Public Appeals and Collective Crisis Mitigation

Peter Haan, Lea Heursen, Jule Specht, Bruno Veltri, Georg Weizsäcker*

August 2025

Abstract

Arrivals of crises often trigger public appeals from policy leaders, attempting to encourage crisis-mitigating behaviors. We ask whether the tone of an appeal changes its effectiveness, and to what extent policymakers know what tone to use. Using a controlled experiment in a large, general-population sample, we first study the impact of appeals and of their emotional tone on contributions to a well-defined crisis mitigation effort. Two equivalent appeals have either positive-tone or negative-tone wordings, and both increase contributions by about 20% compared to no appeal. Next, a sample of policymakers (n=88) is presented with our design and asked to predict the outcome. Although they correctly predict the impact of the positive appeal, they substantially underestimate the effectiveness of the negative one.

Keywords: crisis mitigation, public appeals, social dilemma, prediction survey, experiment, behavioral economics

*Haan: School of Business & Economics, Freie Universität Berlin and DIW Berlin, phaan@diw.de. Heursen: School of Business and Economics, Humboldt-Universität zu Berlin & CESifo, lea.heursen@hu-berlin.de. Specht: Department of Psychology, Humboldt-Universität zu Berlin, jule.specht@hu-berlin.de. Veltri: School of Business and Economics, Humboldt-Universität zu Berlin, bruno-veltri@hu-berlin.de. Weizsäcker: School of Business and Economics, Humboldt-Universität zu Berlin, weizsaecker@hu-berlin.de. The authors gratefully acknowledge the contributions that Willi Weisflog made in the early stages of this project. They also thank Camilla Karnau, So Jung Lee, Maximilian von Mylius and Fintan Viebahn for valuable research assistance, and the VolkswagenStiftung (project ComExp) and the German Research Foundation through CRC TRR 190 (project number 280092119) for financial support. Further thanks go to audiences at conferences in Hannover and Berlin. The research was approved by Humboldt-Universität zu Berlin School of Business and Economics IRB, #2025-02.

1. Introduction

Fights against societal crises—such as climate change, pandemics, or loss of social cohesion—suffer from collective action problems. Most ways of mitigating a crisis have costs that are borne privately, which creates an incentive to free ride on the actions of others. Regulation and formal institutions can incentivize or enforce certain actions, but the orchestration of a comprehensive turn-around in behavior is difficult, especially when under time pressure—like during the onset of a crisis. At least in the short term, policymakers and other societal leaders thus often resort to public appeals, trying to create a motivational force towards collective action.[1] Indeed, politicians increasingly often employ emotional speech (Gennaro and Ash, 2022) and their policy communications during crises have measurable impact on the public (Haan et al., 2022). We ask about the efficacy of such appeals, and how well it is anticipated. While every crisis is different and the societal leader, when making an appeal, is subject to situational constraints, we focus on a degree of freedom that often remains: the emotional tone of the appeal. More precisely, we ask about the extent that a positive versus negative tone affects the mitigation outcome of a well-defined crisis, and about the degree to which actual policymakers are aware of this potentially differential outcome.[2]

Our data collection proceeds in two steps. First, we conduct a large-group experiment with a participant pool that is designed to be representative of the general U.S. population. Participants interact in groups of 100, where each participant's individual contribution can mitigate the severity of a welfare-destroying crisis at a private cost. We randomly vary, between groups, whether or not they are exposed to a public appeal for crisis mitigation before making choices. Moreover, we randomly vary whether the appeal is framed in a positive or a negative tone, without affecting its information value. A positive appeal emphasizes the collective benefits of collaboration and praises the contributions, while a negative appeal emphasizes the danger of the crisis and denounces free riding.

In the second step of data collection, we ask whether policymakers are aware of the effectiveness of different types of appeals. In a survey among a sizable sample of experts (n=88)—members of German government departments—we summarize our experiment and ask for predictions about the outcome. The experts have experience with policy communication, e.g., in the form of preparing speeches for leading politicians. The sur-

[1] See Appendix A.2 for examples of such public appeals by heads of state in the early phase of the COVID-19 pandemic.

[2] We also note that emotional tone is an attribute that can be studied, and manipulated, even when abstracting from real-world contexts. Our experiment describes, accordingly, a largely abstract crisis situation.

vey therefore measures the extent to which the differences in communication results are reflected in the beliefs of actual policy communicators.

We find that public appeals have a sizable and significant motivating effect: they increase average contributions to crisis mitigation by 20%, almost a third of a standard deviation. The motivating effects of positive and negative appeals are of very similar magnitudes and statistically not different from each other, with very narrow confidence bounds. We also examine whether the effect of appeals varies by relevant characteristics of the contributors—for example by age, gender, income or political affiliation—and find that in all subgroups, the appeals significantly increase contributions but the emotional tone of their delivery does not change the effectiveness. Regarding the policymakers' anticipation, we find that they accurately predict the effectiveness of the positive appeal, but vastly underestimate that of the negative appeal. Instead of anticipating the actual increase by 20%, they expect a mild reduction in contributions in response to the negatively toned appeal. The underestimation is highly significant and we conclude that warnings and other negative wording are effective in a way that is surprising to policymakers.

Our study is related to several strands of the behavioral economics literature. A growing body of work measures behavior in "collective risk social dilemmas", in which individual contributions can reduce the danger of a collective loss, as in Milinski et al. (2008), Tavoni et al. (2011), Barrett and Dannenberg (2014), Barrett and Dannenberg (2016), Blanco et al. (2017), Blanco et al. (2020), Szekely et al. (2021), or McEvoy et al. (2022). Some of these studies demonstrate that communication between players can raise collective mitigation efforts (Tavoni et al., 2011; McEvoy et al., 2022), aligning with previous findings on the effectiveness of between-player communication in commons dilemmas and standard public goods games (see e.g. Isaac and Walker, 1988; Ostrom et al., 1992; Brosig et al., 2003; Bochet et al., 2006; Palfrey et al., 2017). Yet, relatively little is known about the effectiveness of communication by external parties, like in our experiment. In public goods games, normative statements (Dal Bó and Dal Bó, 2014) or exogenously suggested contribution levels (Marks et al., 1999; Barron and Nurminen, 2020) have been shown to raise contributions in the laboratory. For field settings, we know that public appeals can encourage desirable behavior (Reiss and White, 2008; Ito et al., 2018) but may also be ineffective (Fellner et al., 2013) or lose their effectiveness over time (Ito et al., 2018). These effects were demonstrated with a focus on individual decision making rather than social dilemmas.[3] We contribute to all of the above by focusing on public commu-

[3]Related to questions about ocmmunication is the ongoing discussion about the effects of information on the support of climate actions. See, e.g., the demonstrations by Douenne and Fabre (2022), Mildenberger et al. (2022), Dechezlepretre et al. (2023), and Woerner et al. (2024) that the support for climate action inceases, generally speaking, in response to information about policy transmission mechanisms

nication in crisis mitigation, with special emphasis on the tone of the communication.

Our two public contribution appeals are designed to induce either positive or negative emotions. Psychological research identified emotions as a powerful and pervasive driver of decision making (see, e.g., Lerner et al., 2015, for a review). Building on this, some scholars have advocated for a deeper integration of emotions into economic theory (Elster, 1998; Loewenstein, 2000).[4] White et al. (2019) and Brosch (2021) offer comprehensive overviews of research on how emotions—both negative and positive—relate to sustainable behaviors. Brosch (2021) comes to the conclusion that affect and emotions are central to climate change communication. Both positive and negative emotions in climate change communications—hope or optimism and fear or guilt—have been shown to increase intended and actual climate action. Positive and negative appeals may also create different effects in that positive language emphasizes the benefits of action and negative language highlights the losses from inaction. Similar to Kahneman and Tversky's powerful demonstrations that gain/loss framing influences the perception of risk (e.g. Tversky and Kahneman, 1981) there is evidence that message framing can affect prosocial behavior: negative appeals are measured as more effective than positive appeals in encouraging blood donations and charitable giving (Chou and Murnighan, 2013; Erlandsson et al., 2018). In the context of social dilemmas, it has also been shown that positive/negative framing matters for cooperative behavior when the frame is applied to the entire game instead of merely the message (e.g. Andreoni, 1995; Cookson, 2000; Dufwenberg et al., 2011). Here, however, a negative frame is *less* effective in motivating collective action than a positive one.[5] For crisis communication, large-scale experimental evidence from 84 countries reveals that loss-framed health messages regarding COVID-19 increased anxiety compared to gain-framed ones, but had no differential effect on behavioral intentions or information-seeking (Dorison et al., 2022). All of this research points to the fact that a positive public appeal may be differentially effective in encouraging crisis mitigation efforts compared to a negative one, although the direction of the effect is unclear. Relative to this body of previous work on affective communication, we focus on collective action rather than individual decision making.

