Free Assignment: Climate Opinion & Behavior in Social Data Science

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1 Part 1: Study design (survey experiment)

1.1 Introduction and research question

Public beliefs about climate change and support for mitigation policies are strongly structured by ideology and identity, often more than by factual knowledge. Meta-analytic evidence suggests that variables tied to ideology, values, and worldviews are among the most consistent predictors of climate change belief and related attitudes, implying that "more facts" alone is unlikely to close divides at scale (Hornsey et al., 2016).

A complementary line of work highlights that climate polarization is not only about *first-order* beliefs (what I believe), but also *second-order* beliefs (what I think other groups believe). Mildenberger and Tingley (2019) argue that people frequently misperceive others' climate beliefs and that these misperceptions matter for political behavior because policy support often depends on expectations of reciprocity (e.g., whether others will also do their part).

At the same time, Campbell and Kay (2014) show that individuals can reject climate science or downplay environmental problems partly because they dislike the policy solutions they associate with the problem ("solution aversion"). If solution preferences shape acceptance of the problem, then interventions that only correct scientific facts may be limited. A promising direction is therefore to target (i) perceived *in-group* norms and (ii) the *type of solution* people have in mind when they think about climate policy.

Research question. Can providing accurate information about in-group climate policy support (a second-order belief intervention) reduce solution aversion and increase support for climate mitigation policies—especially among right-leaning respondents?

1.2 Theory and contribution

Second-order beliefs and reciprocity. Climate policy has a classic collective-action structure: individuals may support mitigation when they believe others will do so as well. Mildenberger and Tingley (2019) show that citizens and elites often underestimate the degree to which other groups acknowledge climate change and support action; experimentally correcting these beliefs can increase cooperative policy preferences by shifting perceived reciprocity.

Solution aversion. Campbell and Kay (2014) demonstrate that people sometimes adjust their factual beliefs to align with preferred solutions: if the salient solution implies disliked government

regulation, individuals with strong free-market ideology may become more skeptical of the problem itself. This implies that climate communication could backfire if it primes unpopular solutions. It also suggests that solution *frames* (e.g., market-based vs. regulatory) should be treated as causal inputs to belief and policy support.

Why this study. Existing research has typically studied second-order beliefs and solution aversion in parallel. The planned study integrates them in a single design to test whether correcting perceived in-group norms can (a) raise policy support directly and (b) attenuate the negative effect of regulation-salient framing among people prone to solution aversion. This integration matters for both theory (linking norm expectations to motivated disbelief) and practice (designing messages that increase support without relying on pure information deficit models).

1.3 Hypotheses

Let $N_i \in \{0, 1\}$ denote whether respondent i receives a norm-correction treatment about in-group policy support, and let $S_i \in \{0, 1\}$ denote whether respondent i receives a regulatory-solution frame (vs. a market-based frame).

- **H1 (Solution aversion main effect).** Relative to a market-based solution frame, a regulatory-solution frame reduces (i) climate change belief certainty and (ii) support for mitigation policies among right-leaning respondents (Campbell and Kay, 2014).
- **H2 (Norm correction main effect).** Providing accurate information about in-group policy support increases support for mitigation policies by increasing perceived in-group support and perceived reciprocity (Mildenberger and Tingley, 2019).
- **H3 (Mitigation of solution aversion).** Norm correction attenuates the negative effect of the regulatory frame on policy support (i.e., N_i moderates the effect of S_i), with the strongest moderation among respondents with high free-market ideology.

1.4 Methods

1.4.1 Design overview

The study is a preregistered online survey experiment with a 2×2 between-subjects design:

	Market-based frame	**Regulatory frame**
Control (no norm correction)	Group A	Group B
Norm correction	Group C	Group D

The order is: background measures → random assignment to solution frame → (optional) norm-correction information → outcomes.

