiment 6, 349 participants failed the comprehension check, and 26 responses were removed due to duplicate Mturk ID or IP addresses, leaving a final N=1122 (M_{age} = 35.1, 642 Women). We did not weigh Mturk samples by political party or gender because we were interested in in-group versus out-group dynamics, not the difference between, for example, Democrats and Republicans. In Experiment 4 we quota-matched to a 50/50 split of Democrats and Republicans. Self-identified Independents were allowed to complete all studies (except Experiment 4), but were excluded from all analyses a priori.

Compensation: Experiments 1, 2, 3, and Study 5 paid $0.10 and were advertised as taking one minute. Experiment 4 was advertised as taking 9 minutes (itself 4 minutes, but it was bundled with a separate 5-minute study which always came after Experiment 4), and participants were paid a preset amount of credit via Qualtrics Panel's internal payment system. Experiment 6 paid $0.15 and was advertised as taking 60-90 seconds.

Procedure: We randomly assigned participants to condition and scenario (in Experiment 4 scenario order) across all the experiments and studies. Across scenarios, we also randomized the order of the dependent variable items (e.g. disliking, opposition). All randomization was

facilitated through Qualtrics' randomization functions. The surveys were programmed to pipe the appropriate out-group and/or in-group labels into the scenarios and dependent variables ratings based on the participants' self-reported group affiliation. All dependent variables across all studies appeared as sliding scales with end-labels and tick-marks, but no visible numbers (except for the ratings in Experiment 6, in which a numeric value (1-100) appeared next to the slider when participants provided a response). Across all experiments and studies, except Experiment 4, excluded participants received full compensation.

Analyses: We analyzed Experiments 1-4 and Study 5 using mixed-effects beta-regressions (glmmTMB[38] package, v 0.2.3) in R (v 3.6.1) and Experiment 6 using linear mixed-effects modeling (lmerTest[39] R package, v 3.1-0). All post-hoc tests utilized the Tukey method for *P*-value adjustment and were conducted with the emmeans[40] R package (v. 1.4). We used beta-regressions for Experiments 1-4 and Study 5 due to the highly skewed GMP response data, and transformed the data for the beta-regressions using established formulas[41]. As a robustness check we performed all non-preregistered beta-regression analyses (Experiments 1, 2, 3, and Study 5) using linear mixed effects modeling via the lmerTest R package: none of our results changed meaningfully. For Experiments 1, 3, 4, Study 5, and the main effects of Experiment 6, we report the results from models that include only the main effects because there were never any significant interactions among the fixed effects; furthermore, the saturated models including fixed effects and the corresponding interactions did not improve model fits. Results for Experiment 2 are from the saturated models, and while we report the interaction of accuracy on condition in Experiment 6, we never find an interaction with party identification and do not report those saturated models. Across Experiments 1-4 we regressed the relevant dependent

variable rating (dislike, opposition, political/social unacceptability) onto fixed effects for condition and the relevant group variable ("party accuracy" in Experiment 1, 3 and 4, "gender accuracy" in Experiment 2), a random effect with random intercepts for scenario (along with an random effect with random intercepts for participant in Experiment 4, due to the repeated measures), and in Experiment 2 an interaction term for the condition by group interaction. In Study 5 we regressed obstructionism onto each GMP item separately, including a fixed effect for party and a random effect with random intercepts for scenario. In Experiment 6 we regressed obstructionism onto condition including a fixed effect for party and a random effect with random intercepts for scenario, then replaced the fixed effect for party with the interaction of accuracy with condition. All tests were two-sided. Data analyses were not performed blind to the conditions of the experiments and studies. Figures were created using the R packages ggstatsplot[42] (v. 0.0.12), sjPlot[43] (v. 2.7.0), and psych[44] (v. 1.8.12).

Experiments 4 and 6 were preregistered. Experiment 4 was preregistered on February 26th, 2019 and can be found here: https://osf.io/atck5. Experiment 6 was preregistered on March 19th, 2019 and can be found here: https://osf.io/jhnsb. No analyses deviate from the preregistrations.

Data Availability

All data that supported the findings of this study are publicly available in CSV format on the Open Science Framework: https://osf.io/zhysa/

Code Availability

All analyses reported in this study used the statistical software R (v 3.6.1). All R files are publicly available on the Open Science Framework: https://osf.io/zhysa/

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Author Contributions

J.L. and M.C. designed all experiments and wrote the manuscript. J.L. completed data collection and analysis under the supervision of M.C.