Lastly, our research relates to the literature on predictions of experimental research (Dreber et al., 2015; Camerer et al., 2016; DellaVigna and Pope, 2018; DellaVigna et al., 2019). Our results highlight that eliciting the predictions of relevant experts can be help-

and climate rebates.

[4]DellaVigna (2009) reviews empirical support for the idea that emotions shape economic decisions in measurable ways.

[5]The negative frame describes contributions as not taking away from a common resource whereas the positive frame describes them as giving to a public good. The paper by van Soest et al. (2016) shows that the action of taking away from a common good changes cooperative dynamics in collective action problems.

ful for assessing the information value of an empirical result. To our knowledge, ours is the first analysis that employs a sample of policy experts to predict the effects of public appeals.

2. Empirical Strategy

We conducted two studies. Study 1, described in Section 2.1, is an experiment on crisis mitigation behavior in a sample representative of the U.S. population in important dimensions (n=2,380). Study 2, described in Section 2.2, measures beliefs about the effectiveness of public appeals to motivate crisis mitigation within an expert sample of policymakers in Germany (n=88).

2.1. Experimental Study: Crisis Mitigation Game

The general setting is a crisis mitigation game, where particpants face a one-shot linear public goods in terms of a crisis that destroys payments in a simple and transparent way. The public good is its mitigation. Participants maximize their individual payoff if they contribute nothing to crisis mitigation, while the group payoff is maximized if everyone contributes everything. In more detail, the experiment has the following features:

Crisis framing, large group size and small marginal per-capita return (MPCR). The linear public goods game is framed in terms of a loss for all group members – the "crisis" (thus named also in the experimental instructions). Each participant has two accounts, a private account ("current account" in the instructions) and a public account ("future account"). The crisis is an exogenous event that arises with certainty and destroys an identical share of every group member's public account. Individual contributions from the private account reduce this share for everyone. Initially, the private account has a balance of 2 USD, while the public account contains 6 USD. Every dollar contributed from an individual's private account increases the *total* group payoff by 1.2 USD, implying a comparatively low marginal-per-capita return (MPCR) of 0.012. In the end, every participant receives the sum of what remains in both accounts. Figure B.1 shows the payoff calculator that participants could use to simulate how different contribution levels would impact individual and group earnings.

The framing in terms of a crisis deviates from existing presentations of one-shot public goods games (see for instance Sonnemans et al., 1998) without changing the monetary incentives and while straightforwardly allowing for our variation in communication. The

large group size and very small MPCR are suitable for our purposes, since they highlight the societal aspect of the crisis and the fact that collective efforts are required for meaningfully lowering the severity of the crisis.[6]

Vocalized instructions and group leader. All participants receive written instructions and in addition, via their electronic devices, they listen to a recording by a fictitious group leader, "James", who reads the experimental instructions out loud. We introduce the group leader so that the person who makes the appeal has a factual authority, in the sense that he also transports the rules of the game and guides the interaction.

In the conditions with appeal, participants may feel compelled to follow James' guidance for a desire to comply with the experiment's objective, which they may infer from the presence of a contribution appeal. However, given our between-subjects design (see Section 2.1.1), it is very unlikely that participants would anticipate that a specific objective is to compare the relative effectiveness of positive versus negative appeals. Thus, any experimenter demand effects should not differentially bias the two appeal conditions.[7]

In a final questionnaire, each participant reports their belief about the average contribution of all participants in their group of 100. Correct guesses or those that were within a 10 Cent range were paid \$0.50. Moreover, participants provide responses about appeal perception (if applicable), and about relevant sociodemographic variables such as gender, age, education and earnings.[8]

2.1.1 *Treatments and Hypotheses*

We randomize participants into one of three groups: a control group (N=790) that receives no appeal and two groups to whom "James" reads a positive (N=789) and a negative appeal (N=792), respectively. The wording of the appeals was analyzed with the Linguistic Inquiry and Word Count (LIWC, cf. Tausczik and Pennebaker, 2010)[9] and the statements contain a high share of positive (positive appeal) or negative (negative appeal) emotion words and none of the respective other category. The statements are designed with the aim of keeping the informational value constant between the positive and negative wordings. Both statements are assertive in the sense of demanding concrete actions. See Appendix A.1 for the exact wording of the appeals and the share of positive

[6]The debate in the literature on the effect of group size and MPCR that started with Isaac and Walker (1988), we set our parameters in order to increase external validity.

[7]Note also that in real-world policy and organizational contexts, the intent of an appeal is explicit, so participants' awareness of the behavioral objective is not an artifact of the laboratory but a feature of how such interventions operate in practice. This enhances the external validity of our appeal treatments (Zizzo (2010)).

[8]The complete instructions, including the questionnaire, are available in Appendix D.

[9]LIWC is one of the most widely used dictionary-based program for quantitative text analysis, counting the share of words falling into linguistic or psychological categories such as, for example, positive or negative emotion words. As of 04.26.24 about 29.600 academic papers on Google Scholar referenced LIWC.

and negative emotion words.

We pre-registered the following hypotheses.[10]

H1: Public appeals increase contributions to crisis mitigation.

Although participants know that the appeal is a mere recommendation and carries no economic consequences, we expect appeals to raise contributions to crisis mitigation. Pre-play communication between players is known to encourage prosocial play in all social dilemma games, including common pool resource games, public good games and collective risk social dilemmas (see, e.g. Isaac and Walker, 1988; Ostrom et al., 1992; Bochet et al., 2006; Tavoni et al., 2011; Palfrey et al., 2017; McEvoy et al., 2022). Evidence on whether communication by an external party can encourage prosocial behavior in social dilemma games is scarce, though a few controlled studies consistently find positive effects in public goods games (Dal Bó and Dal Bó, 2014; Marks et al., 1999; Barron and Nurminen, 2020). For coordination games, there is more evidence that pre-play communication by an external party, advocating for a course of action, can positively influence play, for example, by raising group contributions in a weak-link game (Brandts and Cooper, 2007) or helping subjects to choose the same action in a pure-matching coordination game (Heursen et al., 2023).[11]

H2: Either of the appeals' emotional tones (positive or negative) may increase contributions more than the other.

Like the previous hypothesis, we base H2 on related evidence in the literature. Here, however, the direction of the effect cannot be discerned from previous work. As laid out in the Introduction, both possible directions of the effect of an emotional tone would be consistent with some of the previous findings. While negative appeals were shown to be more effective in blood donations and charitable giving where collective action is not the main concern (Chou and Murnighan, 2013; Erlandsson et al., 2018), a positive framing

[10]Link to pre-registration. In addition to the effect of communication, we wanted to study how the perceived severity of the crisis changes the effectiveness of public communication. To this end, we set up and pre-registered an orthogonal additional treatment that aims to manipulate the perceived crisis severity. However, due to a very weak manipulation of crisis severity perception, the results are inconclusive. We describe the treatments, our pre-registered hypotheses and the results in detail in Appendix C. For the results presented in Section 3, we pool across the two severity conditions, which does not affect our results in any way.

[11]Note, however, that pre-play communication is effective in coordination games or other games with strategic complementarities when it influences higher-order beliefs about other players' strategies. By contrast, in our one-shot crisis mitigation game, no contribution is a dominant strategy without social or reciprocal preferences. Therefore, public appeals may prove relatively ineffective in the type of settings that we study, underscoring the importance of further empirical investigation.

of the entire situation is more conducive to cooperation than a negative framing in social dilemma games (Andreoni, 1995; Cookson, 2000; Dufwenberg et al., 2011).