1.4.2 Participants and sampling

I will recruit approximately $N \approx 1{,}200$ adult respondents via an online panel (e.g., Prolific) with stratification on self-reported ideology to ensure sufficient precision for right-leaning subgroups. A practical target is roughly 40% right-leaning, 40% left-leaning, 20% moderate/other. Exclusion criteria (pre-registered) include failed attention checks and speeders (e.g., completing the survey in less than one-third of median completion time).

Context. The main study context is Denmark (the course setting), but the design can be replicated in Italy or other ESS-participating countries using the same instrument and analysis.

Sample size and precision. With a 2×2 design, $N \approx 1{,}200$ implies roughly 300 respondents per cell. This is chosen to (i) estimate main effects with reasonably tight confidence intervals and (ii) retain usable precision for interaction tests (norm correction $\times$ framing) without inflating the design with many extra factors. The analysis will report effect sizes with confidence intervals and will treat the interaction tests as the primary confirmatory moderation.

1.4.3 Treatments

Solution-frame manipulation (S_i). Participants read a short vignette describing a national climate policy package. The *market-based* version emphasizes a revenue-neutral carbon fee-and-dividend and competition-driven innovation; the *regulatory* version emphasizes standards/mandates and stricter regulation of high-emission sectors. The two vignettes are matched in length, urgency, and stated goal (emission reductions), differing primarily in the policy mechanism.

Norm-correction manipulation (N_i). Participants receive (or do not receive) a short "what people like you think" message: a chart and one paragraph summarizing *true* in-group support rates for (i) acknowledging climate change and (ii) supporting at least one mitigation policy. The in-group is defined by participants' self-identified political orientation (e.g., right-leaning vs. left-leaning). The norm values will be taken from an established public source such as the European Social Survey (ESS) or the European Social Survey (ESS) Round 8 climate change and energy module (or the most recent comparable Eurobarometer/ESS item) for the relevant country and ideological subgroup (reported transparently in the debrief). The message explicitly notes the source and sample size to increase credibility.

1.4.4 Measures

Manipulation checks. To verify that the treatments operate as intended, the survey includes (i) a recall item asking respondents whether they saw any information about public support percentages (yes/no and open numeric), and (ii) items measuring perceived "regulatory" versus "market-based" emphasis of the policy description (1–7). These will be used descriptively; the primary causal estimands remain based on randomized assignment.

Pre-treatment covariates.

- Political ideology (0–10 scale) and party identification.
- Free-market ideology / preferences for regulation (short scale).
- Climate concern at baseline (brief measure to assess ceiling effects).

Mediators (post-treatment).

- Perceived in-group support for climate action (second-order belief; 0–100% estimate).
- Perceived reciprocity / collective efficacy (e.g., agreement with "If people like me support climate action, politicians will act"; 1–7).

Primary outcomes.

- Policy support index (carbon pricing, clean energy subsidies, regulation standards; 1–7 each; averaged).
- Behavioral intention: willingness to sign a petition or contact a representative about climate policy (binary + intention strength).

Secondary outcomes.

- Belief certainty that climate change is happening and primarily human-caused (0–10).
- Support for the specific policy described in the vignette (0–10).

1.4.5 Data analysis plan

The main estimand is the average treatment effect on the policy-support index. The primary model is an OLS regression with interactions:

$$Y_i = \beta_0 + \beta_1 N_i + \beta_2 S_i + \beta_3 (N_i \times S_i) + \gamma^\top X_i + \varepsilon_i,$$

where X_i includes preregistered covariates (ideology, party ID, baseline concern, demographics). Hypotheses map to:

- H1: $\beta_2 < 0$ among right-leaning respondents (estimated via interaction with ideology or subgroup analysis).
- H2: $\beta_1 > 0$.
- H3: $\beta_3 > 0$ (norm correction reduces the negative effect of the regulatory frame).

Mediation. To test the mechanism in H2, I will estimate whether changes in perceived in-group support and reciprocity mediate the effect of N_i on Y_i, using standard causal mediation approaches with sensitivity analyses (reported as exploratory).

