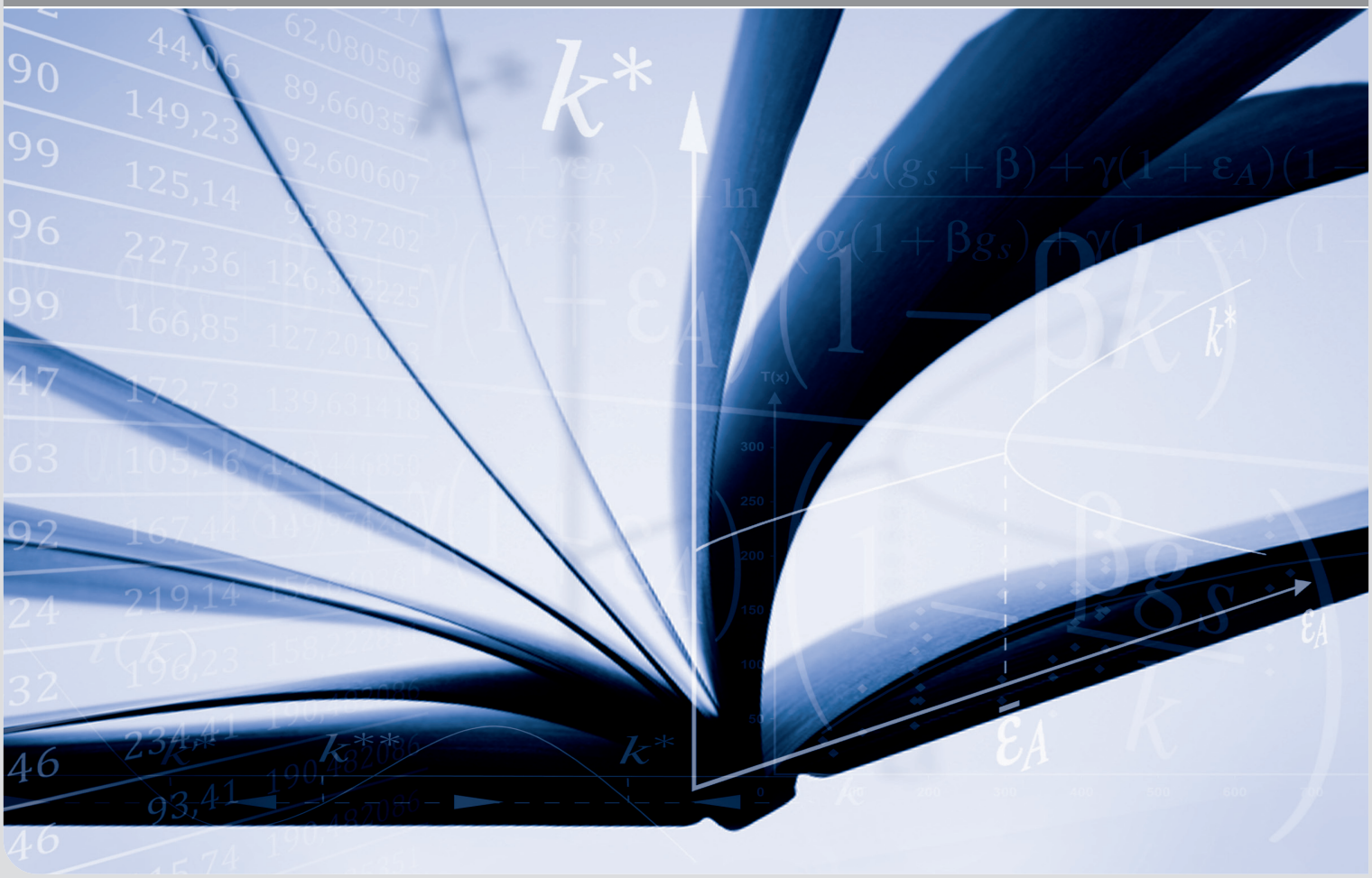
Karlsruher Institut für Technologie

Deliberation in group decisions: Polarization and like-mindedness

by Jessica Jachimowicz and Clemens Puppe

No. 166 | MAY 2025

WORKING PAPER SERIES IN ECONOMICS



Imprint

Karlsruher Institute of Technology (KIT)
Department of Economics and Management
Institute of Economics (ECON)

Kaiserstraße 12
76131 Karlsruhe

KIT – The Research University in the Helmholtz Association

Working Paper Series in Economics
No. 166, May 2025

ISSN 2190-9806

econpapers.wiwi.kit.edu

Deliberation in Group Decisions: Polarization and Like-Mindedness*

Jessica Jachimowicz† Clemens Puppe‡

May 2025

Deliberative decision-making is often proposed as a mechanism to mitigate polarization in democratic processes. However, empirical evidence remains mixed, with some studies suggesting that deliberation among like-minded individuals can drive preference shifts toward extremes. We use a three-round group dictator game to systematically examine how group composition influences deliberative outcomes. Our design allows us to compare deliberation within like-minded and mixed-minded groups while also manipulating the voting rule (median vs. unanimity) to assess its impact on decision-making. Contrary to expectations of polarization, we find that deliberation moderates preferences across all conditions. This effect is strongest for selfish participants in mixed-minded groups, but also like-minded selfish groups behave significantly less extreme than individuals. On the other hand, the moderating effect of deliberation does not persist when subjects revert back to individual decision-making. Regardless of the voting rule, groups tend to converge on unanimous decisions, suggesting norm-driven behavior in deliberative and participatory settings. Our findings contribute to ongoing debates on the role of group composition and decision rules in shaping collective outcomes in social dilemmas.

*This work was funded by the Deutsche Forschungsgemeinschaft (DFG, German Research Foundation)—GRK2739/1—Project Nr. 447089431—Research Training Group: KD2School—Designing Adaptive Systems for Economic Decisions. We are grateful for valuable feedback received during presentations at the workshop on Opinion Dynamics and Collective Decision (2023, Jacobs University Bremen), the PolEcCon Summer School (2023, MPI Berlin), the SJDM Conference (2023, San Francisco, USA), the NYU Motivation Lab (2024, New York, USA), the SSCW Meeting (2024, Paris, France), and at Auckland University of Technology (2025, New Zealand). Special thanks to Antoinette Baujard for detailed comments and suggestions, and to Sibille Hackel for text revision.

†Karlsruhe Institute of Technology (KIT), *jessica.jachimowicz@kit.edu*

‡Karlsruhe Institute of Technology (KIT), *clemens.puppe@kit.edu*

1 Introduction

Polarization remains a critical challenge in democratic decision-making, raising questions about how to structure deliberative processes for constructive public participation. While polarization—both ideological and affective—has been widely studied (Wilson et al., 2020; Dalton, 2021; Orhan, 2022), its behavioral effects on collective decision-making remain unclear. Political polarization has intensified in recent years, shaped by digital media and fragmented information environments (Bail et al., 2018; Levy, 2020; Rhodes, 2021). Some research suggests that deliberation fosters informed decision-making and mitigates polarization (Barabas, 2004; Fishkin, 2019; Luskin et al., 2022), while others argue that it reinforces biases and leads to extreme preferences (Sunstein, 1999; Schkade et al., 2010). A key factor in this debate is like-mindedness: do groups with similar preferences reinforce initial inclinations, or does deliberation promote moderation?