Competing Interests

The authors declare no competing interests

Figures & Legends

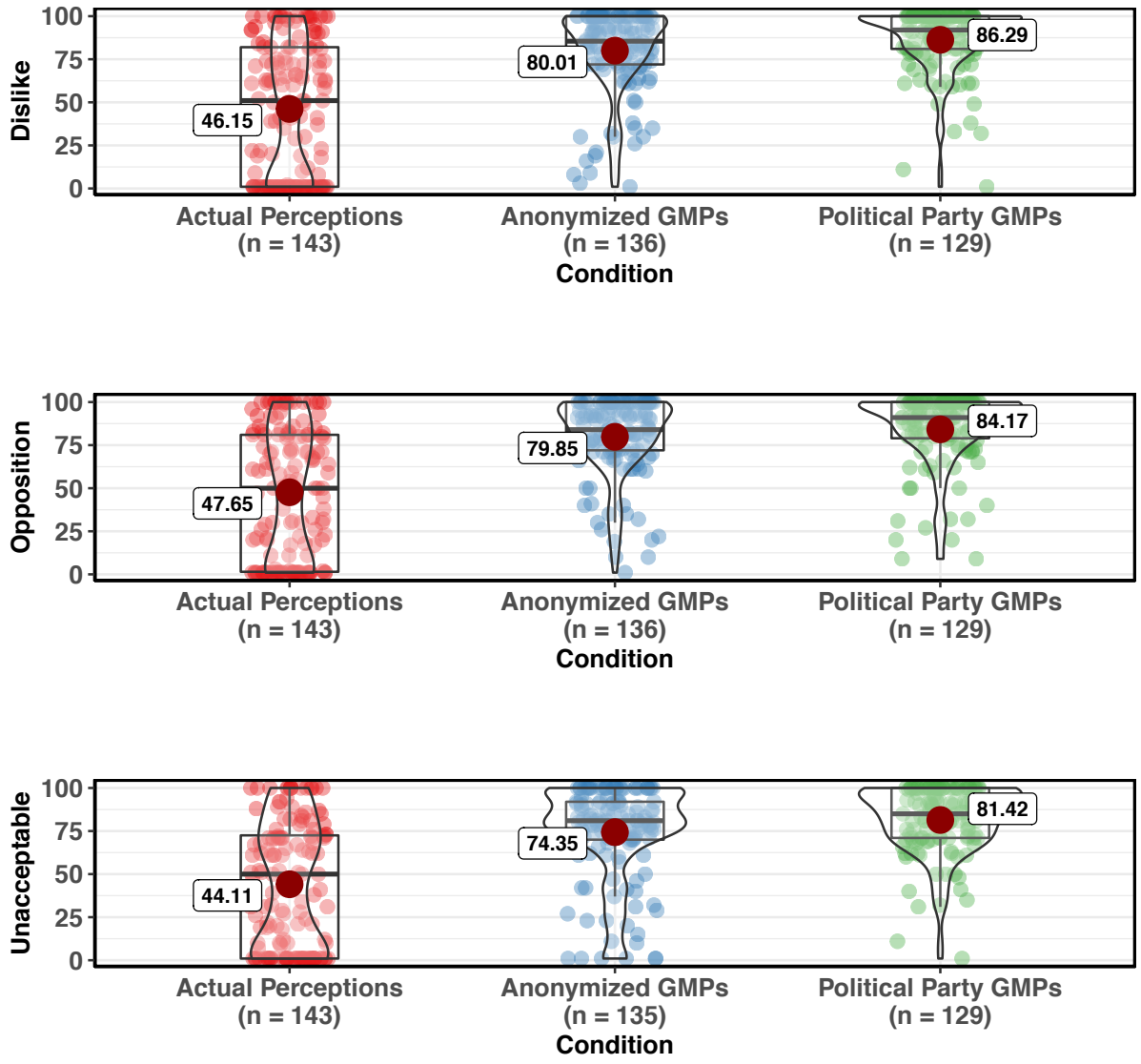


Figure 1: Raw data from Experiment 1 by condition and dependent variable. In this experiment, N=408 (collected via Mechanical Turk). In the two GMP conditions participants reported how much they thought their out-group, or an anonymized political party (control), would dislike, oppose, and find unacceptable the in-group's/other party's action in the scenario. Solid red dots and corresponding numbers are sample means, the boxplot center lines are sample medians. Participants in the political party GMP condition overestimated the negative perceptions of out-group participants in the actual-perception condition on action dislike (b=1.51, 95% CI=[1.19,1.83], OR=4.53, z=9.27, $P < 0.001$), opposition to the action (b=1.40, 95% CI=[1.09,1.72], OR=4.08, z=8.78, $P < 0.001$), and political unacceptability of the action (b=1.36, 95% CI=[1.04,1.67], OR=3.89, z=8.46, $P < 0.001$). Participants in the control meta-perception condition overestimated the negative perceptions of those in the actual-perception condition on dislike (b=1.32, 95% CI=[1.02,1.62], OR=3.74, z=8.55, $P < 0.001$), opposition (b=1.22, 95% CI=[0.93,1.52], OR=3.40, z=8.15, $P < 0.001$), and political unacceptability (b=1.13, 95% CI=[0.83,1.42],

OR=3.08, z=7.45, $P < 0.001$). Pairwise post-hoc tests indicate no statistically significant difference between responses in the control meta-perception vs. GMP condition on dislike (b=-0.19, 95% CI=[-0.54,0.15], OR=0.83 t(402)=-1.30, P=0.40), opposition (b=-0.18, 95% CI=[-0.52,0.16], OR=0.83, t(402)=-1.24, P=0.43), and political unacceptability (b=-0.23, 95% CI=[-0.58,0.11], OR=0.79, t(401)=-1.58, P=0.26). These results provide evidence of overly pessimistic GMPs.