2.1.2 *Participants and Procedures*

We conducted our experiment online in cooperation with Prolific Academic, recruiting a sample of people living in the United States that is representative in terms of age, state, and a broad concept of race. In total, 2,380 individuals participated in the experiment. The study was programmed in Qualtrics (see Appendix D for experimental instructions). Participants had to correctly answer several mandatory comprehension questions and confirm that their audio devices were functioning properly. The average participant took 15:50 minutes to complete the study and earned $6.96, including $1.60 participation payment.

2.2. Policymaker Prediction

After we conducted and analyzed the online experiment in the US, we surveyed German government employees to see if practitioners of public communication could predict the effectiveness of public appeals. First, we asked them how effective negative and positive public appeals are in general when it comes to motivating individual contributions to crisis mitigation. To this end, we gave them a definition of what positive and negative tone of public communication means, corresponding to the distinction made in this paper.

Second, we elicited the government experts' beliefs about the effectiveness of the two specific appeals in our experiment. Before asking them to provide an estimate for average contributions in each communication treatment, we informed them not only about the details of our experiment (e.g. a description of the US sample, a summary of the study and a link to the full study), but also about the average contribution in the control group. We did this to make their predictions of appeal effects more easily comparable.

A potential concern is that our experimental participants (U.S. general population) and our expert sample (German policymakers) differ in background and context. However, expert forecasts of treatment effects in abstract decision environments like ours often involve experts who are socially and/or culturally distant from the study population (Dreber et al., 2015; DellaVigna and Pope, 2018; DellaVigna et al., 2019). Since our experimental design abstracts from national specifics, we expect the *direction* of the motivational effects of the appeals to generalize beyond the U.S., making it informative to elicit predictions from any policy communication experts.

2.2.1 *Participants and Procedures*

We sent our survey by e-mail to personally acquainted individuals working for German ministries on the federal or state (*Land*) level, asking them to forward the survey to colleagues in their ministries. Within the survey, we used a screening question asking respondents if they were working for a federal or state ministry to filter out unintended accidental recipients. Appendix D reproduces the original survey in German and its English translation. Sample collection was limited to a pre-specified time frame of 22 days in March 2023, which we included in the pre-registration of this survey.[12] To credibly guarantee anonymity of responses, we opted not to compensate participants for their participation or for providing accurate predictions, and we refrained from collecting demographic data.

3. Results

3.1. Crisis Mitigation Experiment Results

Before we present the results of the effects of the appeals and their emotional tones on contributions to crisis mitigation, we provide evidence of how contributions vary across relevant subgroups. This descriptive information is important to interpret the magnitude of the appeal effects and the results on treatment heterogeneity.

Contributions of different subgroups. Table 1 reports average contributions in the control group for several demographic subgroups and subgroups defined by median-sample splits on reported preferences and attitudes. As expected, we find that individuals with an above-median level of altruism provide the highest contributions ($1.10 out of $2 on average). Moreover, individuals older than 45 and women contribute more, compared to younger or male participants. The same holds for individuals who state high support for income redistribution. In contrast, differences by income and education are less pronounced.

Effect of public appeals (H1). Next, we consider the causal effect of public appeals on crisis mitigating behavior. Public appeals have a sizable effect on contributions to crisis mitigation: they increase by about 20%. Participants in the control group contributed $0.98 on average, while participants that received an appeal contributed $1.18 on average. This difference is significant at all conventional levels and large at nearly

[12] Link to pre-registration.

Table 1: Average Contributions in the Control Group by Subgroup

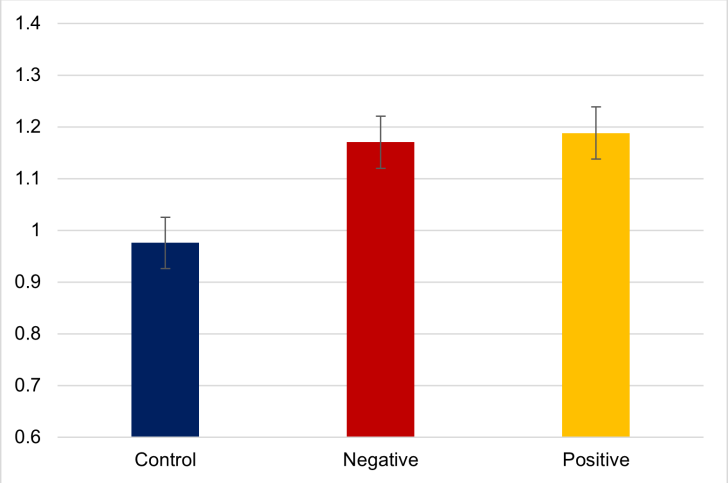
Subgroup	Yes	No	Difference
Demographics			
Age 45+	1.073 (0.037)	0.877 (0.034)	0.196 (0.050)
Female	1.076 (0.033)	0.868 (0.038)	0.208 (0.050)
At least a Bachelor's Degree	0.969 (0.035)	0.983 (0.037)	–0.014 (0.051)
Income over $50k/month	0.934 (0.041)	1.001 (0.032)	–0.067 (0.052)
Preferences: Personal			
Altruist	1.102 (0.035)	0.870 (0.035)	0.232 (0.050)
Risk Averse	0.935 (0.034)	1.020 (0.038)	–0.084 (0.051)
Preferences: Political			
Liberal leaning	1.006 (0.034)	0.938 (0.038)	0.069 (0.051)
Democrat	1.037 (0.036)	0.913 (0.036)	0.124 (0.050)
Pro redistribution	1.037 (0.034)	0.901 (0.038)	0.135 (0.051)

Notes: Numbers are average $ amount contributed out of an endowment of $2. Standard errors in parentheses. All demographic cutoffs were chosen so that the sample split is as close as possible to 50/50. Likewise, preferences are binarized by classifying respondents at the median of some self-reported scale. For example, *Altruist* means respondents state they would give more than the median ($10) out of $100 of a hypothetical lottery prize to charity. *Risk averse* is constructed from responses on an 11-point scale where higher numbers indicate higher willingness to take risks. *Liberal leaning* is constructed from responses on a 5-point scale from "very liberal" to "very conservative" indicating where respondents generally position themselves on policy matters. *Pro redistribution* is constructed from responses on an 11-point scale ranging from "no redistribution" to "full redistribution". See Appendix D for the exact wordings.

30% of a standard deviation. The magnitude of the effect of the appeals is comparable to the effect of high altruism and larger than the difference between any other sub-groups considered in Table 1.

Effect of appeal tone (H2). We find no evidence that average contributions are lower after exposure to a negatively worded appeal compared to a positively worded one. This evidence is consistent with positive and negative appeals being equally effective in increasing contributions to crisis mitigation. In fact, the mean difference is $0.018 with the associated 95-% confidence interval (CI) [-0.053,0.089], which is very narrow. Based on this, we can rule out even very modest differences in appeal effectiveness caused by tone of the appeal. The absence of an effectiveness gap is particularly noteworthy since the two appeals were perceived differently and had a different emotional impact, as we describe below.

Figure 1: Average Contributions to Crisis Mitigation (USD) by Condition



Notes: Bars shows means and whiskers 95%-CIs. Contributions could range from \$0 to \$2.

Appeal perception and emotional impact. After the experiment, we asked participants in the communication treatments to rate i) the perceived tone of the appeal that they heard and ii) what sentiment the appeal evoked in them on a scale from "very negative" to "very positive". Most respondents rated the tone and sentiment in a way that corresponds to the expected effect of each appeal, with the modal perceived tone and evoked sentiment ratings at "slightly negative" for the negative appeal and "positive" for the positive one (see Figure 2a). All average ratings are significantly different from the neutral option ($p < 0.01$). That is, the manipulation was successful in shifting perceived tone and sentiment in the intended direction—albeit more effectively so for the positive appeal. When comparing the tone and sentiment ratings between the two types of appeals, we can conclude that their distributions differ significantly (Wilcoxon-Mann-Whitney test $p < 0.01$).