To address this, we conducted a pre-registered experiment testing how like-mindedness affects deliberation and decision-making. The study builds on the group polarization literature (Cason and Mui, 1997; Luhan et al., 2009), which presents conflicting evidence on whether deliberation fosters consensus or extremism. We formulated two competing hypotheses: (1) like-minded groups amplify polarization, making more extreme allocations, and (2) deliberation moderates preferences, reducing polarization even within like-minded groups.

To test these hypotheses, we employ a modified group dictator game. Unlike previous implementations, our design incorporates a politically salient issue—immigration—by directing allocations to a refugee organization. Participants are pre-screened for redistribution preferences to form like-minded and mixed-minded groups, and we manipulate the voting rule (median vs. unanimity) to examine its impact.

Our findings provide no evidence of polarization. Like-minded groups do not shift toward extreme allocations; instead, we observe moderation across all conditions. Interestingly, like-minded groups retain fewer resources compared to individual decisions, while selfish participants in mixed-minded groups tend to withhold even more. A similar but opposite trend occurs for generous participants. The voting rule does not significantly alter these shifts—groups reach unanimous decisions regardless of the imposed decision rule.

These results suggest that deliberation neither polarizes nor alters individual preferences significantly. Instead, other social dynamics influence group decision-making, fostering moderation rather than extremism. Our study contributes to the debate on deliberative democracy by highlighting the role of social norms and institutional rules in shaping collective decisions.

By systematically linking like-mindedness, deliberation, and decision-making in a controlled experiment, we refine our understanding of group preference aggregation. While deliberation may not resolve ideological divisions, it prevents polarization without necessarily creating long-term consensus. Future research should investigate underlying mechanisms such as normative pressure and strategic voting, contributing to the observed moderation.

2 Conceptual Background Literature

2.1 Polarization and Like-mindedness in Groups

Polarization refers to increasing divergence in opinions and behaviors, with implications for democratic governance (Abramowitz and Saunders, 2008; Bail et al., 2018; Baron et al., 2021). While citizen participation in policymaking is proposed as a solution (Vinokur and Burnstein, 1978; Fishkin et al., 2021), the impact of deliberation remains contested (Dryzek and List, 2003; Niemeyer and Dryzek, 2007; Grönlund et al., 2015; Sunstein, 1999).

Some scholars argue that deliberation mitigates biases and fosters rational discourse (Cohen, 1989; Estlund and Landemore, 2018; List, 2018; Dryzek et al., 2019), while others suggest that it reinforces preexisting attitudes, particularly in like-minded groups (Sunstein, 1999; Mendelberg, 2002). Empirical studies show that deliberation often strengthens majority views, sometimes resulting in harsher jury verdicts (Schkade et al., 1999, 2010). Group homogeneity plays a crucial role, as like-minded groups tend to shift collectively toward more extreme positions (Mendelberg, 2002; Sunstein, 2009).

Deliberation in like-minded groups is susceptible to information cascades, where the absence of opposing arguments leads to reasoning errors (Grönlund et al., 2015). Group members may conform to the dominant opinion rather than independently evaluating arguments (Isenberg, 1986; Lindell et al., 2017). Sunstein (2004) highlights how dominant participants shape group preferences, reinforcing confirmation biases. This contributes to enclave deliberation, where repeated exposure to similar arguments solidifies extreme attitudes (Landemore and Mercier, 2012).

Another related phenomenon is the risky shift, where groups adopt more extreme positions than individuals (Kogan and Wallach, 1967; Vidmar, 1970). This shift is driven by mutual reinforcement and diffusion of responsibility. Vidmar (1970) finds that heterogeneous groups take greater risks than homogeneous ones, though not all studies confirm this effect (Pruitt and Teger, 1969).

Theories such as social comparison and persuasive argumentation (Festinger, 1954; Cason and Mui, 1997) suggest that individuals align with perceived majority preferences (Asch, 1955; Isenberg, 1986; Sunstein, 1999). Persuasive argument theory posits that dominant participants frame deliberation to bias collective reasoning (Kerr et al., 1996). In like-minded groups, the absence of counterarguments increases the likelihood of attitude shifts toward extremes.

2.2 Research Gap

The literature offers conflicting views on whether deliberation amplifies or moderates polarization (Sunstein, 1999; Luskin et al., 2022). While some studies find that like-minded deliberation fosters extremism, others suggest it promotes moderation (List et al., 2013; Strandberg et al., 2018).

Grönlund et al. (2015) find that like-minded deliberation reduces polarization in discussions on immigration. However, the extent to which group composition influences deliberation and decision-making remains underexplored. Our study addresses this gap

by systematically examining how group composition and voting rules shape deliberative decision-making.

We implement a three-round group dictator game (Cason and Mui, 1997; Luhan et al., 2009), where participants allocate resources to a refugee project. By varying group composition and decision rules, we contribute to the empirical study of deliberative decision-making and its effects on polarization.

3 Experimental Design and Procedure

3.1 General Design

The group dictator game is widely used to study group decision-making (Cason and Mui, 1997; Luhan et al., 2009). Participants allocate resources to a refugee organization, testing whether deliberation influences preferences under different voting rules (median vs. unanimity).

Participants make three sequential decisions on their retention of an endowment of 10 "points" each worth 0.50 €. In Round 1, they decide individually. Groups are then formed based on retention preferences—*selfish*, *generous*, or *fair*—and assigned to like-minded or mixed-minded conditions. In Round 2, groups deliberate and vote under either the median or unanimity rule. In Round 3, participants make a second individual decision.

Control variables include gender, education, and refugee attitudes, measured using validated scales (Schneider and Schupp, 2011; Kotzur et al., 2022). Deliberation occurs via an anonymized chat to prevent biases from face-to-face interaction.

3.2 Deliberation and Group Decision

Under the **median rule**, group members vote freely, with the median determining the final decision. Under the **unanimity rule**, all members must agree; otherwise, no allocation occurs (Kocher and Sutter, 2007).

Participants deliberate for up to 15 minutes. Voting decisions are recorded, and individuals proceed to Round 3 to reassess their retention decisions.

3.3 Procedure

The experiment was conducted at the KD2Lab (KIT). Participants were recruited via *Hroot* (Bock et al., 2014) and *ORSEE* (Greiner, 2004). A total of 281 participants took part in 18 sessions, with 216 assigned to three-member group decisions. Random assignment ensured treatment balance.

Sessions lasted approximately 30 minutes. Payments were processed via the lab's digital system, and donations to *Lernfreundehaus*, a local refugee organization, were transferred after the study.

4 Findings

This section presents the results of the data collection and their analysis.