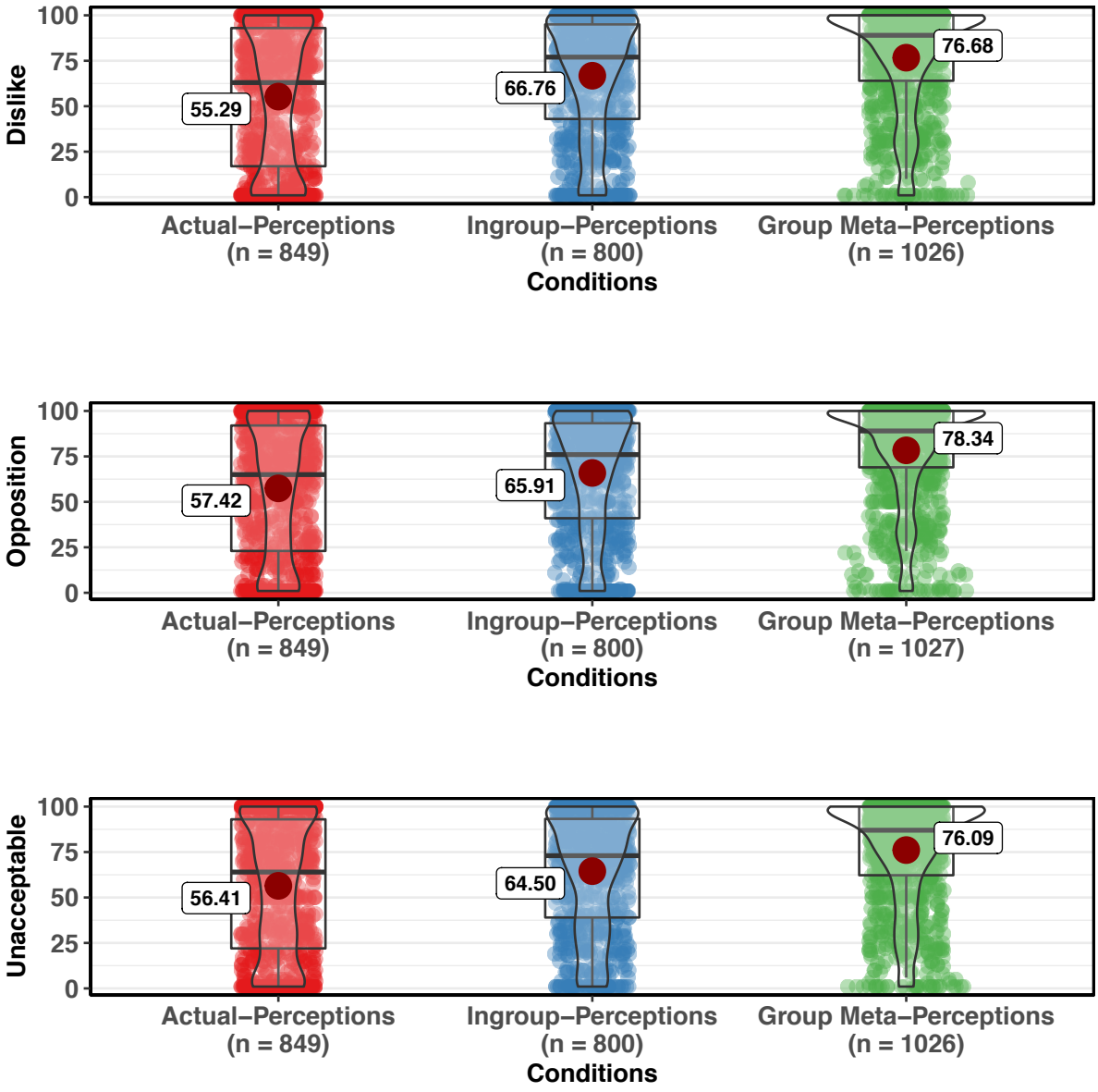


Figure 2: Raw data from Experiment 4 by condition and dependent variable. Sample sizes listed in figures are the number of judgments (across five repeated measures). Total N=538 (nationally representative sample collected via Qualtrics survey panels). By Condition: Actual Perceptions N=170, Ingroup Perception N=160, GMPs=206. Solid red dots and corresponding numbers are sample means, the boxplot center lines are sample medians. Actual perceptions were lower than in-group perceptions for

opposition (*b*=-0.26, 95% CI=[-0.43,-0.09], OR=0.77, z=-2.93, *P*=0.003), unacceptability (*b*=-0.25, 95% CI=[-0.43,-0.07], OR=0.78, z=-2.72, *P*=0.007), and disliking (*b*=-0.34, 95% CI=[-0.52,-0.17], OR=0.71, z=-3.93, $P < 0.001$). GMPs were higher than in-group perceptions for opposition (*b*=0.51, 95% CI=[0.35,0.68], OR=1.67, z=6.10, $P < 0.001$), unacceptability (*b*=0.43, 95% CI=[0.25,0.60], OR=1.53, z=4.87, $P < 0.001$), and disliking (*b*=0.41, 95% CI=[0.24,0.57], OR=1.50, z=4.83, $P < 0.001$). The pairwise post-hoc contrasts between actual-perceptions and GMPs were also significant for opposition (*b*=-0.77, 95% CI=[-0.97,-0.58], OR=0.46, $t(2,669)=-9.27$, $P < 0.001$), unacceptability (*b*=-0.67, 95% CI=[-0.87,-0.47], OR=0.51, $t(2,669)=-7.83$, $P < 0.001$), and disliking (*b*=-0.75, 95% CI=[-0.95,-0.56], OR=0.47, $t(2,669)=-9.04$, $P < 0.001$). These results provide evidence of overly pessimistic GMPs and overly pessimistic judgments of the in-group's reactions.