Multiple outcomes. The policy-support index is the preregistered primary outcome. Other outcomes will be reported with appropriate adjustment (e.g., Holm correction) and interpreted cautiously.

1.4.6 Ethics and limitations

Ethics. The norm-correction message uses truthful, sourced statistics; no deception about the existence of the underlying survey. Participants will be debriefed that the study tests how people respond to different types of information about climate policy.

Limitations. First, online panels may not perfectly represent the electorate; I will describe sample characteristics and discuss generalizability. Second, the effectiveness of norm correction depends on credibility and trust; effects may vary by institutional trust. Third, short exposure may not produce durable attitude change; follow-up waves would be valuable but are beyond the scope of this design.

1.5 Appendix reference: example dataset

A small example dataset (toy) showing the planned structure of the data (units of analysis and variables) is provided in Appendix 3 as both a table and a CSV file.

2 Part 2: Research article review

2.1 Selected article

This review critically examines Mildenberger and Tingley (2019), which introduces the concept of *second-order climate beliefs* (beliefs about others' beliefs) and argues that these perceptions shape climate politics by influencing expectations of reciprocity and collective action.

2.2 1. Research objectives, theory, and course relevance

A persistent puzzle in climate politics is why mitigation policy support lags behind the (often substantial) public acceptance of climate change. A common explanation emphasizes ideology, identity, and motivated reasoning (Hornsey et al., 2016). Mildenberger and Tingley (2019) build on this, but shift attention from what individuals believe to what they *think others believe*. Their key theoretical claim is that climate mitigation resembles a collective-action problem: if people underestimate others' willingness to act, they may withhold their own support even when they personally acknowledge the problem.

This perspective fits directly with core themes from the course: the role of norms and expectations, the social nature of opinion formation, and the gap between attitude and action. It also complements work on communication strategies that emphasize social norms and efficacy as routes to engagement (van der Linden et al., 2015). At the same time, the paper sits in tension with purely "information deficit" approaches: even if people are informed about climate science, misperceptions of others' beliefs can still block cooperation.

2.3 2. Method, data, and rationale

Mildenberger and Tingley (2019) use a multi-method research design: several surveys (spanning different samples and political populations), plus experiments that manipulate information about others' climate beliefs.

Across surveys, the authors measure:

- **First-order beliefs:** respondents' own views about climate change and/or climate policy.
- **Second-order beliefs:** respondents' estimates of what *other groups* believe (e.g., other partisans, elites, or citizens in another country).
- **Policy preferences:** support for mitigation actions and willingness to cooperate.

They motivate the choice of second-order beliefs by drawing on theories of collective action and strategic interaction: individuals update their preferences based on perceived cooperation by others. Methodologically, the paper's strength is that it does not rely on a single dataset or a single operationalization. Instead, it triangulates: do misperceptions exist, do they vary systematically by group, and do they matter for policy support when manipulated?

2.4 3. Main results and evaluation of the analytical approach

The paper reports three central findings.

(i) Widespread misperceptions of others' climate beliefs. Respondents systematically underestimate the extent to which other groups accept climate change and support action. These errors appear consistent with a form of "egocentric" projection plus partisan stereotypes: people assume the out-group is less concerned than it is.

(ii) Second-order beliefs predict climate policy preferences. Even controlling for respondents' own beliefs, second-order beliefs are strongly associated with support for cooperative climate action. This is consistent with the paper's core theoretical mechanism: expectations about others shape whether action seems worthwhile.

(iii) Informational interventions can shift preferences. A particularly informative test updates Americans about *Chinese* public beliefs. In the experiment, the treatment increases expected Chinese compliance with a global climate agreement by about 0.35 points on a 0–10 scale (relative to control). The authors also report that a substantial share of the treatment effect operates through updated second-order beliefs about Chinese public support and willingness to act, consistent with the coordination logic: when people expect others to do their part, cooperative policy becomes more appealing.