4.1 Data and Summary Statistics

The experiment was conducted over 18 sessions with 216 participants. Subjects were randomly assigned to groups of three and engaged in a decision-making task. The voting rule was assigned at the session level and balanced across the sample to ensure comparability across treatments.

Fairness Benchmark and Relabeling Before data collection, we set five points as the global fairness benchmark (ex-ante). However, after observing the first individual withdrawal decisions, we reassessed fairness using the median withdrawal, which was six points. Based on this revised benchmark, we reclassified participants' types and groups accordingly. This adjustment ensures that the analysis reflects fairness perceptions within the sample rather than relying solely on a pre-determined threshold.

Demographics and Sample Characteristics Table 1 summarizes the statistics for key demographic variables. The participants had an average age of 24 years (SD = 4.32), and 40 percent identified as female. The sample consisted primarily of students, with 62 percent not holding a formal degree and 35 percent having completed at least a bachelor's degree. A small proportion (2 percent) were either employed or pursuing a doctoral degree. The slight gender imbalance observed in the sample is a well-documented characteristic of the KIT participant pool and is considered in the analysis.

Group Composition Participants were assigned to one of two group structures:

- *Like-minded groups* (39 percent of participants) consisted of members with similar retention preferences.
- *Mixed-minded groups* (61 percent of participants) contained members with varying retention preferences. Participants in these groups were classified into one of three types:
  - *Selfish*: Retained more than six points.
  - *Fair*: Retained exactly six points.
  - *Generous*: Retained fewer than six points.

All possible combinations of these three types were feasible in mixed-minded groups.

Table 1: Summary Statistics

Variable	Mean	SD
Demographics		
Age (years)	24.00	4.32
Female (dummy)	0.40	0.49
Bachelor or Higher (dummy)	0.36	0.48
Group Composition		
Like-minded (dummy)	0.39	0.49
Mixed-minded (dummy)	0.61	0.49
Treatment Conditions		
LMGEU	0.10	0.30
LMSU	0.11	0.31
MMU	0.28	0.45
LMGEM	0.07	0.25
LMSM	0.11	0.31
MMM	0.33	0.47

Notes: $N = 216$ for all variables, except group composition (Like-minded $N = 84$, Mixed-minded $N = 132$). - Dummy variables equal 1 if the condition is met and 0 otherwise. - *Treatment groups:* - LMGU: Like-minded, generous, unanimity rule - LMGM: Like-minded, generous, median rule - LMSU: Like-minded, selfish, unanimity rule - LMSM: Like-minded, selfish, median rule - MMU: Mixed-minded, unanimity rule - MMM: Mixed-minded, median rule

Treatment Conditions and Voting Rules Participants were assigned to one of six treatment conditions based on group composition (like-minded vs. mixed-minded) and the assigned voting rule (unanimity vs. median). The treatment groups are defined as follows: *Like-minded groups:*

- LMGEU – Generous, unanimity rule
- LMGEM – Generous, median rule
- LMSU – Selfish, unanimity rule
- LMSM – Selfish, median rule

Mixed-minded groups:

- MMU – Mixed-minded, unanimity rule
- MMM – Mixed-minded, median rule

Additionally, within mixed-minded groups, participants were classified based on their individual type:

- MMGE – Generous participant in a mixed-minded group
- MMS – Selfish participant in a mixed-minded group
- MMF – Fair participant in a mixed-minded group

Sample Composition 39 percent of participants engaged in like-minded deliberation and voting, while 61 percent participated in mixed-minded groups. The classification was determined based on preference elicitation in the first individual decision round. The voting rules were randomly assigned at the session level to ensure balance across conditions.

4.2 Treatment Effects

In the following, we assess the impact of group composition on deliberation and voting, as well as the effect of the voting rule on the process and outcome. We begin by analyzing the impact of the unanimity and median rules on voting behavior and outcomes. We then examine the effect of like-mindedness on voting outcomes and individual decision-making. Finally, we analyze the deliberation data to understand the effects of the treatment on the deliberation process.

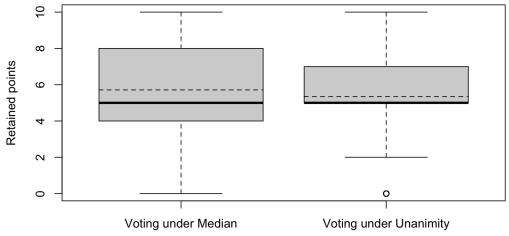
4.2.1 The Effect of Manipulating Voting Rules

Figure 1 presents the distribution of group withdrawal, i.e., the amount of retained points, votes across the voting rule treatments. In our study, 111 participants voted under the median rule, and 105 participants voted under the unanimity rule. Our sample appears balanced across the voting rule treatment.

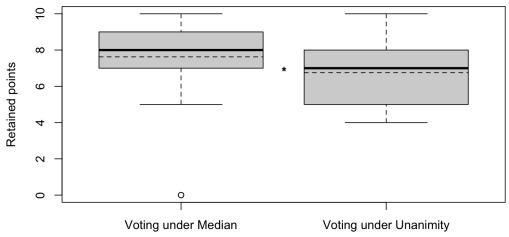
Sessions using the unanimity rule yielded a mean voting outcome of 5.3, whereas the median rule led to a mean voting outcome of 5.7. However, this difference is not statistically significant (Mann-Whitney U test: $p > 0.1$, $N = 216$).

A deeper analysis of voting behavior reveals that among the 37 groups that deliberated under the median rule, 29 reached unanimous votes. Additionally, 12 groups reached a unanimous agreement on the median of their initial individual preferences.

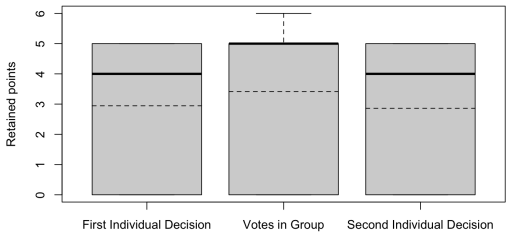
Further, when analyzing differences across group compositions, we find that in like-minded selfish groups (LMS), withdrawal votes significantly differ between the two voting rules. Figure 1b shows that the mean vote in the median condition is 7.6 compared to 6.8 in the unanimity condition. This difference is statistically significant (Mann-Whitney U test: $p < 0.05$, $N = 48$). However, for other group compositions, we do not find significant differences between the voting rules.



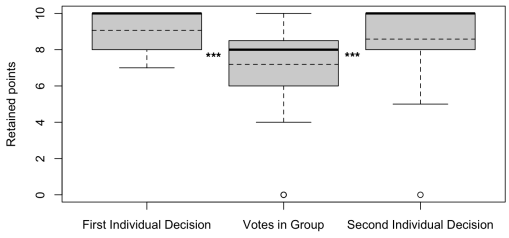
(a) Withdrawal Group Decisions by Voting Rule.