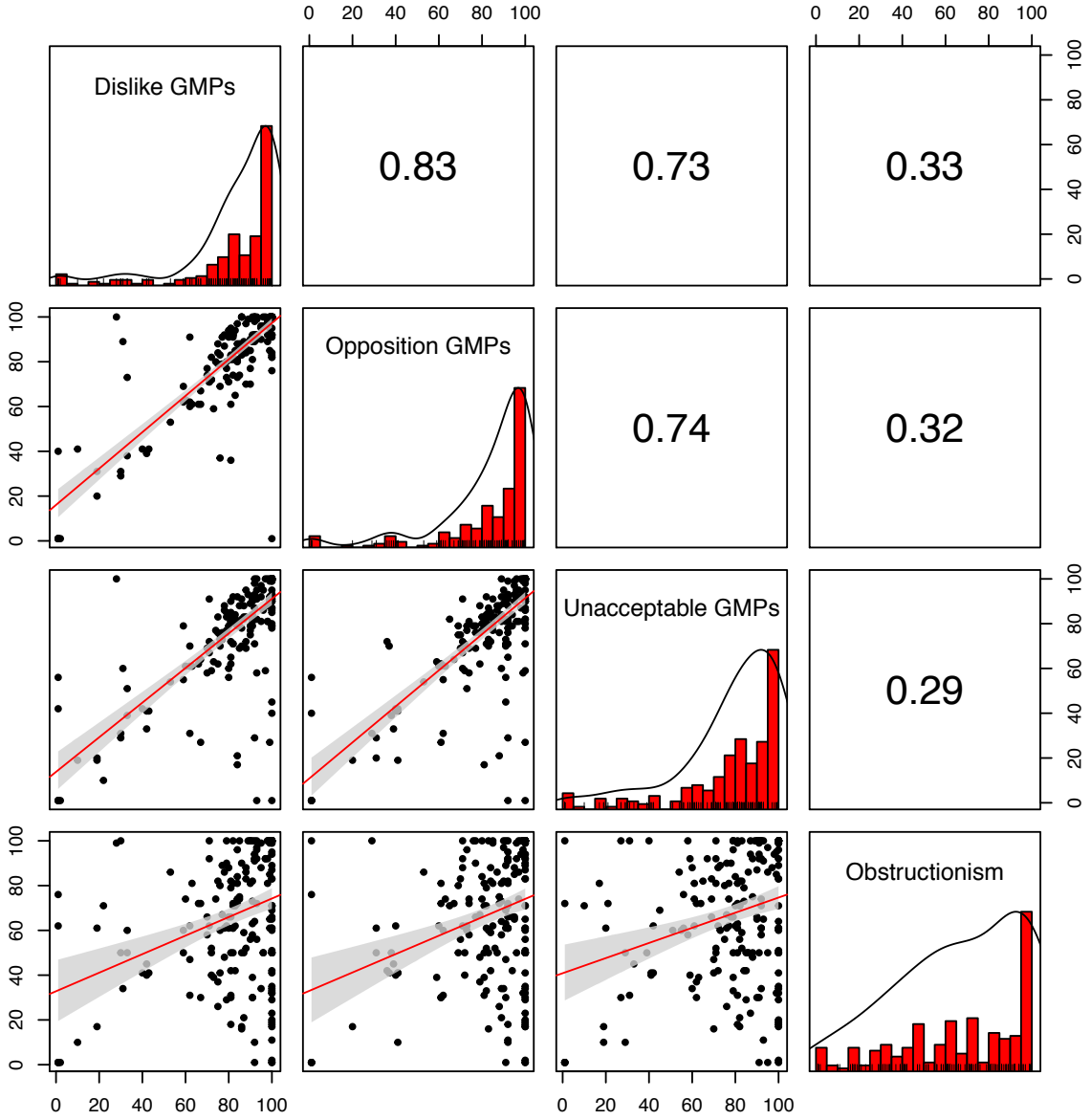


Figure 3: Distributions, Pearson correlations, and scatterplots for the three GMP ratings and beliefs about out-group obstructionism in Study 5. Sample size, N=212 (collected via Mechanical Turk). Scatterplot lines are linear regression lines, shaded area around lines are 95% confidence intervals. Correlations: Disliking – Opposition (r=0.83, 95% CI=[0.79,0.87], t(208)=21.73, P < 0.001), Disliking – Unacceptable (r=0.73, 95% CI=[0.66,0.79], t(210)=15.50, P < 0.001), Disliking – Obstructionism (r=0.33, 95% CI=[0.20,0.45], t(210)=5.08, P < 0.001), Unacceptable – Opposition (r=0.74, 95% CI=[0.68,0.80], t(208)=16.02, P < 0.001), Unacceptable – Obstructionism (r=0.29, 95% CI=[0.16,0.40], t(210)=4.32, P < 0.001), and Obstructionism – Opposition (r=0.32, 95% CI=[0.19,0.43], t(208)=4.80, P < 0.001). These data indicate a positive linear association between pessimistic GMPs and the belief that the out-group is purposefully obstructionist.

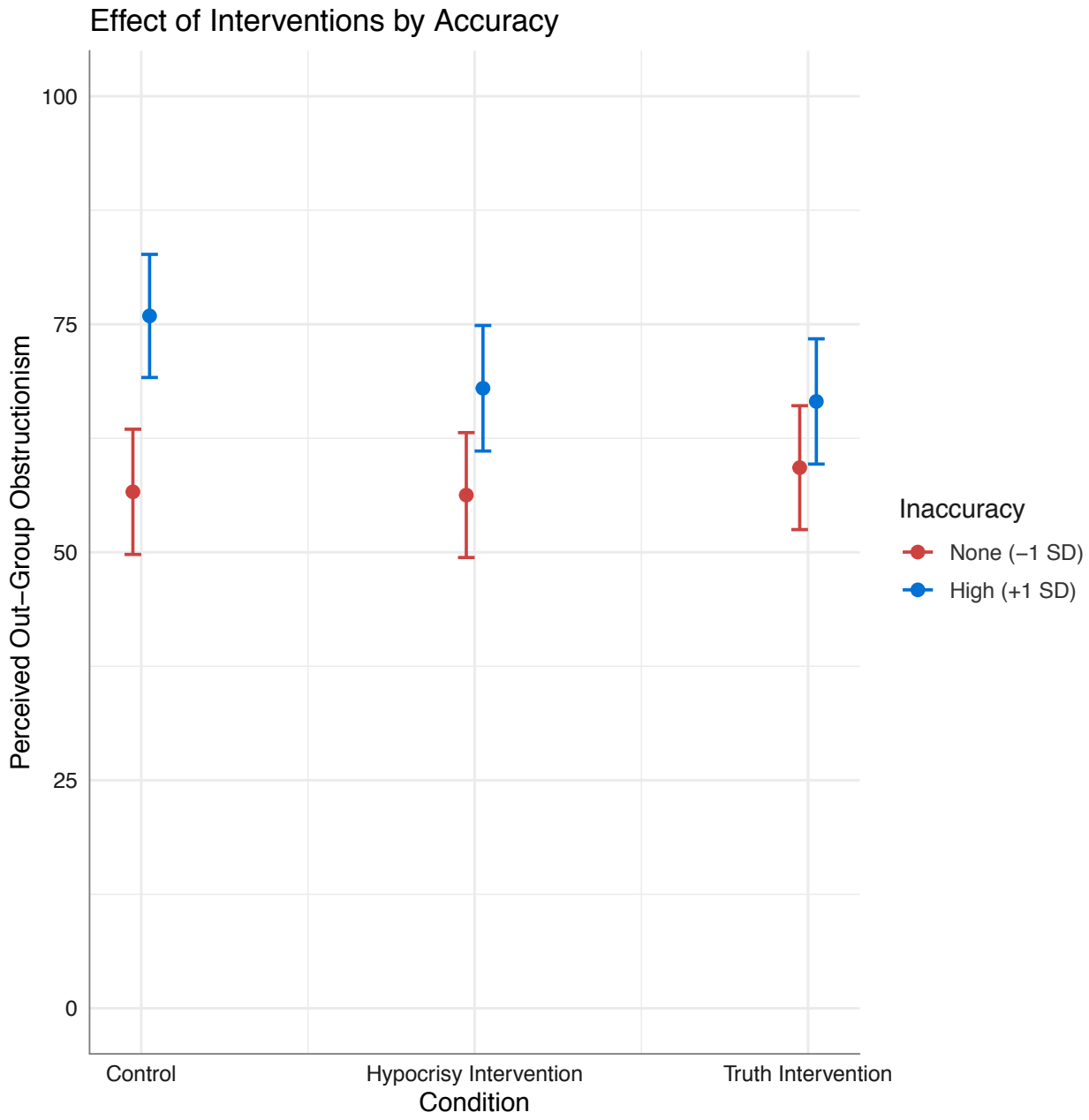


Figure 4: Effect of condition on obstructionism, by accuracy, in Experiment 6. Sample size, N=1122 (collected via Mechanical Turk). By Condition: Control=396, Hypocrisy Intervention=368, Truth Intervention=358. GMP inaccuracy moderated the effectiveness of the hypocrisy prevention intervention (b=-0.17, 95% CI=[-0.33,-0.01], β=-0.144, t(1,112)=-2.09, P=0.037), and truth intervention (b=-0.27, 95% CI=[-0.43,-0.12], β=-0.23, t(1,113)=-3.39, $P < 0.001$) at reducing obstructionism. In other words, the interventions were more effective at reducing obstructionism for participants whose GMPs were relatively more inaccurate and negative. Here inaccuracy is plotted at one standard deviation above and below the mean inaccuracy (M=22, SD=22). -1 SD equals an inaccuracy of zero, meaning that the participant was on average perfectly accurate in their GMPs. +1 SD equals an inaccuracy of 44, meaning that the participant on average overestimated out-group negativity by 44 points (on a 100-point scale). Bars are 95% confidence intervals.

