Communication and Voting in Multiparty Elections: An Experimental Study*

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Abstract

We investigate communication and costly voting in multiparty election experiments. Turnout is consistently lower in across electorate communication as compared to restricted communication within parties. Voters are more likely to choose the strategic voting option at the outset in restricted communication, but more likely to start deliberation by stating their first preference when unrestricted. Distributions of earnings are more inequitable when communication is restricted and the candidate preferred by the minority of voters is more likely to win. We also find that even restricted communication significantly increases participation and strategic voting by swing voters, above and beyond induced identity effects.

1 Introduction

In almost all voting situations individuals engage in communication prior to voting. They discuss, for example, their preferences over the choices before them, how they might choose, or

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the costs they face from participating. Some structured communication exists in large elections such as in polls, but almost always there is also unstructured communication where individuals are free to speak or not and to determine what they will say. Rarely do people cast a ballot without such prior free-form discussion with at least some of the other participants. This circumstance is all the more relevant as the constituency becomes smaller, such as elections or decisions in parties and associations, or club and faculty meetings.

Studies of communication in voting have yielded interesting insights—we know that communication can increase turnout in costly voting elections (Großer and Schram, 2006) and that communication can increase the ability of voters to coordinate and vote strategically in elections with multiple (more than two) choices (Rietz, 1993). However, it is seldom the case that communication is either impossible or completely unrestricted. In natural settings, individuals are structured into subgroups such as parties, factions or friends. It follows that deliberative contributions from different sources have different impacts on individual voting decisions.

Currently, we have little knowledge of how free-form communication proceeds and of the effects of different types of communication networks on how voters choose. We therefore introduce communication barriers between groups and study the effect of such restrictions. In particular, how much does it matter if voters can only communicate with a subset of voters (such as other party members) rather than with a larger set of voters? Are voters less likely to turnout if communication is restricted to a subset of fellow participants? Is communication across groups of voters necessary for coordination of voters in elections with more than two choices? Or is the mere existence of some communication, even if restricted within a group, important enough to affect turnout and coordination?

A growing number of studies have examined the effects of communication in voting. However, previous research has focused on three mutually exclusive situations: (1) situations where voting is costless, abstention is not allowed, choices are binary, and communication is free-form across all voters (e.g. Goeree and Yariv, 2011), (2) situations where voting is costly, abstention is allowed, choices are binary, and structured communication about turnout decisions occurs between subsets of individuals (e.g. Großer and Schram, 2006), and (3) situations where voting is not costly, abstention is allowed, choices are multiple (greater than two), and structured communication to all voters occurs via polls and campaign advertisements (Rietz, 1993).[1] Because

[1]Free-form communication in elections was allowed in early voting experiments (see Fiorina and Plott, 1978),

the variation in voting costs, abstention possibilities, vote options, and communication possibilities, it is not possible to draw inferences from comparisons of studies of voting behaviour with limited communication networks (as in Großer and Schram, 2006) to those with broad communication networks (as in Goeree and Yariv, 2011; Rietz, 1993).

Furthermore, participation costs, multiple choices, and pre-voting communication characterize a large number of collective choice processes but none of the above-mentioned studies combine all three characteristics. From a technical point of view there are good reasons for (a) separating the issues of multiple choices and costly voting in the theoretical and experimental literature and (b) the lack of an elaborate examination of free-form communication in either context. Simpler models and more controlled environments provide more easily testable propositions that can be studied in the laboratory or the field. Studying free-form communication was technically infeasible or excessively tedious until recently.

Separating out the two characteristics of costly voting and multiple choices and ignoring how pre-voting communication operates in such combined contexts leaves important avenues unexplored. The desire to coordinate in multicandidate or multiparty elections may affect voter abstention decisions. Mechanisms that increase coordination may also increase ethical expressive voting if such mechanisms instil feelings of group or social solidarity. Großer and Schram (2006) show that voters are influenced by the knowledge of other voters' decisions to turn out and are more likely to vote when voters with similar preferences have also voted. If voters are more likely to participate if they value group welfare or the social aspect of voting as a group, then coordinating in multichoice elections may enhance the group or ethical driven utility they receive from participation.