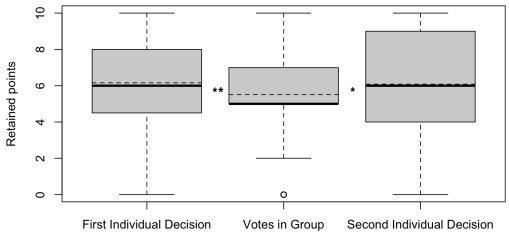
(b) Withdrawal LMS Group Decisions by Voting Rule.



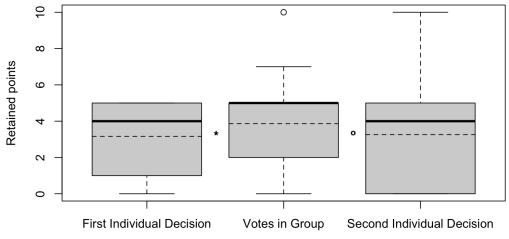
(c) Withdrawal Decisions in Like-Minded Generous Groups.



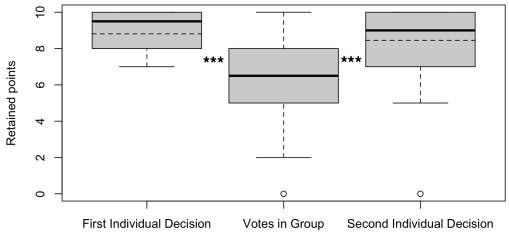
(d) Withdrawal Decisions in Like-Minded Selfish Groups.



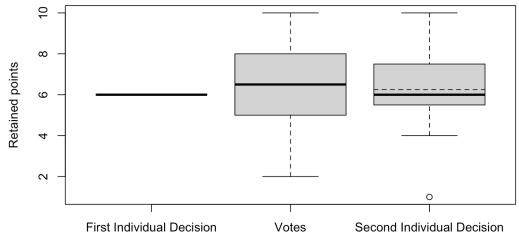
(e) Withdrawal Decisions in Mixed-Minded Groups.



(f) Withdrawal Decisions of Generous Participants in MM Groups.



(g) Withdrawal Decisions of Selfish Participants in MM Groups.

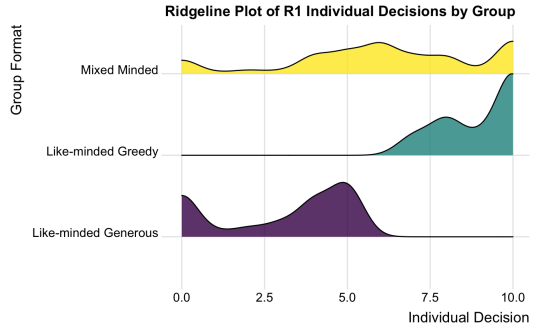


(h) Withdrawal Decisions of Fair Participants in MM Groups.

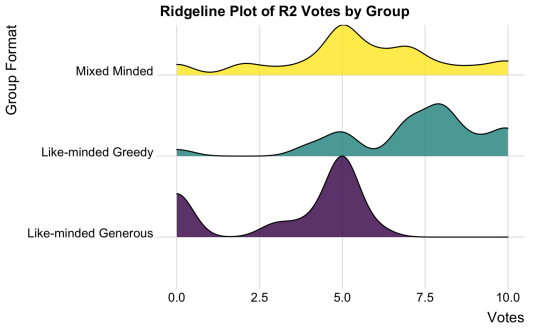
Figure 1: Distribution of withdrawal decisions by voting rule, group type, and participant type across rounds. Figures (a) and (b) compare median and unanimity voting rules. Figures (c) and (d) show like-minded groups. Figures (e), (f), (g), and (h) display withdrawal decisions in mixed-minded groups, distinguishing between participant types. Dotted lines indicate mean values. Statistical significance of differences is noted in each figure.

4.2.2 The Evolution of Withdrawal Decisions Across Rounds

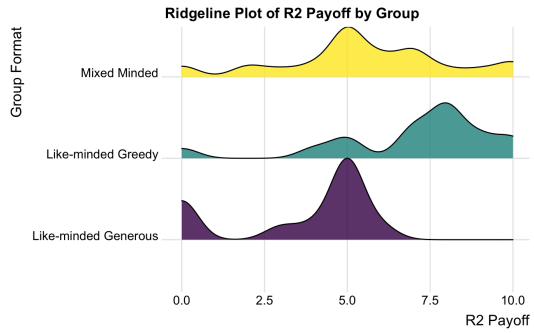
The density shifts of withdrawal decisions across rounds are illustrated in Figure 2. The x-axis represents withdrawal decisions at different stages: (a) individual decisions in Round 1 (R1), (b) group votes in Round 2 (R2), (c) individual payoffs resulting from group votes in R2, and (d) individual decisions in Round 3 (R3). The y-axis indicates group composition, distinguishing between mixed-minded, like-minded selfish, and like-minded generous groups.



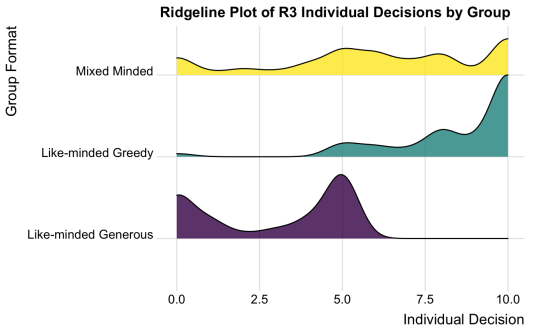
(a) Density distribution of individual decisions in Round 1.



(b) Density distribution of group votes in Round 2.



(c) Density distribution of payoffs in Round 2.



(d) Density distribution of individual decisions in Round 3.

Figure 2: Density distributions of individual decisions, group votes, and payoffs across rounds. (a) Individual decisions in Round 1 before deliberation. (b) Group votes in Round 2. (c) Payoff distributions in Round 2 based on group voting. (d) Individual decisions in Round 3 after deliberation. Group compositions are categorized as like-minded or mixed-minded.

The density plots suggest that group decisions moderate around the global fairness point (5) in R2. However, this moderation does not persist in the second individual decision round (R3). This observation holds for all group formats.

For like-minded generous groups (LMG), the mean withdrawal shifts from R1 (2.94) to R2 (3.42) and then returns to R3 (2.86) (see Table 2). There are no significant differences

across rounds (Wilcoxon signed-rank test: $p > 0.1$, $N = 36$), though the small sample size should be noted. This suggests that group votes exhibit slight moderation but do not translate into long-term individual decision changes (see Figure 1c).

In like-minded selfish groups (LMS), the shift is more pronounced. The mean withdrawal changes from R1 (9.04) to R2 (7.19) and then to R3 (8.58). The differences between R1 and R2, as well as between R3 and R2, are highly significant (Wilcoxon signed-rank test: $p < 0.001$, $N = 48$). However, no significant differences are found between R1 and R3, suggesting that the group moderation effect is only temporary (see Figure 1d).