An assumption that is implicit in our design is that appeals also work *through* their emotional tone and emotional impact, and that both negative and positive emotional tones can motivate contributions. It turns out, however, that the data patterns point to a different conclusion. When we compare contributions conditional on appeal perception, we find that a more positive appeal perception is associated with higher contributions, regardless of which appeal the participants heard, see Figure 2b for the results regarding perceived tone.[13]

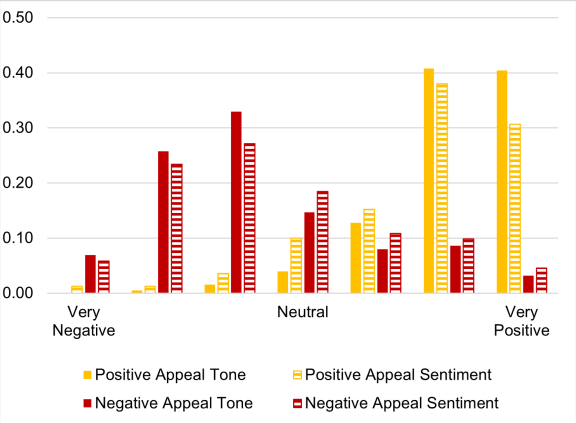
The implication is that the sentiment that an appeal evokes and how its emotional tone is perceived may not be causal for the effect of an appeal. This could point to a

[13]Comparing contributions conditional on evoked sentiment yields a very similar picture.

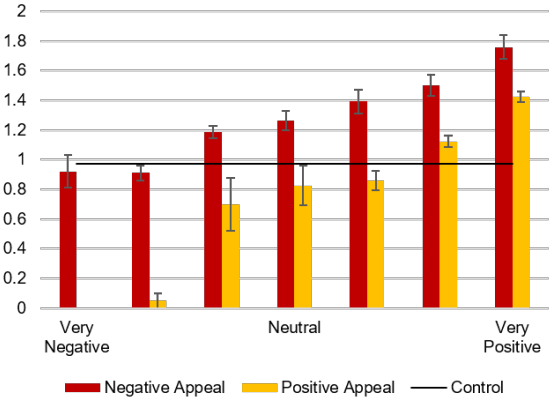
number of possible explanations that invite further investigation. A potential explanation is a taste for authoritative guidance, that is, an appreciation of clear instructions on how to act. Such a taste may cause individuals to perceive the guidance positively, independent of the tone in which it is delivered and, at the same time, make individuals susceptible to act on this guidance.

Figure 2: Appeal Perceptions and Contributions by Appeal Tone

(a) Perceived Tone and Evoked Sentiment by Appeal



(b) Contributions by Tone and Appeal



Notes: Data are presented by experimental condition, Negative Appeal in red (n=793) and Positive Appeal in yellow (n=795). **Panel a)**: Bars show the share of participants in a condition who selected the answer option on the 7-point Likert scale ranging from "very negative" to "very positive". The perceived emotional tone of an appeal is measured with the question "How do you perceive the tone of this statement?" and the sentiment that it invoked with "Does this statement evoke a negative or a positive sentiment in you?" **Panel b)**: Bars show average contributions by perceived appeal tone and whiskers standard errors. The figure for evoked sentiment looks very similar.

Treatment Heterogeneity. We assess treatment heterogeneity across the subgroups defined above (Table 1). First, we test the robustness of our core finding—that positive and negative appeals are similarly effective—within each subgroup. For each, we estimate a linear regression comparing average contributions in the control group to those in the positive and negative appeal groups, and assess whether the resulting coefficients differ. Figure 3a plots the differences in estimated effects alongside 95-% confidence intervals. Across all subgroups but one, we fail to reject the null hypothesis of equal appeal effectiveness, even without corrections for multiple testing.

Second, we find that the overall effect of appeals on contributions is remarkably consistent across subgroups. Pooling across positive and negative appeals in linear regressions, exposure significantly increases contributions relative to the control group in every subgroup (Figure 3b). Moreover, in all cases, subgroup-specific treatment effects are statistically indistinguishable in magnitude from the average treatment effect in the full

sample (Figure 3b).

Why are appeals effective in motivating behavior? Recall that we elicit beliefs about the average contribution in one's own group of 100. While these beliefs are clearly endogenous to one's own contribution, the between-participant differences in these beliefs account for two thirds of the treatment differences: regressions of contributions on the treatment yield treatment coefficients of about 0.20 in the case of bivariate regressions (see column 3 of Appendix Table B.1), versus about 0.07 in regressions where beliefs are included as a right-hand-side variable (see column 1). Notably, for people who we could classify as conditional cooperators based on a separate survey item, the correlation between beliefs and contributions is only slightly larger than for other respondents (estimated coefficient of the interaction term 0.06, see column 2 of Appendix Table B.1).[14] That means that, overall, we find no evidence of appeal effects differing significantly between conditional cooperators and other respondents (column 3). This is inconsistent with the idea that appeals work mainly through a shift in beliefs.

3.2. Policymaker Prediction Results

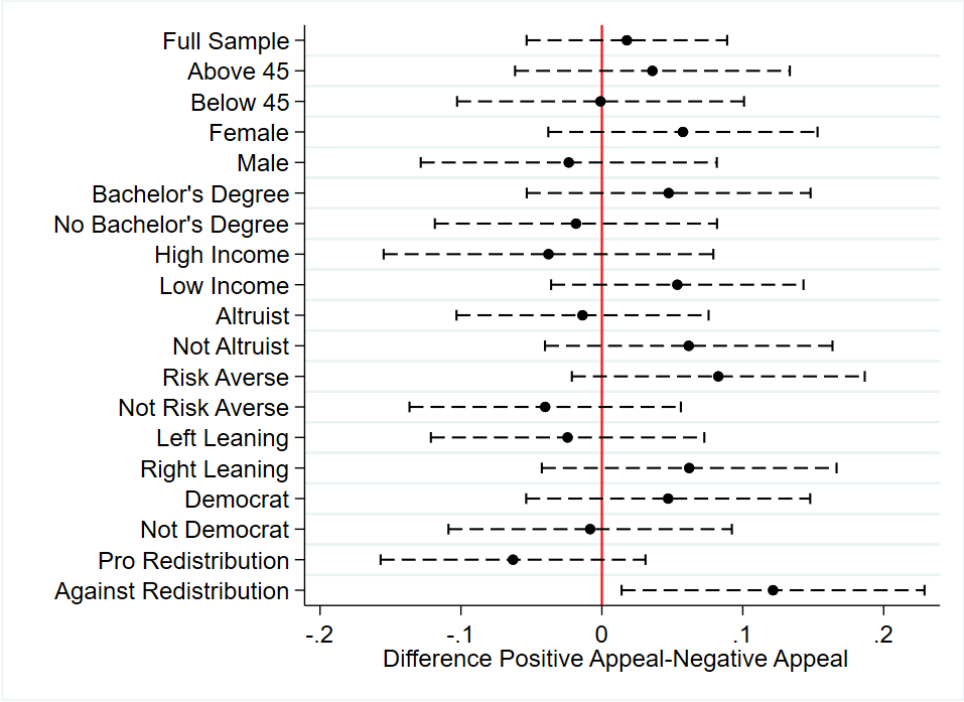
From an ex-ante perspective, it appears unclear whether positive or negative appeals are more effective in motivating crisis mitigation. Policymakers are in a situation similar to an ex-ante state and they decide about the communication design in terms of wording and emotional tone. Therefore, it is important to understand how policymakers think about the role of emotional tone in public communication.

The German government officials whom we surveyed believe, on average, that only positive appeals increases individual contributions to crisis mitigation. Our questionnaire asked, "Can positive/negative appeals motivate prosocial behavior that reduces the risk of a collective damage?", with answers ranging from "strongly decrease motivation (1)" to "strongly increase motivation (7)". The average response is 5.3 for a positive appeal and 4.11 (=no influence) for the negative one. Similarly, for our concrete experiment, the policymakers expect a positive effect for the positive appeal only. With an average predicted contribution level of \$1.23, they predict its size with surprising accuracy. By contrast, they expect the negative appeal to have no effect or even to somewhat decrease contributions, relative to the average contribution level in the control group—the average predicted contribution level is \$0.91 (see Figure 4).