Supplementary Notes

Demographic Characteristics of Samples from Experiments/Studies 1-6

Demographic Characteristics: Experiment 1

Collected on Mechanical Turk

Total N = 408
M_{age} = 35.2, SD_{age} = 11.1
239 Women, 169 Men
271 Democrats, 137 Republicans

	Actual-P Condition	**Control Condition**	**Meta-P Condition**
Democrat	95	82	94
Republican	48	54	35

	Female	**Male**
Democrat	167	104
Republican	72	65

Demographic Characteristics: Experiment 2

Collected on Mechanical Turk

Total N = 286
M_{age} = 36.2, SD_{age} = 11.5
156 Women, 130 Men

	Actual-P Condition	**Meta-P Condition**
Female	87	69
Male	71	59

Demographic Characteristics: Experiment 3

Collected on Mechanical Turk

Total N = 499
M_{age} = 35.1, SD_{age} = 11.9
293 Women, 206 Men
328 Democrats, 171 Republicans

	Actual-P Condition	**Meta-P Condition**
Democrat	165	163
Republican	101	70

	Female	**Male**
Democrat	199	129
Republican	94	77

Demographic Characteristics: Experiment 4

Collected via Qualtrics Survey Panels

Experiment 4 was quota matched to census population characteristics such that the survey would be representative of the general American population. Below are the quotes utilized in data collection. We set out to collect N = 500, and Qualtrics purposefully oversampled to guarantee data quality. Total N = 536.

Quotas:

Gender:
51% Female
49% Male

Age:
32% 18-34
34% 35-54
34% 55+

Income:
40% $0 – $50k
33% $50k – $100k
21% $100k - $200k
6% $200k+

Ethnicity:
63% Non-Hispanic White
12% Non-Hispanic Black
17% Hispanic
5% Asian
3% American Indian/Alaskan Native/Other

Education:
41% HS Diploma/GED
21% Some College (no degree)
27% College Degree
11% Graduate Degree

Political Affiliation:
50% Democrat
50% Republican

Below are the characteristics of the sample collected:

Total N = 536

Gender:
Female: 273 (50.9%
Male: 263 (49.1%)

Age:
18-34: 165 (30.8%)
35-54: 189 (35.3%)
55+: 182 (34%)

Income:
$0 – $50k: 213 (39.7%)
$50k – $100k: 180 (33.6%)
$100k - $200k: 109 (20.3%)
$200k+: 28 (5.2%)
Prefer not to say: 6 (1.1%)

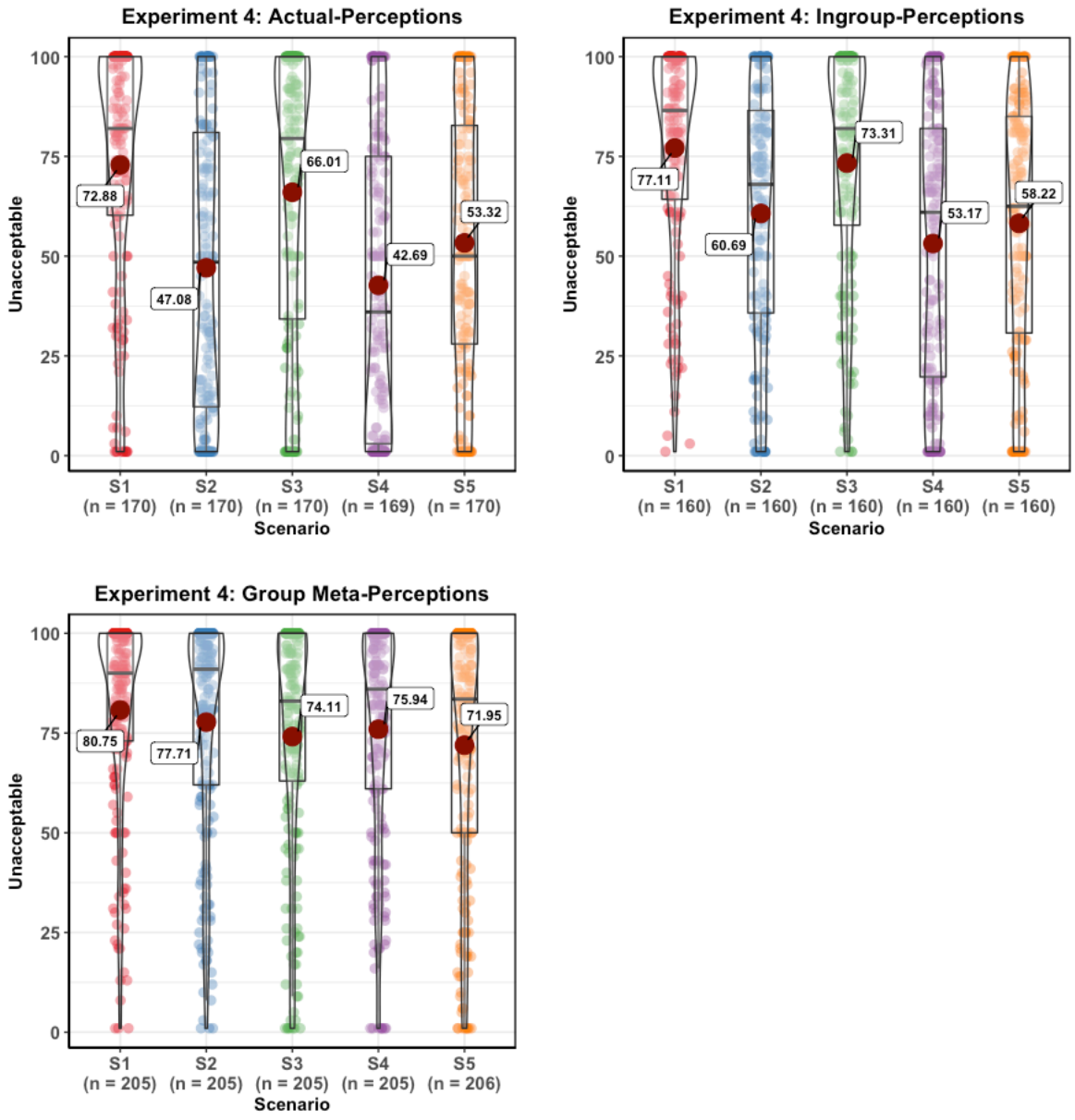
Ethnicity:
Non-Hispanic White: 344 (64.2%)
Non-Hispanic Black: 61 (11.4%)
Hispanic: 88 (16.4%)
Asian: 26 (4.9%)
American Indian/Alaskan Native/Other: 13 (2.4%)
Prefer not to say: 4 (0.7%)

Education:
HS Diploma/GED: 194 (36.2%)
Some College (no degree): 114 (21.3%)
College Degree: 154 (28.7%)
Graduate Degree: 72 (13.4%)
Prefer not to say: 2 (0.4%)