For mixed-minded groups, a similar trend is observed. The mean withdrawal shifts from R1 (6.16) to R2 (5.51) and then to R3 (6.08) (see Table 2). The changes from R1 to R2 are statistically significant (Wilcoxon signed-rank test: $p < 0.01$, $N = 132$), and the differences between R2 and R3 are also significant but weaker ($p < 0.05$). This indicates again a temporary effect of group deliberation, which does not persist in individual decision-making (see Figure 1e).

A closer analysis of participant types in mixed-minded groups reveals that generous members (MMG) moderate their voting behavior in R2, shifting from R1 (3.16) to R2 (3.86) and then to R3 (3.26) (see Figure 1f). The difference between R1 and R2 is significant ($p < 0.05$, $N = 50$), while R2 to R3 is only weakly significant ($p < 0.1$). In contrast, selfish members (MMS) show a strong moderation effect, shifting from R1 (8.81) to R2 (6.52) ($p < 0.001$, $N = 58$), but reverting to R3 (8.45) (see Figure 1g). Fair participants (MMF) remain stable across rounds (R1 = 6, R2 = 6.5, R3 = 6.25) with no significant changes ($p > 0.1$, $N = 24$) (see Figure 1h).

Table 2: Overview of Withdrawal Decisions Across Treatments and Rounds

Category	N	Withdrawal Mean	SD	Min	Max	p50 - Median
Individual Decisions						
Individual - R1	216	6.3	3.2	0	10	6
Individual - R3	216	6.1	3.4	0	10	6
Group Vote Breakdown (R2)						
Group Vote - All	216	5.5	2.7	0	10	5
Group Vote - Unanimity (U)	105	5.3	2.7	0	10	5
Group Vote - Median (M)	111	5.7	2.7	0	10	5
Group Outcome Breakdown (R2)						
Group Outcome - All	216	5.5	2.7	0	10	5
Group Outcome - Unanimity (U)	105	5.3	2.7	0	10	5
Group Outcome - Median (M)	111	5.7	2.7	0	10	5
Group Composition Breakdown (R2)						
Like-minded (LM)	84	5.6	3.0	0	10	5
Mixed-minded (MM)	132	5.5	2.5	0	10	5
Breakdown by Group Type and Voting Rule (R2)						
LMGE - Unanimity (U)	21	3.3	2.2	0	5	5
LMS - Unanimity (U)	24	6.8	1.9	4	10	7
MM - Unanimity (U)	60	5.5	2.7	0	10	6
LMGE - Median (M)	15	3.6	2.3	0	6	5
LMS - Median (M)	24	7.6	2.7	0	10	8
MM - Median (M)	72	5.5	2.4	0	10	5

Notes: This table displays individual and group-level withdrawal decisions across all treatments and rounds. R1 and R3 refer to individual decision rounds, while R2 corresponds to the group voting round. "Unanimity (U)" and "Median (M)" refer to the voting rules applied in the group decision-making process. "LMG" = Like-minded Generous, "LMS" = Like-minded Selfish, "MM" = Mixed-minded. A detailed definition of the abbreviations can be found in Section 4.1.

4.2.3 Effect of Participant Type and Group Composition

Table 3 - Table 6 present the results of the regression analysis. Given the nature of withdrawal decisions, we employ a Tobit regression, with the independent variable left-bounded at zero since no participant can withdraw less than zero. Censoring is appropriate, as our dataset contains no values below this threshold. The analysis explores the joint effect of participant type and group composition on voting behavior and withdrawal decisions.

We first examine how selfish behavior interacts with like-minded and mixed-minded settings. Table 5 presents estimates for (a) the additional effect of a selfish participant in a like-minded group and (b) the additional effect of a selfish participant in a mixed-

minded group. Both group types exert a symmetrical and equally strong influence on voting behavior and payoffs but in opposite directions.

The positive interaction estimate of 2.2 ($p < 0.01$) for *Selfish* × *Like-minded* suggests that selfish participants in homogeneous selfish groups reinforce their initial behavior, leading to increased support for self-serving outcomes. Conversely, the negative interaction estimate of -2.2 ($p < 0.01$) for *Selfish* × *Mixed-minded* indicates that selfish participants in heterogeneous groups moderate their behavior, aligning more closely with fair-minded participants. This suggests that deliberation in diverse groups tempers extreme self-interest. These findings highlight that the impact of greed strongly depends on group composition.

Table 3: Effect of Selfish Participants on Voting and Group Outcomes

Dependent variable	Vote	Outcome
Selfish × Like-minded	2.2** (0.72)	1.9* (0.74)
Selfish × Mixed-minded	-2.2** (0.72)	-1.9* (0.74)
Like-minded	-1.5** (0.53)	-1.3* (0.54)
Mixed-minded	1.5** (0.53)	1.3* (0.54)
Selfish	1.9*** (0.45)	1.9*** (0.46)
Constant	4.6*** (0.30)	4.6*** (0.30)
Controls	No	No
Observations	216	216

Notes: Tobit regressions. Dependent variables: *vote* (support for the proposal) and *outcome* (group payoff). Standard errors in parentheses. - *Selfish* refers to participants who made a self-interested decision in the first dictator game. - *Selfish* × *Like-minded* increases voting support and payoffs, reinforcing self-interested behavior in homogeneous groups. - *Selfish* × *Mixed-minded* decreases voting support and payoffs, suggesting that diverse groups temper self-interest.
† $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 6 examines the interaction effects of generous behavior in like-minded and mixed-minded groups. The results reveal a reversed pattern compared to selfish participants. The negative interaction estimate of -1.9 ($p < 0.05$) suggests that generous participants in like-minded groups withdraw even less than expected, meaning that generosity is diminished when deliberating with similar-minded individuals. In contrast, the positive interaction estimate of 1.9 ($p < 0.05$) in mixed-minded groups suggests that generous participants withdraw significantly more than anticipated, indicating that deliberation in diverse settings amplifies prosocial behavior.

Table 7 explores the effect of fair participants in mixed-minded groups. The results show no statistically significant effect, indicating that fairness does not strongly influence voting behavior or withdrawal decisions in mixed-minded deliberative settings.

Table 4: Effect of generous participants on voting and group outcomes

Dependent variable	Vote	Outcome
Generous × Like-minded	-1.9* (0.79)	-1.6* (0.80)
Generous × Mixed-minded	1.9* (0.79)	1.6* (0.80)
Like-minded	0.6 (0.40)	0.5 (0.41)
Mixed-minded	-0.6 (0.40)	-0.5 (0.41)
Generous	-2.8*** (0.50)	-2.8*** (0.51)
Constant	6.1*** (0.25)	6.1*** (0.25)
Controls	No	No
Observations	216	216

Notes: Tobit regressions. Dependent variables: *vote* (support for the proposal) and *outcome* (group payoff). Standard errors in parentheses. - *Generous* refers to participants who made an altruistic decision in the first dictator game. - *Generous* × *Like-minded* reduces voting support and payoffs, suggesting generosity is less effective in homogeneous groups. - *Generous* × *Mixed-minded* increases voting support and payoffs, indicating that generosity is reinforced in diverse groups.
† $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

4.2.4 Control Variables and Additional Effects

Table 6 introduces additional control variables, including gender, refugee attitudes, and social norms. The inclusion of the generous type remains a strong predictor of lower withdrawal votes (-2.2, $p < 0.01$). However, the effect of the selfish type is mitigated when controls are introduced.