The paper further documents heterogeneity: treatment effects are smaller among more conservative respondents. This pattern is consistent with motivated reasoning and with the possibility that factual updates collide with ideological "solution" priors (Campbell and Kay, 2014).

In experimental components, providing information about others' climate beliefs increases willingness to cooperate and support policy, with effects partly mediated by updated expectations of others' cooperation. The authors also use text responses and topic modeling to probe mechanisms in participants' reasoning, strengthening the interpretation that reciprocity beliefs are central.

Overall, the analytical approach is appropriate for the question: the combination of descriptive evidence, correlational models with controls, and experiments supports a credible causal story. The experiments are particularly valuable because they help address the usual concern that second-order beliefs might simply proxy for ideology or affective polarization.

2.5 4. Strengths, weaknesses, and future research

Sharper concerns and alternative explanations. Three additional issues are worth emphasizing:

- **Demand and experimenter-desirability effects.** Being shown "true" distributions may signal what the researcher thinks is correct or socially desirable, especially on moralized issues like climate change. A stronger design would vary the *source* (government vs independent pollster vs partisan messenger) and measure trust in the source.
- **Reference group ambiguity.** Second-order beliefs are measured about broad populations ("Americans," "Chinese public"). In practice, people may coordinate primarily with narrower in-groups (party, community, workplace). Future work could test whether updating *in-group* norms (e.g., "people like you") has larger or more durable effects than updating population-wide estimates.
- **Mechanism competition.** The treatment might increase treaty support not only through reciprocity expectations but also through shifts in perceived moral legitimacy ("others care, so I should care") or through reduced out-group derogation. Measuring multiple candidate mediators and using design-based identification (e.g., sequential treatments) would help separate these channels.

Strengths.

- **Conceptual contribution:** The second-order belief framework is simple, intuitive, and links naturally to collective-action theory.
- **Triangulation:** Multiple samples and methods reduce the risk that results depend on one operationalization or context.

- **Mechanism evidence:** The use of mediation and qualitative/open-ended responses helps connect the treatment to the proposed reciprocity channel.

Weaknesses and limitations.

- **External validity and durability:** Many survey experiments measure short-term updates. The paper provides limited evidence about whether norm-correction effects persist over time or translate into real behavior (e.g., turnout, donations).
- **Credibility and trust:** Norm information is only persuasive when seen as credible. Effects may therefore depend on trust in institutions or on prior conspiratorial beliefs, which could generate heterogeneity not fully captured.
- **Scope of "others":** The choice of reference group matters. Beliefs about national publics, local communities, and partisan elites may play different roles. The paper focuses on a subset of salient groups; future work could test which reference group is most behaviorally relevant.

Future research directions. Two extensions seem especially promising given course themes:

1. **Field interventions in real communication environments.** Building on best-practice recommendations to make messages local and socially grounded (van der Linden et al., 2015), researchers could test norm-correction in real media ecosystems, where partisan cues and elite messaging may shape whether information is accepted.
2. **Interaction with motivated reasoning and solution preferences.** The paper's framework can be integrated with solution aversion (Campbell and Kay, 2014): if people dislike certain solutions, norm-correction might be more effective when paired with a solution frame that reduces defensiveness (e.g., market-based policies). This motivates the study design in Part 1.

2.6 5. Broader societal implications

If second-order misperceptions depress support for climate policy, then correcting those misperceptions could be a relatively low-cost complement to other interventions. In practical terms, the paper suggests that communicators might focus less on persuading individuals that climate change is real (where ideology-driven motivated reasoning is strong (Hornsey et al., 2016)) and more on correcting beliefs about how much *others* already agree and are willing to act.