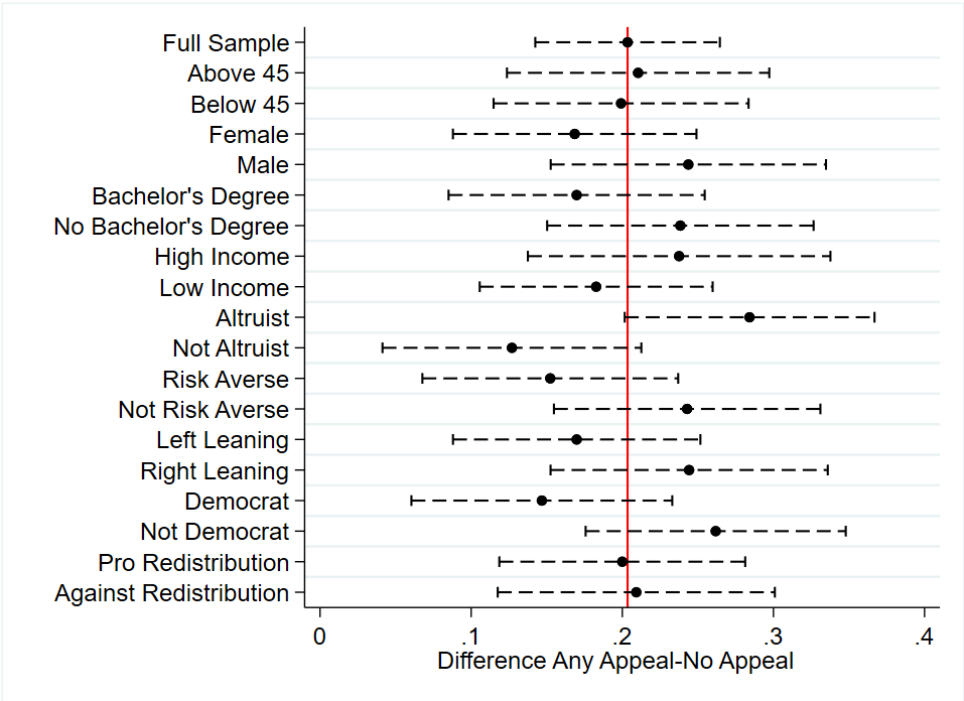
[14]Subjects were classified as a conditional cooperator based on their answers to survey questions in the final questionnaire (see Appendix D for the exact wording). These subjects indicated in hypothetical scenarios, in which the average group member's contribution is known, that they would like to increase their own contribution when others contribute much and decrease it when others contribute little.

Figure 3: Treatment Heterogeneity Across Subgroups

(a) Difference in Positive and Negative Appeal Effectiveness

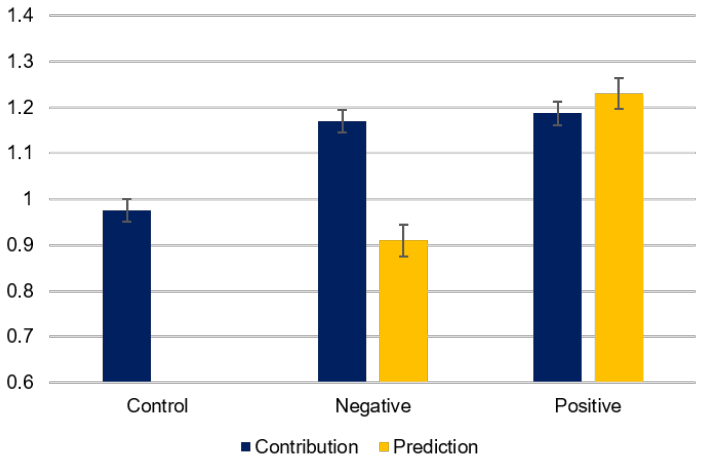


(b) Effectiveness of Appeals (Pooled) Compared to No Appeal



Notes: Each line in the plot shows estimates from a separate regression in the specified subgroup sample. **Panel a)**: Difference in the estimated effect sizes of the positive and negative appeal each compared to the control group with the associated 95-% CI. **Panel b)**: Estimated difference in average contributions in appeal groups (pooled) compared to the control group with the associated 95-% CI. Refer to Table 1 for average contributions levels in the control group in each of these subgroups.

Figure 4: Actual Contributions and Policymaker Predictions by Appeal (USD)



Notes: Bars show mean actual (in blue) or predicted contributions (in yellow) and whiskers standard errors. Each policymaker (n=88) predicted the average contribution amount in both appeal conditions.

Table 2: Policymakers: Professional Expertise in Public Communication and Predicted Contributions

Frequency of Public Communication			**Predicted Contributions**	
	Number	Percent	*Neg. Appeal* Mean (SE)	*Pos. Appeal* Mean (SE)
Less than once a year	3	3.41	0.89 (0.10)	1.18 (0.12)
More than once a year	18	20.45	0.92 (0.09)	1.10 (0.06)
More than once a month	35	39.77	0.93 (0.05)	1.26 (0.04)
More than once a week	32	36.36	0.89 (0.06)	1.27 (0.07)
Experience Level (Self-Evaluation)				
Limited experience	24	27.27	0.93 (0.07)	1.16 (0.05)
Moderate experience	31	35.23	0.90 (0.06)	1.19 (0.06)
Extensive experience	33	37.50	0.90 (0.05)	1.32 (0.06)
Total	**88**	**100.00**	**0.91 (0.04)**	**1.23 (0.03)**

Notes: Frequency of Public Communication are policymakers' answers to the questions "How often do you deal with public communication in your job"? *Experience Level (Self-Evaluation)* is derived from policymakers' responses to the question: "On a scale from 1 (very inexperienced) to 5 (very experienced), how would you assess your experience with public communication in general"? Responses of 1–2 are categorized as *limited experience*, a response of 3 as *moderate experience*, and responses of 4–5 as *extensive experience*. *Predicted Contributions* refer to the average contributions (in $) that policymakers predicted in response to an appeal. Means are presented by frequency of professional engagement in public communication or experience level. Standard errors in parentheses.

One might expect that policymakers' misperception of the effectiveness of public appeals is driven by those with limited expertise in public communication. To assess this possibility, we asked policymakers about both their experience in public communication

and the frequency with which they engage in it professionally. When rating their general experience on a scale from 1 ("very inexperienced") to 5 ("very experienced"), 35% selected the midpoint (3), and 38% chose a higher rating (see Table 2). Moreover, 76% reported engaging in public communication more than once per month, and one in three policymakers does so more than once per week (see Table 2). Table 2 also displays average predicted contributions of policymakers across different levels of experience and engagement in public communication. We find no evidence that greater expertise mitigates the misperception of the effectiveness of the negative appeal. If anything, policymakers who report more frequent engagement and greater experience in public communication appear slightly more optimistic about the effectiveness of the positive appeal than their less experienced peers. This suggests that even among the most experienced policymakers in our sample, there is a substantial underestimation of the effectiveness of negative appeals to motivate contributions to crisis mitigation.

4. Conclusion

Our study offers two sets of conclusions, one for scholars who research public communication, and one for policymakers who professionally engage in it. From a perspective of behavioral economics and communication, it is interesting to observe that appeals are effective in helping to mitigate a collective action problem. We find no evidence that the emotional tone of a public appeal changes its effectiveness. Although our positively and negatively worded appeals were perceived as such and although their effects on contributions were of similar magnitude, there was no association between the intended emotional tone and contributions. Rather, the appeals were uniformly perceived as more positive when contributions were higher.

From a perspective of policymakers, it may be useful to see evidence that appeals have a material effect on behavior in a large and representative sample of individuals living in the United States. Among our sample of German policymakers, who are largely similar to policymakers elsewhere in terms of their job descriptions and experiences, the effectiveness of negative appeals is generally underestimated. It is important to highlight that our study demonstrates the effectiveness of appeals in motivating contributions to a well-defined crisis mitigation effort, particularly when individuals are exposed to the appeal immediately before making their contribution decision. There are many aspects of the environment that may amplify or mute appeal effectiveness, for example, time-lagged or repeat exposure (Ito et al., 2018), political alignment or uncertainty about how behavior contributes to crisis mitigation. Therefore, we interpret our findings as evidence that appeals can help to create a motivational force towards crisis mitigation, and that there is no evidence of them hurting the policymakers' objective. Given their potential

for rapid, large-scale dissemination, such appeals can complement regulatory measures and other institutional mechanisms that promote crisis-mitigating behavior.

While we find no evidence of one type of appeal being more effective than the other to motivate behavior, they may differ on other dimensions, such as the ability to create attention. Evidence by Robertson et al. (2023) suggests that negative wording increases news consumption rates, and to the extent that attention is important for public communication practitioners, a conclusion may therefore be to also incorporate negative wordings, like warnings and admonitions, into their appeals for action.