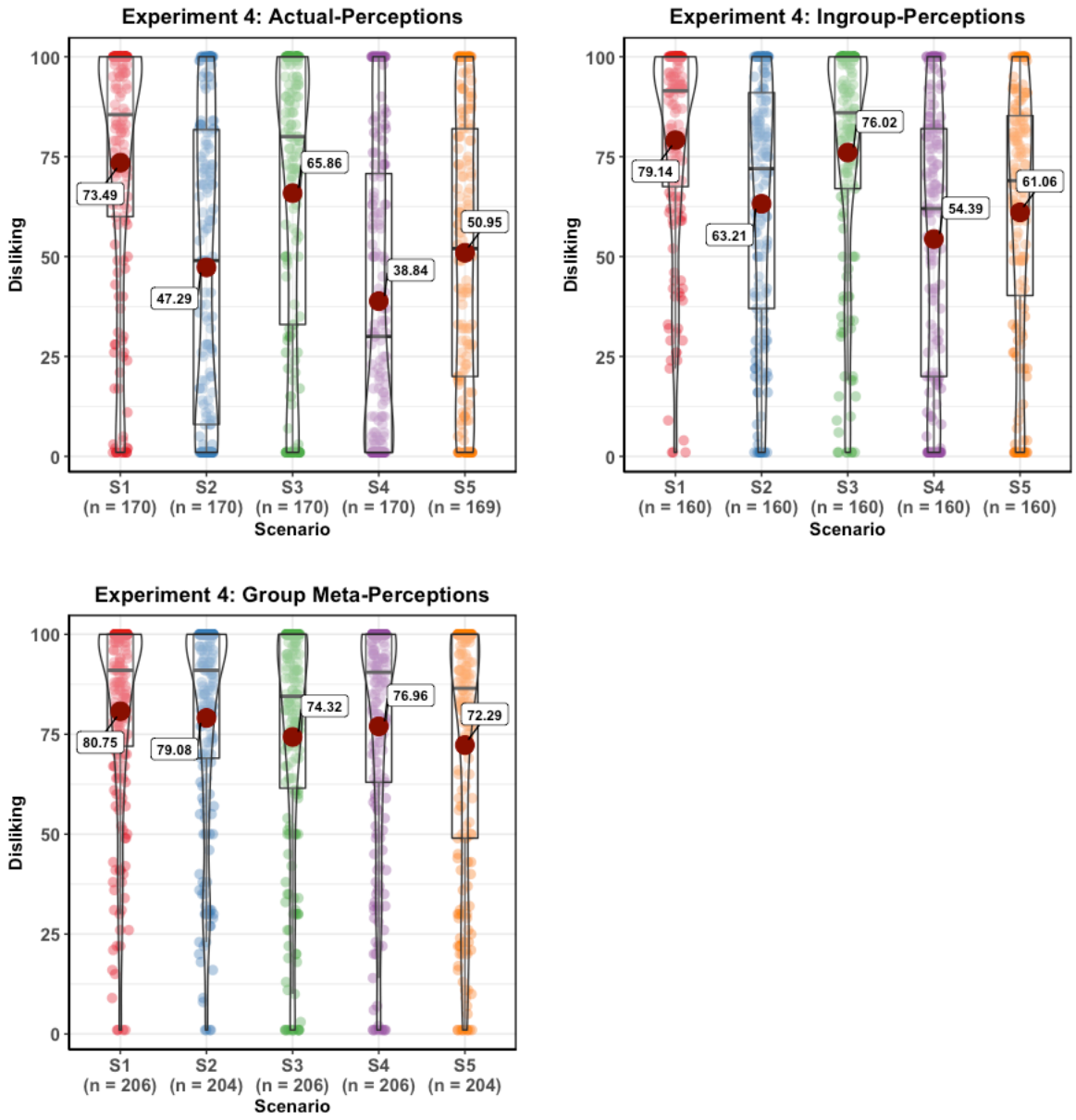
Political Affiliation:
Democrat: 269 (50.2%)
Republican: 267 (49.8%)

	Actual-P Condition	**Ingroup-P Condition**	**Meta-P Condition**
Democrat	82	79	108
Republican	88	81	98

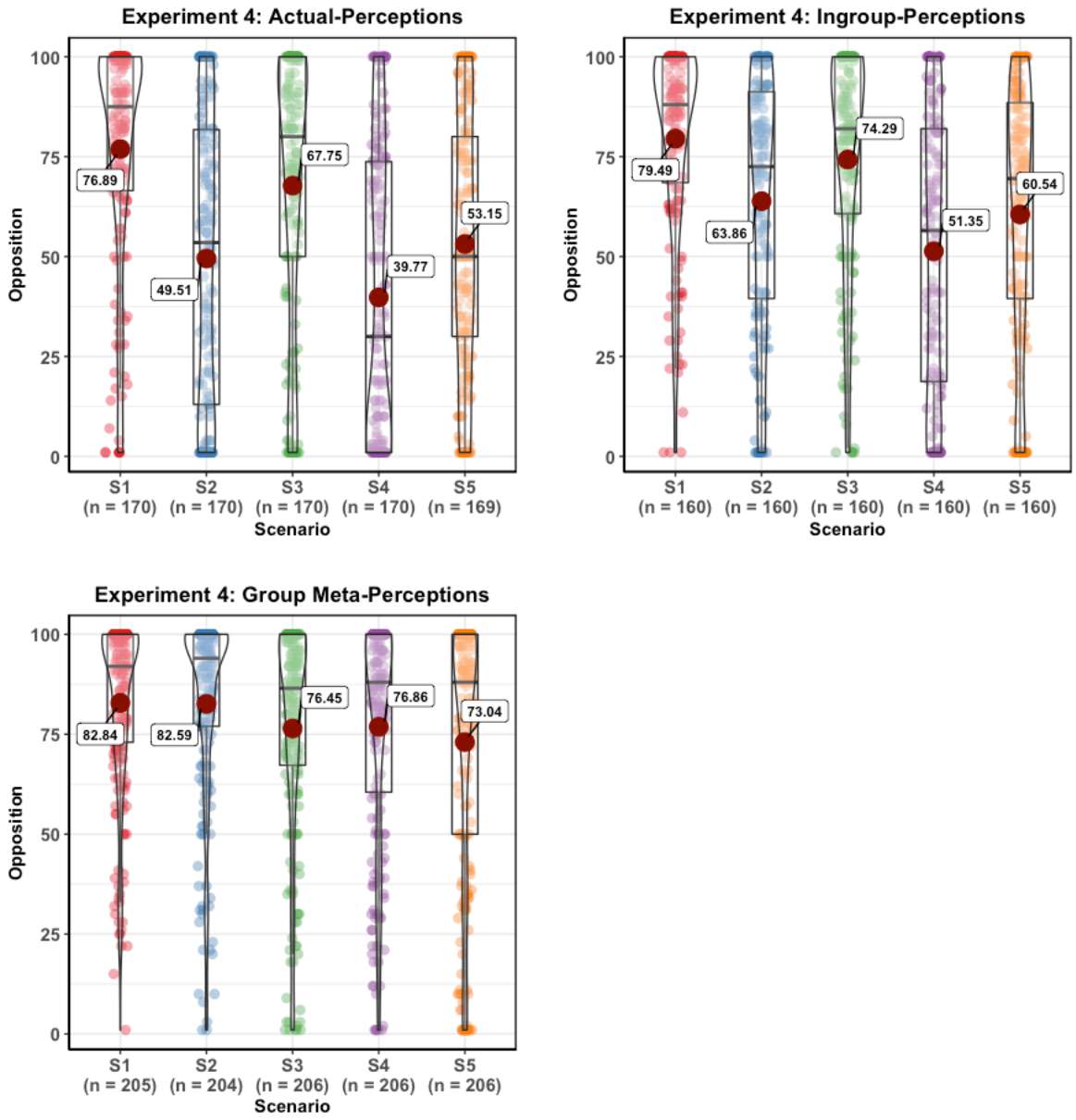
	Female	**Male**
Democrat	187	82
Republican	86	181