However, this raises ethical and political questions. Norm-based messaging can be used responsibly when it is truthful and transparent about sources, but it can also be abused via selective statistics or manufactured consensus. Moreover, making group norms salient may backfire if it heightens partisan conflict or triggers reactance. From a policy perspective, the most defensible implication is not "use norms to manipulate," but "reduce information frictions about true public support" so that collective action is not blocked by pessimism about others.

In sum, Mildenberger and Tingley (2019) offers a compelling and testable mechanism that bridges public opinion research and collective-action theory. It clarifies why climate politics can remain stuck even when many individuals privately accept the problem, and it provides an intervention logic that can be combined with other approaches (e.g., moral framing, messenger choices, or policy framing) to build more durable support for mitigation.

3 Part 3: Discussion questions

1. Lecture 1: Hornsey, M. J., Harris, E. A., Bain, P. G., & Fielding, K. S. (2016): If ideology consistently outweighs knowledge in predicting climate change beliefs, what does this imply for policies or interventions that focus primarily on information campaigns and science communication? Are such approaches fundamentally limited?
2. Van der Linden, Sander, Edward Maibach, and Anthony Leiserowitz.: The authors argue that climate change communication should emphasize personal, local, and experiential framing rather than abstract, global, and analytical information. How realistic is this recommendation in large-scale climate communication (e.g., national policies, international campaigns, or social media platforms), and what trade-offs might arise between making messages locally relevant and maintaining scientific accuracy and consistency across contexts?
3. Lecture 2: Feinberg, Matthew, and Robb Willer: The article suggests "moral reframing" to reduce polarization. Is it a good idea to tailor climate messages to different moral values, or is that manipulative? Where is the line?
4. Campbell, Troy H., and Aaron C. Kay.: Is it possible that some people reject climate change mainly because they dislike the policies linked to it, not because they doubt the science?
5. Lecture 3: Fielding, Kelly S., and Matthew J. Hornsey: If climate change attitudes follow group identity and ingroup norms, does that mean "more facts" campaigns are often the wrong tool? What would a realistic intervention look like that uses ingroup messengers (or a shared "superordinate identity") to reduce polarization without feeling manipulative?
6. Scruggs, Lyle, and Salil Benegal: The paper shows climate belief drops among Republicans, Independents, and even Democrats. If it's not only partisanship, what else could explain the shared decline?
7. Lecture 4: Jill E. Hopke (2019): Hopke measures "issue attention" as whether climate terms appear in heatwave/wildfire stories. Does a simple "mention" really capture meaningful climate framing/attribution, or could it miss (or overcount) the real climate connection?
8. Merkley, Eric, and Dominik A. Stecula : The paper says Democratic climate cues can increase Republican skepticism. Does that mean "talking about climate" can backfire? When, and what should communicators do instead?
9. Lecture 5: Hoffmann, Roman, Raya Muttarak, Jonas Peisker, and Piero Stanig: The paper finds climate shocks (heat/drought) relate to more Green voting, but the effect is weaker in already-warm/poorer regions. Why might people who face climate impacts more directly be less likely to shift toward Green politics and what would that mean for climate communication?
10. Kronborg, Anton, Frederik Hedegaard, Isak Klindt, Clara Vandeweerdt: If disasters increase green voting, does that create a perverse political incentive to 'benefit' from catastrophes and how should we talk about that ethically?
11. Lecture 6: Nielsen, K. S., Nicholas, K. A., Creutzig, F., Dietz, T., & Stern, P. C. (2021) : Nielsen et al. frame high-SES people as gatekeepers of decarbonization through investment choices, organizational power, social signaling, and political influence so the "problem" isn't only individual lifestyle but also who steers systems. The discussion can focus on where responsibility and leverage really sit, and what kinds of interventions risk becoming symbolic rather than reducing emissions.
12. Lecture 7: Haugestad, Christian AP, Anja Duun Skauge, Jonas R. Kunst, and Seamus A. Power : In the paper, youth activists describe climate change as a shared, structural responsibility and argue that focusing on individual blame is ineffective yet the authors also find that collective guilt and group identification/efficacy help predict protest intentions. How can a movement avoid "blaming individuals" while still generating enough moral pressure to mobilize collective action and would this balance work the same way outside a privileged "oil-economy" context like Norway?
13. Schürmann, Lennart. 2023. : Schürmann finds that more local Fridays for Future protests in an MP's district are followed by more climate-related communication, but the pattern differs by arena (movement mentions on Facebook vs policy talk in parliament) and seems stronger later rather than immediately so what mechanism do you think is actually driving the change: constituent pressure, media attention, party strategy, or something else, and how would each mechanism predict different communication behavior across these arenas?
14. Lecture 8: Nielsen KS, Brick C, Hofmann W, et al. (2022) : Given that people who see themselves as "green consumers" may still have high clothing-related emissions, how could policymakers or companies design interventions that close the "motivation impact gap"? For example, would better product labeling, circular