References

Andreoni, J. (1995). Warm-glow versus cold-prickle: The effects of positive and negative framing on cooperation in experiments. *The Quarterly Journal of Economics*, 110(1):1–21.

Barrett, S. and Dannenberg, A. (2014). Sensitivity of collective action to uncertainty about climate tipping points. *Nature Climate Change*, 4(1):36–39.

Barrett, S. and Dannenberg, A. (2016). An experimental investigation into 'pledge and review' in climate negotiations. *Climatic Change*, 138(1):339–351.

Barron, K. and Nurminen, T. (2020). Nudging cooperation in public goods provision. *Journal of Behavioral and Experimental Economics*, 88:101542.

Blanco, E., Dutcher, G., and Haller, T. (2020). Social dilemmas with public and private insurance against losses. *Journal of Economic Behavior Organization*, 180:924–937.

Blanco, E., Haller, T., and Walker, J. M. (2017). Externalities in appropriation: responses to probabilistic losses. *Experimental Economics*, 20(4):793–808.

Bochet, O., Page, T., and Putterman, L. (2006). Communication and punishment in voluntary contribution experiments. *Journal of Economic Behavior Organization*, 60(1):11–26.

Brandts, J. and Cooper, D. J. (2007). It's what you say, not what you pay: An experimental study of manager-employee relationships in overcoming coordination failure. *Journal of the European Economic Association*, 5(6):1223–1268.

Brosch, T. (2021). Affect and emotions as drivers of climate change perception and action: a review. *Current Opinion in Behavioral Sciences*, 42:15–21. Human Response to Climate Change: From Neurons to Collective Action.

Brosig, J., Weimann, J., and Ockenfels, A. (2003). The effect of communication media on cooperation. *German Economic Review*, 4(2):217–241.

Camerer, C. F., Dreber, A., Forsell, E., Ho, T.-H., Huber, J., Johannesson, M., Kirchler, M., Almenberg, J., Altmejd, A., Chan, T., Heikensten, E., Holzmeister, F., Imai, T., Isaksson, S., Nave, G., Pfeiffer, T., Razen, M., and Wu, H. (2016). Evaluating replicability of laboratory experiments in economics. *Science*, 351(6280):1433–1436.

Chou, E. Y. and Murnighan, J. K. (2013). Life or death decisions: Framing the call for help. *PLOS ONE*, 8(3):1–6.

Cookson, R. (2000). Framing effects in public goods experiments. *Experimental Economics*, 3(1):55–79.

Dal Bó, E. and Dal Bó, P. (2014). "do the right thing:" the effects of moral suasion on cooperation. *Journal of Public Economics*, 117:28–38.

Dechezlepretre, A., Fabre, A., Kruse, T., Planterose, B., Chico, A. S., and Stantcheva, S. (2023). Limited impacts of carbon tax rebate programmes on public support for carbon pricing. *American Economic Review, (forthcoming)*, 14(1).

DellaVigna, S. (2009). Psychology and economics: Evidence from the field. *Journal of Economic Literature*, 47(2):315–72.

DellaVigna, S. and Pope, D. (2018). Predicting experimental results: Who knows what? *Journal of Political Economy*, 126(6):2410–2456.

DellaVigna, S., Pope, D., and Vivalt, E. (2019). Predict science to improve science. *Science*, 366(6464):428–429.

Dorison, C. A., Lerner, J. S., Heller, B. H., et al. (2022). In COVID-19 health messaging, loss framing increases anxiety with little-to-no concomitant benefits: Experimental evidence from 84 countries. *Affective Science*, 3:577–602.

Douenne, T. and Fabre, A. (2022). Yellow vests, pessimistic beliefs, and carbon tax aversion. *American Economic Journal: Economic Policy*, 14(1):81–110.

Dreber, A., Pfeiffer, T., Almenberg, J., Isaksson, S., Wilson, B., Chen, Y., Nosek, B. A., and Johannesson, M. (2015). Using prediction markets to estimate the reproducibility of scientific research. *Proceedings of the National Academy of Sciences*, 112(50):15343–15347.

Dufwenberg, M., Gächter, S., and Hennig-Schmidt, H. (2011). The framing of games and the psychology of play. *Games and Economic Behavior*, 73(2):459–478.

Elster, J. (1998). Emotions and economic theory. *Journal of Economic Literature*, 36(1):47–74.

Erlandsson, A., Nilsson, A., and Västfjäll, D. (2018). Attitudes and donation behavior when reading positive and negative charity appeals. *Journal of Nonprofit & Public Sector Marketing*, 30(4):444–474.

Evans, J. S. B. T. (2003). In two minds: Dual-process accounts of reasoning. *Trends in Cognitive Sciences*, 7(10):454–459.

Fellner, G., Sausgruber, R., and Traxler, C. (2013). Testing enforcement strategies in the field: Threat, moral appeal and social information. *Journal of the European Economic Association*, 11(3):634–660.

Gennaro, G. and Ash, E. (2022). Emotion and reason in political language. *The Economic Journal*, 132(643):1037–1059.

Haan, P., Peichl, A., Schrenker, A., Weizsäcker, G., and Winter, J. (2022). Expectation management of policy leaders: Evidence from covid-19. *Journal of Public Economics*, 209:104659.

Heursen, L., Ranehill, E., and Weber, R. (2023). Are women less effective leaders than men? evidence from experiments using coordination games. Technical report, Discussion Paper.

Isaac, R. M. and Walker, J. M. (1988). Group size effects in public goods provision: The voluntary contributions mechanism. *The Quarterly Journal of Economics*, 103(1):179–199.

Ito, K., Ida, T., and Tanaka, M. (2018). Moral suasion and economic incentives: Field experimental evidence from energy demand. *American Economic Journal: Economic Policy*, 10(1):240–67.

Lerner, J. S., Li, Y., Valdesolo, P., and Kassam, K. S. (2015). Emotion and decision making. *Annual Review of Psychology*, 66(Volume 66, 2015):799–823.

Loewenstein, G. (2000). Emotions in economic theory and economic behavior. *The American Economic Review*, 90(2):426–432.

Marks, M. B., Schansberg, D. E., and Croson, R. T. (1999). Using suggested contributions in fundraising for public good. *Nonprofit Management and Leadership*, 9(4):369–384.

McEvoy, D. M., Haller, T., and Blanco, E. (2022). The role of non-binding pledges in social dilemmas with mitigation and adaptation. *Environmental and Resource Economics*, 81(4):685–710.

Mildenberger, M., Lachapelle, E., Harrison, K., and Stadelmann-Steffen, I. (2022). Limited impacts of carbon tax rebate programmes on public support for carbon pricing. *Nature Climate Change*, 12(February 2022):141–147.

Milinski, M., Sommerfeld, R. D., Krambeck, H.-J., Reed, F. A., and Marotzke, J. (2008). The collective-risk social dilemma and the prevention of simulated dangerous climate change. *Proceedings of the National Academy of Sciences*, 105(7):2291–2294.

Ostrom, E., Walker, J., and Gardner, R. (1992). Covenants with and without a sword: Self-governance is possible. *The American Political Science Review*, 86(2):404–417.

Palfrey, T., Rosenthal, H., and Roy, N. (2017). How cheap talk enhances efficiency in threshold public goods games. *Games and Economic Behavior*, 101:234–259.

Reiss, P. C. and White, M. W. (2008). What changes energy consumption? prices and public pressures. *The RAND Journal of Economics*, 39(3):636–663.

Robertson, C. E., Pröllochs, N., Schwarzenegger, K., Pärnamets, P., Van Bavel, J. J., and Feuerriegel, S. (2023). Negativity drives online news consumption. *Nature Human Behaviour*, pages 1–11.

Sonnemans, J., Schram, A., and Offerman, T. (1998). Public good provision and public bad prevention: The effect of framing. *Journal of Economic Behavior & Organization*, 34(1):143–161.

Szekely, A., Lipari, F., Antonioni, A., Paolucci, M., Ángel Sánchez, Tummolini, L., and Andrighetto, G. (2021). Evidence from a long-term experiment that collective risks change social norms and promote cooperation. *Nature Communications*, 12(1):5452.

Tausczik, Y. R. and Pennebaker, J. W. (2010). The psychological meaning of words: Liwc and computerized text analysis methods. *Journal of language and social psychology*, 29(1):24–54.