A significant gender effect is observed, with female participants withdrawing significantly less than male participants (-1.1, $p < 0.05$). Refugee attitudes exhibit a weak significant effect on voting behavior, suggesting that ideological attitudes toward migration policy may influence economic decision-making in group settings. However, social norms do not emerge as a significant predictor.

4.2.5 Deliberation Analysis

We now elaborate on the analysis of deliberation behavior across treatments. Figure 3 presents the deliberation duration, message frequency, and sentiment analysis.

Panel (a) shows the deliberation duration by voting rule. Groups under the median rule deliberated for an average of 4.8 minutes, while groups under the unanimity rule deliberated for an average of 5.2 minutes. This difference is not statistically significant.

Panel (b) presents the deliberation time across group compositions. A pairwise comparison using Dunn's test finds a weak significant difference, where like-minded generous groups (LMG) deliberate for a shorter duration (mean: 3.9 minutes) compared to like-minded selfish (LMS) and mixed-minded (MM) groups (mean: 5.2 minutes). However,

Table 5: Effect of fair participants on voting and group outcomes in mixed-minded groups

Dependent variable	Vote	Outcome
Fair	0.2 (0.51)	0.3 (0.51)
Constant	5.4*** (0.28)	5.4*** (0.29)
Controls	No	No
Observations	132	132

Notes: Tobit regressions. Standard errors in parentheses. - *Fair* refers to participants who made an equal-split decision in the first dictator game. - The reference group consists of *selfish and generous* participants.
† $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

the median deliberation time differs between LMS (3.9 minutes) and MM (4.52 minutes), possibly due to sample size differences.

Panel (c) presents the message frequencies by group treatment. The number of messages exchanged does not significantly differ across treatments, suggesting that group format did not influence communication intensity.

Panel (d) shows a sentiment analysis using the Bing lexicon. Deliberation chat messages contained more positive sentiment (41 instances) than negative sentiment (27 instances). This suggests that overall, the group discussions were more positively framed.

We also conducted a qualitative content analysis following Luhan et al. (2009). Table 7 summarizes the most frequent arguments used in group discussions. Arguments advocating to "keep more for ourselves" and "keep less for ourselves" were common, but fairness arguments appeared most frequently.

5 Discussion

Our main finding concerns deliberation and polarization in like-minded groups. Voting behavior and outcomes in the group round are more moderated compared to individual decision-making. A qualitative content analysis provides insights into this pattern. Some groups avoided deliberation, with first-proposers selecting allocations perceived as uncontroversial, such as fair distributions, regardless of their initial preferences. Where deliberation occurred, arguments remained cautious and modest, as confirmed by sentiment analysis. Selfish members occasionally advocated for higher retainment but often proposed lower allocations than in their individual decisions. Generous and fair members disclosed more information and showed greater certainty. Some selfish participants concealed their initial decisions, while generous participants consistently emphasized fairness and mutual understanding.

These patterns emerge in both like-minded and mixed-minded groups. In both like-minded selfish and like-minded generous groups, voting decisions moderated. A possible limitation is that participants were unaware of the group composition logic. While

Table 6: Effect of selfish and generous participants on voting and group outcomes in mixed-minded groups

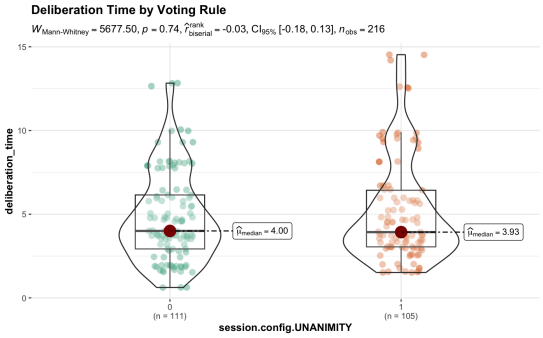
Dependent variable	With Controls		Without Controls	
	Vote	Outcome	Vote	Outcome
Selfish	0.5 (0.48)	0.5 (0.49)	0.9† (0.48)	0.9† (0.49)
Generous	-2.2*** (0.55)	-2.2*** (0.56)	-2.3*** (0.56)	-2.3*** (0.57)
Female	-1.1* (0.44)	-1.1* (0.44)	–	–
Bachelor	-0.5 (0.43)	-0.5 (0.44)	–	–
Refugee Attitude	-0.6† (0.37)	-0.6 (0.38)	–	–
Social Norm	0.7 (0.77)	0.7 (0.78)	–	–
Social Comparison	0.7 (0.52)	0.6 (0.53)	–	–
Constant	4.5 (2.84)	4.5 (2.90)	5.6*** (0.37)	5.6*** (0.38)
Controls	Yes	Yes	No	No
Observations	132	132	132	132

Notes: Tobit regressions. Standard errors in parentheses. - *Selfish* and *Generous* refer to participants who made self-interested or altruistic decisions in the first dictator game. - The reference group consists of *fair* participants. - Controls include *gender (female)*, *education (bachelor)*, *refugee attitude*, *social norm*, and *social comparison*.
† $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

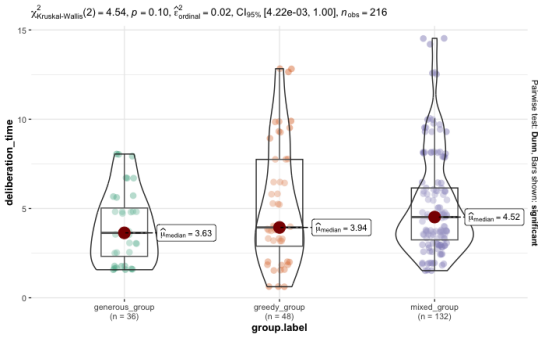
deliberation should enable preference discovery, in like-minded selfish groups, significant moderation of stated preferences suggests norm-driven behavior (Kimbrough and Vostroknutov, 2016). Kimbrough and Vostroknutov (2016) argue that prosocial behavior is shaped by social norms rather than individual preferences. This aligns with Smith's (2010) concept of the impartial spectator, enforcing group fairness norms. Even in an anonymous setting, deliberation fosters group coherence by positioning participants as both decision-makers and observers of others' arguments. This dual role explains short deliberation times, low participation rates, and an overall positive sentiment. Consequently, voting decisions may reflect a preference for social appropriateness rather than strategic payoff maximization, leading to moderation.

This aligns with findings by Cason and Mui (1997), who show that generous members often dominate mixed-minded group decisions. In our study, mixed-minded groups without generous participants exhibited a strong influence of selfish members on voting behavior. However, adding a single generous participant nullified this effect. Social comparison theory offers a potential explanation: individuals adjust preferences to align with assumed norms rather than reinforcing their initial preferences through argumentation.