fashion systems, or consumption limits make a difference?

15. Koller K, Pankowska PK and Brick C (2023): If people overreport their environmental behavior because being "green" has become part of a desirable social identity, are self-identified environmentalists helping or harming the climate movement? Could the pressure to appear sustainable actually discourage honest reflection and genuine change?
16. Lecture 9: Carlsson, F., Gravert, C., Johansson-Stenman, O., & Kurz, V. (2021). : Most green nudge studies reviewed were conducted in Western contexts (e.g., Europe, North America). Question: How transferable do you think these results are to other cultural or economic settings for example, in low-income countries or collectivist cultures? Would moral or pure nudges work differently there?
17. Gravert, C., & Mormann, M. (2025): The study tested two in-store interventions highlighting the single-unit price and adding a simple reminder ("I am happy to come home with you if you will eat me"). Both reduced overpurchasing. Question: If you were designing a national strategy to reduce food waste, would you focus on scaling these behavioral interventions, or would you try to eliminate multi-unit promotions altogether?
18. Lecture 10: Wyss AM, Knoch D and Berger S (2022) : Wyss et al. find that proenvironmental attitudes translate into action mainly when personal costs are low, environmental benefits are salient, and individuals have strong self-control. Considering Klöckner's findings about habits and behavioral control, do you think self-control should be viewed as a stable individual trait or something that policies can meaningfully influence? How might policymakers design interventions that reduce the attitude–behavior gap without relying on individuals' self-control capacities (e.g., default rules, structural changes, incentives)?
19. Klöckner CA (2013) : Klöckner's comprehensive model shows that habits, perceived behavioral control, and personal norms directly shape environmental behavior, while values and attitudes operate indirectly. How does this challenge common policy approaches that focus mainly on "changing attitudes"? In real-world contexts (e.g., recycling, transportation, energy use), do you think interventions targeting habits or perceived behavioral control might produce more durable behavioral change than those targeting attitudes alone? Why or why not?
20. Lecture 11: van Valkengoed AM, Abrahamse W and Steg L (2022): The authors argue that 'Choice Architecture' (nudging) is effective for specific contexts but relies on automatic processing and may not last once the intervention is removed. In contrast, targeting 'Environmental Self-Identity' is harder but can lead to broader lifestyle changes. Given the urgent timeline of the climate crisis mentioned in the introduction (40-70% emission reduction needed by 2050), should policymakers prioritize the immediate, reliable wins of nudging, or is the 'slow and deep' work of changing identity necessary despite the time it takes?
21. Bergquist M, Thiel M, Goldberg MH, et al. (2023) : The authors found that interventions were most effective at reducing littering but least effective at changing transportation habits. Since transportation has a massive carbon footprint compared to littering, are current behavioral interventions distracting us with 'easy wins'? Should we stop funding interventions for low-impact behaviors like littering and focus entirely on the difficult task of changing transportation, even if the success rate is currently low?
22. Lecture 12: Soutter ARB, Bates TC and Mõttus R (2020) : The paper suggests tailoring environmental messaging based on personality traits for example, emphasizing personal profit for people low in honesty–humility. Should policymakers ethically use personality-targeted framing to promote climate actions, or does this risk manipulation? Where should the line be drawn?
23. Matz, S. C., Teeny, J. D., Vaid, S. S., Peters, H., Harari, G. M., & Cerf, M. (2024). : The study's field experiment uses Facebook ads in the U.S. context to test personality-tailored messaging. Do you think these effects would replicate in countries with different political cultures, digital ecosystems, or privacy norms? What aspects of the findings are likely to be culture-specific?
24. Lecture 13: Nyborg, K., Anderies, J. M., Dannenberg, A., Lindahl, T., Schill, C., Schlüter, M., Adger, W. N., Arrow, K. J., Barrett, S., Carpenter, S., Chapin, F. S., 3rd, Crépin, A.-S., Daily, G., Ehrlich, P., Folke, C., Jager, W., Kautsky, N., Levin, S. A., Madsen, O. J., ... de Zeeuw, A. (2016). Social norms as solutions. Science (New York, N.Y.), : Nyborg et al. argue that policy can trigger tipping points by changing expectations and by making climate-friendly behavior more observable