Tavoni, A., Dannenberg, A., Kallis, G., and Löschel, A. (2011). Inequality, communication, and the avoidance of disastrous climate change in a public goods game. *Proceedings of the National Academy of Sciences*, 108(29):11825–11829.

Trope, Y. and Liberman, N. (2010). Construal-level theory of psychological distance. *Psychological review*, 117(2):440.

Tversky, A. and Kahneman, D. (1981). The framing of decisions and the psychology of choice. *Science*, 211(4481):453–458.

van Soest, D., Stoop, J., and Vyrastekova, J. (2016). Toward a delineation of the circumstances in which cooperation can be sustained in environmental and resource problems. *Journal of Environmental Economics and Management*, 77:1–13.

White, K., Habib, R., and Hardisty, D. J. (2019). How to shift consumer behaviors to be more sustainable: A literature review and guiding framework. *Journal of Marketing*, 83(3):22–49.

Woerner, A., Imai, T., Pace, D. D., and Schmidt, K. M. (2024). How to increase public support for carbon pricing with revenue recycling. *Nature Sustainability*, 7(December 2024):1633–1641.

Zizzo, D. J. (2010). Experimenter demand effects in economic experiments. *Experimental Economics*, 13(1):75–98.

Appendices

A. Appeals

The Linguistic Inquiry and Word Count (LIWC, cf. Tausczik and Pennebaker, 2010) is one of the most widely used dictionary-based program for quantitative text analysis, counting the share of words falling into linguistic or psychological categories such as, for example, positive or negative emotion words. We used this program to construct the appeals for our experiment and to analyze examples of real-world appeals made by policymakers during the early phase of the COVID-19 pandemic.

A.1. Appeals in Public Goods Game

Positive Appeal: Be generous and contribute to the common good! The more you contribute the more everyone will profit. Help your group succeed and benefit everyone! If everyone in your group works together, you can make matters better.

LIWC: Positive tone words = 22.22%, Negative tone words = 0.00%

Negative Appeal: Don't be selfish. Reduce collective damage! The less you contribute to making the crisis less severe, the more everyone will lose. You will let your group down if you don't minimize the harm to everyone! If your group fails to join forces, then matters will remain bad.

LIWC: Positive tone words = 0.00%, Negative tone words = 12.24%

A.2. Appeal Examples from COVID-19 Crisis

French President Emanuel Macron during televised "Address to the French People" (12 March 2020, source): "The other danger would be that of being too centered on individual self-interest. We can never overcome such difficulties on our own. On the contrary, it's by standing shoulder to shoulder and saying "we" rather than thinking "I" that we'll meet this huge challenge.

This is why I want to tell you this evening that I'm counting on you in the coming days, weeks and months. I'm counting on you because the Government can't do everything alone and because we're a nation. Everyone has their role to play. I'm counting on you to follow current and future guidelines issued by the authorities, particularly the well-known "barrier actions" to combat the virus. Even now, these are inadequately

applied. It means washing your hands long enough with soap or anti-bacterial gel. It means greeting people without kissing them or shaking their hand to avoid passing on the virus. It means keeping a distance of a meter away. These actions may seem insignificant to you. They save lives. This is why, my dear compatriots, I solemnly urge you to adopt them. Every one of us plays a part protecting others, starting with our loved ones."

LIWC: Positive tone words: 5.03%, Negative tone words: 2.01%

German Chancellor Angela Merkel during televised "Address to the Nation" (18 March 2020, source): "I therefore urge you to abide by the rules that will remain in place for the time being. The government will constantly reassess what measures can be adjusted and also what further measures may still be necessary. This is a developing situation, and we will ensure that we continue to learn from it so that we can adjust our thinking and deploy new instruments at any time. If we do so, then we will explain our reasons once again.

Therefore, I call on you to not believe any rumours, but rather only the official messages that we will always translate into many languages. We are a democracy. We thrive not because we are forced to do something, but because we share knowledge and encourage active participation. This is a historic task, and it can only be mastered if we face it together. I have absolutely no doubt that we will overcome this crisis. But how many victims will it claim? How many loved ones will we lose? The answer, to a great extent, lies in our hands. Right now, we can take decisive action all together. We can accept these current limitations and support one another. The situation is serious, and the outcome uncertain. Our success will also largely depend on how disciplined each and every one of us is in following the rules."

LIWC: Positive tone words: 4.02%, Negative tone words: 0.89%

US President Donald Trump during Coronavirus Task Force press briefing (30 March 2020, source): "Our future is in our own hands, and the choices and sacrifices we make will determine the fate of this virus and, really, the fate of our victory. We will have a great victory. We have no other choice. Every one of us has a role to play in winning this war. Every citizen, family, and business can make the difference in stopping the virus. This is our shared patriotic duty.

Challenging times are ahead for the next 30 days, and this is a very vital 30 days. We're sort of putting it all on the line, this 30 days. So important because we have to get back. But the more we dedicate ourselves today, the more quickly we will emerge on the other side of the crisis. And that's the time we're waiting for. The more we commit

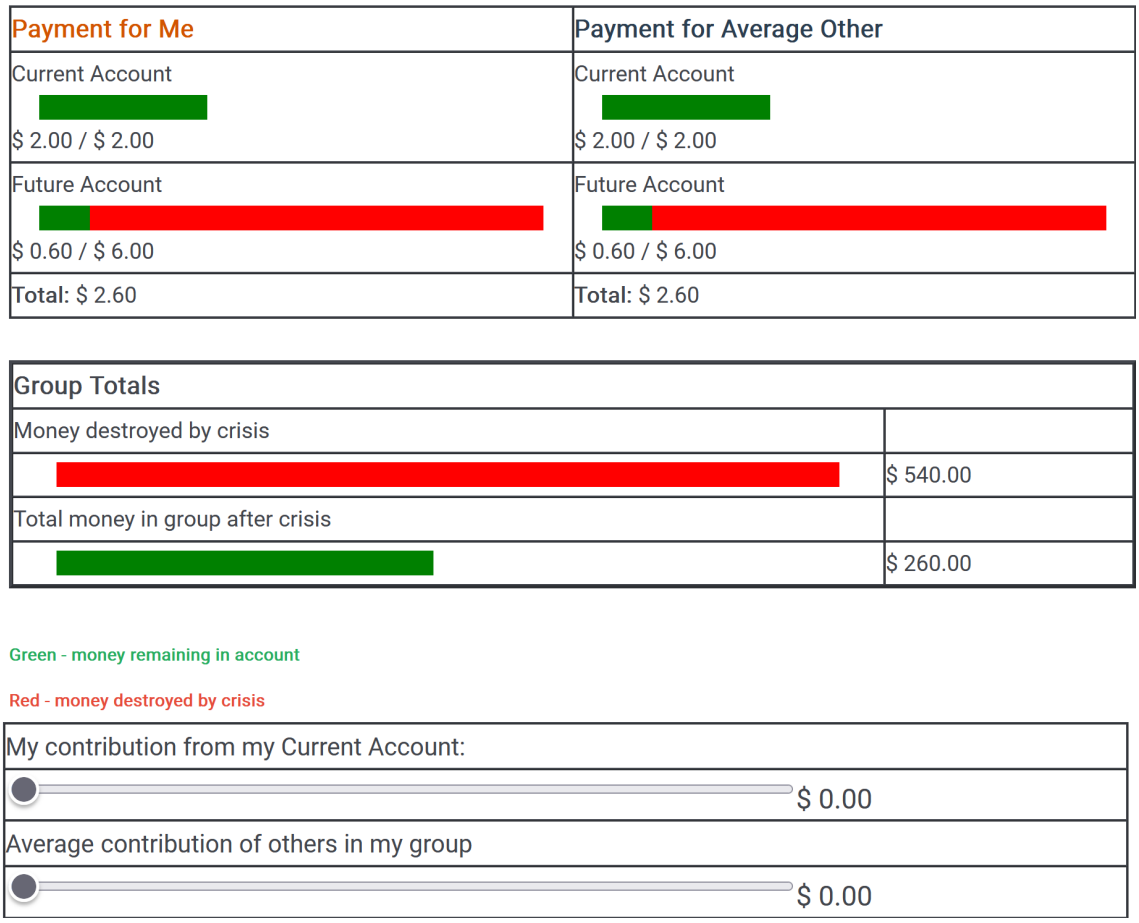
ourselves now, the sooner we can win the fight and return to our lives. And they will be great lives — maybe better than ever."