Supplementary Figure 1: Distributions of Unacceptability measure by condition and scenario in Experiment 4. Conditions (actual-perceptions, group meta-perceptions, and ingroup perceptions) are between-subjects, and within condition participants read and rated all five Scenarios (S1 – S5). Red dots and corresponding numbers are sample means, the boxplot center lines are sample medians.



Supplementary Figure 2: Distributions of Disliking measure by condition and scenario in Experiment 4. Conditions (actual-perceptions, group meta-perceptions, and ingroup perceptions) are between-subjects, and within condition participants read and rated all five Scenarios (S1 – S5). Red dots and corresponding numbers are sample means, the boxplot center lines are sample medians.



Supplementary Figure 3: Distributions of Opposition measure by condition and scenario in Experiment 4. Conditions (actual-perceptions, group meta-perceptions, and ingroup perceptions) are between-subjects, and within condition participants read and rated all five Scenarios (S1 – S5). Red dots and corresponding numbers are sample means, the boxplot center lines are sample medians.

Demographic Characteristics: Study 5

Collected on Mechanical Turk

Total N = 212

M_{age} = 35.89, SD_{age} = 11.5
120 Women, 92 Men
132 Democrats, 80 Republicans

	Female	Male
Democrat	80	52
Republican	40	40

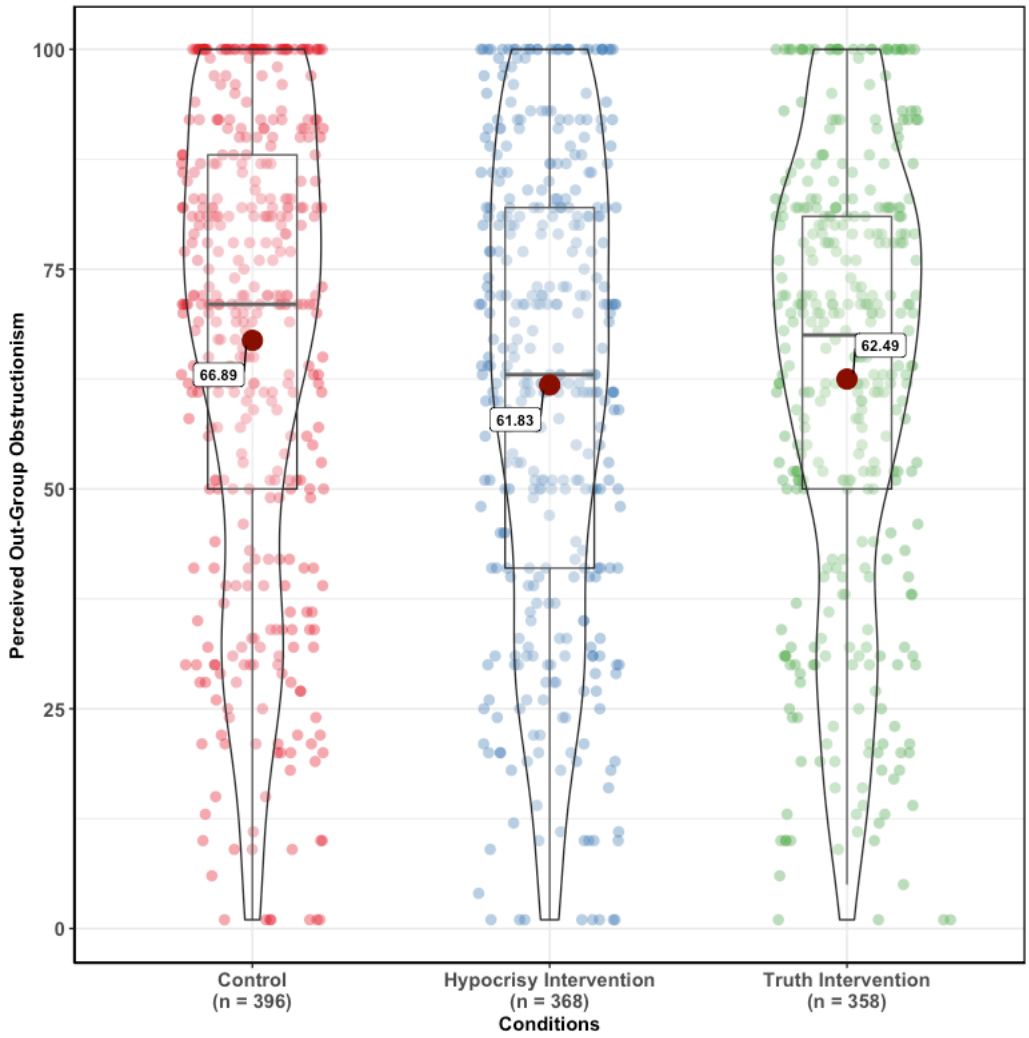
Demographic Characteristics: Experiment 6

Collected on Mechanical Turk

Total N = 1122
M_{age} = 35.1, SD_{age} = 11.6
642 Women, 480 Men
704 Democrats, 418 Republicans

	Control	Hypocrisy Intervention	Truth Intervention
Democrat	253	234	217
Republican	143	134	141

	Female	Male
Democrat	423	281
Republican	219	199



Supplementary Figure 4: Distributions of Obstructionism measure by condition, collapsed across all scenarios, in Experiment 6. Red dots and corresponding numbers are sample means, the boxplot center lines are sample medians. Conditions and scenarios are between subjects.

Experiment 6 "True Values"

In Experiment 6 participants in the intervention conditions were told the true values (i.e. the actual-perceptions) of their out-group and in-group, for the scenario the participant read. Below are those true-values. These values are the mean values, by party and scenario, from the general population sample in Experiment 4.