(so social reactions matter). For one climate behavior (e.g., cycling, EVs, eating less meat), what is one realistic way to increase its observability—and would that likely speed up adoption or create backlash?

25. Centola, D., Becker, J., Brackbill, D., & Baronchelli, A. (2018). : Centola et al. find a tipping point around ~25% committed minority to flip a convention in a controlled coordination task. How realistic is it to expect a similar "critical mass" for climate-related social norms (e.g., flying less, eating less meat, supporting carbon taxes) in the real world where people have identities, politics, and unequal influence? What would make the threshold lower or higher?
26. Lecture 14: Wollbrant CE, Knutsson M and Martinsson P (2022) : The paper suggests that raising a recycling reward can sometimes make people recycle less (crowding-out). If you were advising a government, how would you design an incentive so it increases recycling without undermining intrinsic motivationand what concrete sign in the data would tell you crowding-out is happening?
27. Maki A, Carrico AR, Raimi KT, et al. (2019) : The meta-analysis finds small positive spillover for intentions (d≈0.17) but near-zero/slightly negative spillover for actual behavior (d≈-0.03) and basically none for policy support so what should we conclude about "nudge-style" climate interventions: are they genuinely helpful or mostly shifting what people say rather than what they do?

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Appendix

Appendix: Survey items and variable list (illustrative)

This appendix is included to clarify the planned measurement and analysis in Part 1. Because Part 1 is a survey experiment (Option A), an example dataset is not required; the table below provides the intended variable structure and coding.

Key survey items (short form)

- **Policy support (primary outcome).** "To what extent do you support or oppose the following policies?" (1–7 strongly oppose/strongly support). Items: (i) carbon tax with revenues returned, (ii) subsidies for renewables, (iii) stricter efficiency standards.
- **Second-order beliefs (mediator).** "Out of 100 people like you, how many do you think support stronger climate policy?" (0–100).
- **Reciprocity / collective efficacy (mediator).** Agreement (1–7): "If people like me support climate action, politicians will act."; "Most others will do their part if they believe others will too."
- **Free-market ideology (moderator).** Short scale (e.g., 3–4 items) capturing preferences for regulation vs markets (1–7).

Planned variable list

Variable	Description / coding
id	respondent identifier
country	DK (Denmark), with optional replication elsewhere
frame	0=market-based frame, 1=regulatory frame
norm_corr	0=control, 1=norm correction treatment
ideo	self-placed ideology scale (0–10)
fmi	free-market ideology index (standardized)
sob_ingroup	perceived in-group support (0–100)
efficacy	reciprocity/collective efficacy index
support_idx	policy support index (standardized)