LIWC: Positive tone words: 5.39%, Negative tone words: 1.8%

Notes: The Linguistic Inquiry and Word Count (LIWC) is one of the most widely used dictionary-based program for quantitative text analysis, counting the share of words falling into linguistic or psychological categories such as, for example, positive or negative emotion words.

B. Figures and Tables

Figure B.1: Payoff Calculator for Participants in Experimental Study



Notes: Participants in the experiment could simulate different payoffs by moving the two bottom sliders. We added this feature to enhance comprehension in this general-population sample.

Table B.1: Linear Regressions Predicting Contributions to Crisis Mitigation

	(1) Contribution	(2) Contribution	(3) Contribution
Negative Appeal	0.071***	0.070***	0.212***
	(0.025)	(0.025)	(0.048)
Positive Appeal	0.061**	0.059**	0.230***
	(0.026)	(0.026)	(0.049)
Conditional Cooperator			0.011
			(0.052)
Negative Appeal x Cond Cooperator			-0.041
			(0.073)
Positive Appeal x Cond Cooperator			-0.040
			(0.073)
Belief	1.013***	1.002***	
	(0.021)	(0.021)	
Belief x Conditional Cooperator		0.056***	
		(0.019)	
Constant	0.045*	0.034	0.971***
	(0.026)	(0.026)	(0.034)
Observations	2,371	2,371	2,371
R-squared	0.515	0.517	0.018

Notes: Linear regressions of amount contributed out of an endowment of \$2 to crisis mitigation. *Positive appeal/ negative appeal* indicate that a participant was exposed to the positive appeal/negative contribution appeal before making their contribution decision. *Conditional cooperator* indicates that a subject was classified as a conditional cooperator based on their answers to survey questions. These subjects indicated in hypothetical scenarios, in which the average group member's contribution is known, that they would like to increase their own contribution when others contribute much and decrease it when others contribute little. *Belief* is how much money a participant believes the average group member has contributed to crisis mitigation out of their endowment of \$2. Standard errors in parentheses. $^{***}p < 0.01$,$^{**}p < 0.05$,$^{*}p < 0.1$

C. Communication and Crisis Severity

The types of systemic crises we consider differ in many aspects and characteristics of a crisis may influence the effectiveness of public crisis communication. We hypothesized that the perceived severity of a crisis may be one such characteristic. Intuitively, a crisis which is very urgent, such as a pandemic, feels more severe and may therefore warrant a different kind of appeal to foster collective mitigation than one whose consequences still feel distant such as climate change. In the following, we describe our precise hypotheses, treatments, and results.

C.1. Treatments and Hypotheses

In an orthogonal sample split, we randomize participants into one of two groups, with the intention of varying the perceived severity of the crisis. In one condition, the crisis destroys 50% of the public account if no participant contributes to crisis mitigation (we call this condition "Low Impact"). In the other condition, it destroys 90% of the public account if no-one contributes ("High Impact"). However, between the groups, the total amount by which contributions can reduce the crisis damage is held constant at 40 percentage points. Therefore, the smallest damage that the crisis can do to the public account is 10% (Low Impact) and 50% (High Impact). The default value of the public account is \$6 in both conditions. That is, also the public good multiplier of each dollar contributed from an individual's private account is the same at 1.2, implying that the marginal individual and social gains of an additional dollar invested remain the same. Effectively, the only economic difference between the two conditions is a minimum guaranteed transfer to participants worth (1-*default crisis damage*)x*public account default value*, which amounts to \$3 (Low Impact) and \$0.6 (High Impact).

We pre-registered the following hypotheses.

H3: Higher perceived crisis severity may increase or decrease average contributions to crisis mitigation.

We did not have a directed hypothesis about the effect of perceived crisis severity itself.

H4: The positive appeal increases contributions more in the low-severity crisis, while the negative appeal increases contributions more in the high-severity crisis.

This hypothesis is consistent with Construal Level Theory (cf. Trope and Liberman, 2010) and with Dual-System Theory (e.g. Evans, 2003). Under both theories, the less "distant" and more severe second version of the crisis (the one with 90% impact) is

likely to invite a representation of lower abstraction and more System-1-immediacy. We hypothesize that this implies a more selfish instinctive reaction and the negative wording may resonate better with this selfish pre-inclination.

C.2. Results

Severity (H3). There is no evidence that our crisis severity treatment changed the average willingness to contribute to crisis mitigation in either the control, negative or positive appeal groups (see Appendix Table C.1).

Interaction of severity and tonality (H4). Descriptively, the data seem to support our interaction hypothesis (cf. Table C.1). The point estimate of the effect of the positive appeal on contributions is higher when the crisis severity is low, while that of the negative appeal is higher when crisis severity is high. However, the difference between the two differences is not significantly greater than zero (p=0.16 for a one-tailed F-test as per our directed pre-registered hypothesis).

Table C.1: Average Contribution by Treatment Cell

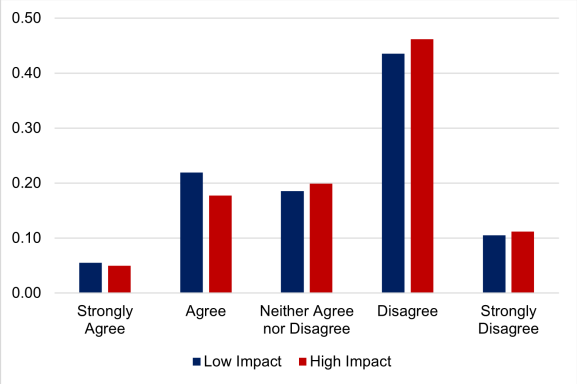
Appeal	High Impact	Low Impact	Difference
Control	0.959 (0.036)	0.992 (0.036)	0.033 (0.051)
Positive	1.165 (0.036)	1.211 (0.037)	0.046 (0.052)
Negative	1.185 (0.036)	1.155 (0.036)	–0.029 (0.051)
Difference-in-Differences:			
Positive vs Negative			0.075 (0.073)

Notes: Standard errors in parentheses.

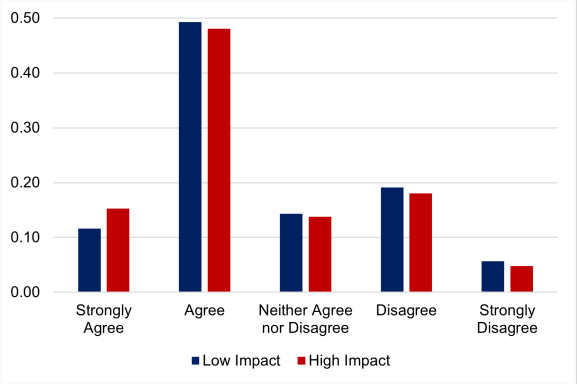
Manipulation of crisis perception. After the experiment, we asked participants to what extent they agreed with the statements that the crisis felt "threatening" to them and that it felt "distant" to them on 5-point Likert scales. We expected that the high impact treatment would be perceived as more threatening and less distant than the low impact treatment. However, evidence for a successful manipulation is weak (see Appendix Figure (C.1).

Figure C.1: Manipulation Checks Perceived Crisis Severity: Low Impact versus High Impact Treatments

(a) Perceived Crisis Distance



(b) Perceived Crisis Threat



Notes: Distributions of perceived crisis severity by impact treatment. **Panel a)**: Agreement with the statement: "The crisis felt distant to me." on a 5-point Likert scale. **Panel b)**: Agreement with the statement: "The crisis felt threatening to me." on a 5-point Likert scale. Low Impact condition: n=1193, High Impact condition: n=1185.

For perceived threat of crisis and distance, the distributions are different according to a Wilcoxon-Mann-Whitney test at the 5% significance level, but the difference is small (see Appendix Figure C.1). Weak manipulation of crisis perception has likely contributed to the statistical insignificance of i) the perceived distance of the crisis on contributions and ii) the interaction effect of appeal type and crisis distance.

D. Instructions

This Appendix presents the original instructions as presented to participants.

1. Instructions Experimental Study
2. Instructions Policymakers
    - German original
    - English translation