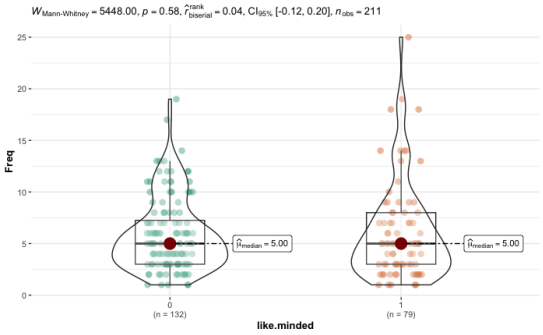
Deliberation and group decision-making do not significantly impact second-round individual decisions. The absence of a shift between first (R1) and second (R3) individual decisions suggests a rejection of persuasive argument theory in this context. If persuasion had occurred, individual decisions should have shifted in line with group voting outcomes.



(a) Deliberation Time by Voting Rule.



(b) Deliberation Time by Group Composition.



(c) Message Frequencies by Group Treatment.

(d) Message Sentiment in Deliberation.

Figure 3: Deliberation time, message frequency, and sentiment in deliberation. (a) Deliberation time by voting rule. The x-axis denotes the dummy variable for the unanimity rule (1 = unanimity rule). (b) Deliberation time by group composition. There is a weakly significant difference between group types. (c) Message frequencies by group treatment. No significant difference is observed. (d) Overall message sentiment in deliberation.

Instead, limited exchange of explicit preferences and low deliberation quality likely explain this finding. Grönlund et al. (2015) emphasize that ad-hoc group formation can reduce engagement and weaken group identification. Reputation concerns influence deliberation participation and the extent to which individuals adopt extreme views (Schkade et al., 2010). However, amplification effects may be mitigated by additional information or moderators.

Another key observation is the high frequency of unanimous voting in median-rule groups. Bartling et al. (2015) suggest that this could be attributed to responsibility attribution and pivotality aversion. The role of the median voter was rarely discussed, as participants focused on achieving broadly accepted results, shifting responsibility to the group.

A final consideration is the potential impact of the take-frame in the study design. The take-frame may intensify external beliefs and reinforce spectator roles in deliberation and

Table 7: Analysis of Group Chats

Argument	Number of Arguments	Number of Groups
Keep more for ourselves	28	19
Keep less for ourselves	29	21
Be fair and...	35	21
...retain more	–	8
...retain less	–	1
...retain fair	–	12

Notes: Categorization adapted from Luhan et al. (2009) with additional coding.

voting. While Dreber et al. (2013) find no evidence that framing destabilizes preferences, they note that communication with the recipient can influence allocations. Reducing social distance through deliberation may enhance the salience of fairness, generosity, or greed in decision-making. The ambiguous role of participants as decision-makers and observers may further contribute to this effect.

6 Conclusion

This study examines polarization in deliberative decision-making and the effects of voting rules—unanimity and median—on deliberation and outcomes. Using a computer-based experiment, we test whether like-minded group deliberation fosters polarization. In a three-round dictator game, we compare like-minded and mixed-minded groups, as well as individual and group decisions. The take-frame and a refugee project as the recipient were introduced to increase preference variance.

We find no evidence that like-minded group deliberation pushes withdrawal decisions toward extremes. Instead, both like-minded selfish (retaining more than 6 points) and like-minded generous (retaining fewer than 6 points) groups moderate their voting behavior toward fairness (5 points). Individual and group decisions differ across treatments, with selfish and generous members in mixed-minded groups moderating their withdrawal votes. Notably, generous participants strongly influence voting outcomes in mixed-minded groups. However, we find no significant shift between the first and second individual decision rounds across treatments.

Voting rules do not significantly impact voting behavior or outcomes across group compositions. However, in like-minded selfish groups, voting and outcomes differ significantly between the median and unanimity conditions. These findings suggest that deliberation does not reinforce initial preferences or push decisions toward extremes. Instead, group voting moderation supports the argument for norm-driven behavior. A lack of pivotality and responsibility aversion is also evident, particularly in the median rule condition. Future research should explore the role of pivotality in group voting, particularly in participatory decision-making contexts.

References

Abramowitz, A. and Saunders, K. L. (2008). Is polarization a myth? *The Journal of Politics*, 70:542 – 555.

Asch, S. E. (1955). Opinions and social pressure. *Scientific American*, 193(5):31–35.

Bail, C., Argyle, L. P., Brown, T. W., Bumpus, J. P., Chen, H., Hunzaker, M. F., Lee, J., Mann, M., Merhout, F., and Volfovsky, A. (2018). Exposure to opposing views on social media can increase political polarization. *Proceedings of the National Academy of Sciences of the United States of America*, 115:9216 – 9221.

Barabas, J. (2004). How deliberation affects policy opinions. *Political Communication*, 21(2):177–193.

Baron, H., Blair, R., Choi, D. D., Gamboa, L., Gottlieb, J., Robinson, A. L., Rosenzweig, S., Turnbull, M., and West, E. A. (2021). Can Americans depolarize? Assessing the effects of reciprocal group reflection on partisan polarization. Preprint.

Bartling, B., Fischbacher, U., and Schudy, S. (2015). Pivotality and responsibility attribution in sequential voting. *Journal of Public Economics*, 128:133–139.

Bock, O., Baetge, I., and Nicklisch, A. (2014). hroot: Hamburg registration and organization online tool. *European Economic Review*, 71:117–120.

Cason, T. N. and Mui, V.-L. (1997). A laboratory study of group polarization in the team dictator game. *The Economic Journal*, 108(448):1107–1124.

Cohen, J. (1989). Deliberation and democratic legitimacy. In *The Good Polity*, pages 17–34.

Dalton, R. (2021). Modeling ideological polarization in democratic party systems. *Electoral Studies*, 72:102346.

Dreber, A., Ellingsen, T., Johannesson, M., and Rand, D. G. (2013). Do people care about social context? Framing effects in dictator games. *Experimental Economics*, 16:349–371.

Dryzek, J. S., Bächtiger, A., Chambers, S., Cohen, J., Druckman, J. N., Felicetti, A., Fishkin, J. S., Farrell, D. M., Fung, A., Gutmann, A., et al. (2019). The crisis of democracy and the science of deliberation. *Science*, 363(6432):1144–1146.

Dryzek, J. S. and List, C. (2003). Social choice theory and deliberative democracy: a reconciliation. *British Journal of Political Science*, 33(1):1–28.

Estlund, D. and Landemore, H. (2018). The epistemic value of democratic deliberation. In *The Oxford Handbook of Deliberative Democracy*, pages 113–131. Oxford University Press.

Festinger, L. (1954). A theory of social comparison processes. *Human Relations*, 7(2):117–140.

Fishkin, J., Siu, A., Diamond, L., and Bradburn, N. (2021). Is deliberation an antidote to extreme partisan polarization? Reflections on "America in one room". *American Political Science Review*, 115(4):1464–1481.

Fishkin, J. S. (2019). Democracy when the people are thinking: Deliberation and democratic renewal. *Proceedings of the American Philosophical Society*, 163(2):108–121.