Supplementary Table 1: True Actual-Perceptions

	Scenario #1	Scenario #2	Scenario #3	Scenario #4	Scenario #5

Dem Actual Disliking	73	45	64	31	49
Dem Actual Unacceptable	73	44	63	33	52
Dem Actual Opposition	76	45	65	31	49
Rep Actual Disliking	74	49	67	46	53
Rep Actual Unacceptable	73	50	69	52	55
Rep Actual Opposition	77	54	71	48	57

Supplementary Methods

Supplemental Experiment A: Convenience Sample Direct Replication of Experiment 3

Supplemental Experiment A is near-identical to Experiment 4 (in the manuscript). It serves as a direct replication of the effects observed in Experiment 4 but whereas Experiment 4 was run using a nationally representative Qualtrics Panel, Supplemental Experiment A was run on Mechanical Turk. It was performed before Experiment 4 was performed, and the data collected in Supplemental Experiment A was used to conduct the power analysis for the preregistration of Experiment 4.

Outside of the sample, the only way that Supplemental Experiment A differed from Experiment 4 was in the placing of the demographic questions. In Supplement Experiment A the demographic questions appeared at the very end of the survey, and asked for participant's gender and age. In Experiment 4, because the experiment utilized demographic quotas, all the demographic questions appeared at the beginning of the survey, and the questions were expanded to include age, gender, ethnicity, education, and income. As such, the addition of the income, ethnicity, and education questions, along with all the demographic questions being at the beginning rather than end of the survey, constitute the only differences between Supplemental Experiment A and Experiment 4. See the manuscript for details on Experiment 4's design. Below are the summary statistics and results.

Total N = 397
M_{age} = 35.4, SD_{age} = 11.0
199 Women, 198 Men
260 Democrats, 137 Republicans

	Actual-P Condition	Ingroup-P Condition	Meta-P Condition
Democrat	80	96	84
Republican	56	40	41

	Female	Male
Democrat	132	128
Republican	67	70

Supplemental Experiment B: Follow Up on Experiment 6

Supplemental Experiment B was an exploratory follow up study with participants who completed Experiment 6. The follow up occurred approximately a week after participants finished Experiment 6. The goal of Supplemental Experiment B was to examine whether the effects observed in Experiment 6, namely the significant reduction of perceived out-group obstructionism in the intervention conditions and moderation of this effect by accuracy, would last for a weeklong period. In short, we found no evidence of the effect of Experiment 6 a week later.

All 1122 participants from Experiment 6 were directly invited (via email through Mechanical Turks interface) to participate in Supplemental Experiment B. We decide a priori that we would attempt to recruit participants for Supplemental Experiment B for a five-day period, at which point we could cease data collection and analyze the data.

Participants, after providing informed consent, provided their political party affiliation, then responded to a general question regarding out-group obstructionism ("Overall, [out-group members] are purposefully obstructing the legislative process", 1-100 sliding scale, "Strongly Disagree" to "Strongly Agree"). Participants then provided their age and gender, and the study ended. Participants were paid $0.50.

In total we collected 886 responses. We then matched participants by gender, Mturk ID, and party affiliation at T1 and T2. This resulted in 64 participants being dropped due to a mismatch in reported political party or gender (8 for gender mismatch, 51 for political party mismatch, 5 for both gender and party mismatch). As such our final sample was N = 822. Supplemental Experiment B was not preregistered. Below are the summary statistics and results.

Total N = 822
479 Women, 343 Men
529 Democrats, 293 Republicans

Participants by Condition at Time 1

	Control	Hypocrisy Intervention	Truth Intervention
Democrat	189	180	160

	Control	Hypocrisy Intervention	Truth Intervention
Republican	102	95	96

	Female	Male
Democrat	325	204
Republican	154	139

Supplementary Analysis

Supplemental Experiment A: *Analysis*

Mixed-effect beta regression analysis revealed significant differences between all three conditions on all three outcome measures. Actual perceptions were lower than in-group perceptions for opposition (b = -0.42, 95% CI = [-0.58,-0.26], OR = 0.66, z = -5.12, $P < 0.001$), unacceptability (b = -0.31, 95% CI = [-0.48,-0.15], OR = 0.73, z = -3.68, $P < 0.001$), and disliking (b = -0.43, 95% CI = [-0.60,-0.27], OR = 0.65, z = -5.28, $P < 0.001$). In-group perceptions were lower than GMPs for opposition (b = 0.73, 95% CI = [0.55,0.90], OR = 2.07, z = 8.22, $P < 0.001$), unacceptability (b = 0.67, 95% CI = [0.49,0.85], OR = 1.96, z = 7.34, $P < 0.001$), and disliking (b = 0.72, 95% CI = [0.54,0.89], OR = 2.05, z = 8.07, $P < 0.001$). The pairwise post-hoc contrasts between actual-perceptions and GMPs were also significant for opposition (b = -1.15, 95% CI = [-1.35,-0.94], OR = 0.32, $t(1969)$ = -13.17, $P < 0.001$), unacceptability (b = -0.98, 95% CI = [-1.19,-0.77], OR = 0.37, $t(1970)$ = -10.98, $P < 0.001$), and disliking (b = -1.15, 95% CI = [-1.36,-0.95], OR = 0.32, $t(1972)$ = -13.15, $P < 0.001$). These results directly replicate the findings from Experiment 4. All these models are main-effects only models, as party-accuracy never significantly interacted with condition for any of the DVs (also replicating the findings from Experiment 4).

Supplemental Experiment B: *Analysis*

To investigate the effect of the T1 intervention and accuracy with T2 perceived obstructionism (M = 75.69, SD = 21.14), we utilized a multiple regression framework, with T2 obstructionism as the dependent variable regressed onto T1 condition (control, truth intervention,

hypocrisy intervention), T1 accuracy (continuous), and an interaction of T1 condition and accuracy.

We find no evidence that obstructionism differed from control in either the truth intervention (b = 2.43, 95% CI = [-2.54,7.42], t(816) = 0.96, P = 0.34) or hypocrisy intervention (b = -1.74, 95% CI = [-6.77,3.30], t(816) = -0.68, P = 0.50), nor was there a significant interaction of T1 accuracy with the truth intervention (b = -0.07, 95% CI = [-0.22,0.09], t(816) = -0.83, P = 0.41) or hypocrisy intervention (b = 0.08, 95% CI = [-0.08,0.25], t(816) = 1.03, P = 0.30). There was, however, a positive linear association between T1 accuracy and T2 obstructionism (r = 0.22, 95% CI = [0.15,0.28], t(820) = 6.43, P < 0.001), suggesting that those who were more inaccurate and overly negative in their group meta-perceptions at T1 perceived their out-group as being higher in obstructionism at T2.