Greiner, B. (2004). An online recruitment system for economic experiments. In Kremer, K. and Macho, V., editors, *Forschung und wissenschaftliches Rechnen 2003*, volume 63 of *GWDG Bericht*, pages 79–93. Gesellschaft fuer Wiss. Datenverarbeitung, Goettingen.

Grönlund, K., Herne, K., and Setälä, M. (2015). Does enclave deliberation polarize opinions? *Political Behavior*, 37:995–1020.

Isenberg, D. J. (1986). Group polarization: A critical review and meta-analysis. *Journal of personality and social psychology*, 50(6):1141.

Kerr, N. L., MacCoun, R. J., and Kramer, G. P. (1996). Bias in judgment: Comparing individuals and groups. *Psychological review*, 103(4):687.

Kimbrough, E. O. and Vostroknutov, A. (2016). Norms make preferences social. *Journal of the European Economic Association*, 14(3):608–638.

Kocher, M. G. and Sutter, M. (2007). Individual versus group behavior and the role of the decision making procedure in gift-exchange experiments. *Empirica*, 34:63–88.

Kogan, N. and Wallach, M. A. (1967). Risky-shift phenomenon in small decision-making groups: A test of the information-exchange hypothesis. *Journal of Experimental Social Psychology*, 3(1):75–84.

Kotzur, P. F., Friehs, M.-T., Schmidt, P., Wagner, U., Pötzschke, S., and Weiß, B. (2022). Attitudes towards refugees: Introducing a short three-dimensional scale. *British Journal of Social Psychology*, 61(4):1305–1331.

Landemore, H. and Mercier, H. (2012). Talking it out with others vs. deliberation within and the law of group polarization: Some implications of the argumentative theory of reasoning for deliberative democracy. *Análise Social*, 47(205):910–934.

Levy, R. (2020). Social media, news consumption, and polarization: Evidence from a field experiment. *Mass Communication eJournal*.

Lindell, M., Bächtiger, A., Grönlund, K., Herne, K., Setälä, M., and Wyss, D. (2017). What drives the polarisation and moderation of opinions? Evidence from a Finnish citizen deliberation experiment on immigration. *European Journal of Political Research*, 56(1):23–45.

List, C. (2018). Democratic deliberation and social choice. In *The Oxford Handbook of Deliberative Democracy*, pages 463–489.

List, C., Luskin, R. C., Fishkin, J. S., and McLean, I. (2013). Deliberation, single-peakedness, and the possibility of meaningful democracy: Evidence from deliberative polls. *The Journal of Politics*, 75(1):80–95.

Luhan, W. J., Kocher, M. G., and Sutter, M. (2009). Group polarization in the team dictator game reconsidered. *Journal of the European Economic Association*, 7(2-3):594–605.

Luskin, R. C., Sood, G., Fishkin, J. S., and Hahn, K. S. (2022). Deliberative distortions? Homogenization, polarization, and domination in small group discussions. *British Journal of Political Science*, 52(3):1205–1225.

Mendelberg, T. (2002). The deliberative citizen: Theory and evidence. *Political decision making, deliberation and participation*, 6(1):151–193.

Niemeyer, S. and Dryzek, J. S. (2007). The ends of deliberation: meta-consensus and inter-subjective rationality as ideal outcomes. *Swiss political science review*, 13(4):497–526.

Orhan, Y. E. (2022). The relationship between affective polarization and democratic backsliding: Comparative evidence. *Democratization*, 29(4):714–735.

Pruitt, D. G. and Teger, A. I. (1969). The risky shift in group betting. *Journal of Experimental Social Psychology*, 5(2):115–126.

Rhodes, S. C. (2021). Filter bubbles, echo chambers, and fake news: How social media conditions individuals to be less critical of political misinformation. *Political Communication*, 39:1 – 22.

Schkade, D., Sunstein, C. R., and Hastie, R. (2010). When deliberation produces extremism. *Critical Review*, 22(2-3):227–252.

Schkade, D., Sunstein, C. R., and Kahneman, D. (1999). Are juries less erratic than individuals? Deliberation, polarization, and punitive damages. *Deliberation, Polarization, and Punitive Damages (September 1999). University of Chicago Law School, John M. Olin Law & Economics Working Paper*, (81).

Schneider, S. and Schupp, J. (2011). The social comparison scale: Testing the validity, reliability, and applicability of the Iowa-Netherlands comparison orientation measure (INCOM) on the German population. (368).

Smith, A. (2010). *The theory of moral sentiments*. Penguin.

Strandberg, K., Himmelroos, S., and Grönlund, K. (2018). Do discussions in like-minded groups necessarily lead to more extreme opinions? Deliberative democracy and group polarization. *Journal of Conflict Resolution*, 40.

Sunstein, C. R. (1999). The law of group polarization. *John M. Olin Law & Economics Working Paper* 91, University of Chicago Law School.

Sunstein, C. R. (2004). Democracy and filtering. *Communications of the ACM*, 47(12):57–59.

Sunstein, C. R. (2009). *Going to Extremes: How like minds unite and divide*. Oxford University Press.

Vidmar, N. (1970). Group composition and the risky shift. *Journal of Experimental Social Psychology*, 6(2):153–166.

Vinokur, A. and Burnstein, E. (1978). Depolarization of attitudes in groups. *Journal of Personality and Social Psychology*, 36(8):872–885.

Wilson, A. E., Parker, V., and Feinberg, M. (2020). Polarization in the contemporary political and media landscape. *Current Opinion in Behavioral Sciences*, 34:223–228.

Working Paper Series in Economics

recent issues

No. 166 *Jessica Jachimowicz, Clemens Puppe:* Deliberation in group decisions: Polarization and like-mindedness, May 2025

No. 165 *Kay Mitusch:* Aktuelle Entwicklungen im Eisenbahnsektor: Wetbewerb, verkehrspolitische Zielsetzungen, Steuerung der DB InfraGO und Trassenpreise, April 2025

No. 164 *Matthias Ammann, Clemens Puppe:* Preference diversity, April 2024

No. 163 *Andreas Benz, Peter R. Demerjian, Daniel Hoang, Martin Ruckes:* Picking winners: Managerial ability and capital allocation, January 2024

No. 162 *Jörg Urban:* Credit cycles revisited, June 2023

No. 161 *Andranik S. Tangian:* Apportionment in times of digitalization, April 2023

No. 160 *Klaus Nehring, Clemens Puppe:* Multi-dimensional social choice under frugal information: the Tukey median as Condorcet winner ex ante, March 2023

No. 159 *Clemens Puppe, Arkadii Slinko:* Maximal Condorcet domains. A further progress report, December 2022

No. 158 *Daniel Hoang, Kevin Wiegratz:* Machine learning methods in finance: recent applications and prospects, December 2022

No. 157 *David Ehrlich, Nora Szech:* How to start a grassroots movement, September 2022

No. 156 *Klaus Nehring, Clemens Puppe:* Condorcet solutions in frugal models of budget allocation, March 2022