In particular, the cognitive demands of elections with costly voting and multiple choices may reduce turnout and the ability to coordinate on common candidates. That is, not only will voters have to coordinate over strategic and sincere voting, but they will also need to estimate the probabilities that voters in their group of diverse preferences will participate in the election. Given the increased cognitive difficulties of such elections, it is unclear whether limited communication networks can overcome these problems or if broader communication networks are necessary.

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but the possibilities to document the communication were much more restricted than in modern computer-based chats.

In this paper we compare the effects of variations in communication networks on turnout and coordination in a voting game which combines costly voting with multiple choices. We proceed in two steps. In the first step, we study the impact of communication by comparing two non-communication treatments to two communication treatments. In the second step, we focus on two types of free-form communication that differ by the extension of the communication network. We define two parties and allow for communication only within parties in the one and across both parties in the other treatment.

We use laboratory experiments as this method allows us to gather complete data on free-form pre-voting communication. Hence we draw on and extend earlier experimental work on the effect of communication (Brosig *et al.*, 2003; Bosman *et al.*, 2006; Luhan *et al.*, 2009). We use the communication protocols to study initial intentions and changes in these intentions in the course of the communication process, which can then be compared to actual voting behaviour. Our approach also enables us to compare elections with and without communication controlling for preferences and choices.

In our discussion of the results, we first explore the effects of variations in communication networks by statistically comparing the effects of variations in communication networks on election outcomes and net payoffs. We then study voting behaviour in the different treatments and compare stated voting intentions in the communication treatments with actual voting behaviour in more detail. Our contribution to the existing literature is twofold: Firstly, in our theoretical model as well as in the lab experiments, we combine multichoice elections with costly voting and the possibility of abstention. To the best of our knowledge, this situation has not been examined before. Secondly, we examine the effects of free form communication and group membership on strategic voting and voter turnout.

In the next two sections we present our experimental design and situate our study in the wider context of the literature. In section 4 we present our experimental results and section 5 discusses the implications of our findings for the study of voting.

2 Multiparty Voting and Communication

2.1 *Voting*

In their seminal paper, Myerson and Weber (1993) describe a model of strategic voting in multiparty elections with three parties A (30 percent), B (30 percent), and C (40 percent) with utility vectors $u^A = (10, 9, 0)$ for voters of type A, $u^B = (9, 10, 0)$ for voters of type B, and $u^C = (0, 0, 10)$ for voters of type C. They show that in this situation, there are three equilibria, one in which all voters of type A and B vote for party A, and party A wins, one in which all voters of type A and B vote for party B, and party B wins, and one in which all voters vote for their first preference, and party C wins. We extend this approach by introducing a cost for voting and thus an incentive to abstain (Levine and Palfrey, 2007).

We thus investigate multichoice elections where sets of subjects disagree over the preferred party but share one least preferred party. In our setting there exist coordination equilibria in which the least preferred party is defeated. We assign subjects to one of four preference types labelled E, F, G, and H, presented in Table 1. These types define the subjects' preferences over the three parties (or candidates, policies) A, B and C in the election that are induced by payoffs.[2] We label voters of type E and H *partisans* as their payoffs are highest if Party A (respectively, B) is elected but the payoffs from the election of B (respectively, A) are equivalent to their payoffs from the election of C. Put differently, partisans have a first preferred party and are indifferent between the remaining parties. Voters of type F and G have a clear preference order. We call these subjects *swing voters* as their preference structure may induce them to vote strategically: should their first preferred party be unlikely to win the election, it might be rational to vote for their second preference in order to avoid a win by their least preferred party.

To allow for learning we implemented repeated votes. As Fudenberg (2006, 700) remarks: "Game theorists have long understood that equilibrium analysis is unlikely to be a good predictor of the outcome the first time people play an unfamiliar game ..." Many game theorists think of equilibrium choices as the norms of play that have developed as an outcome of repetition with randomization, learning from similar games, information gained from social learning, and other sources. In order to avoid supergame effects, we varied the size of the electorate, the

[2]The payoffs were given in experimental points which were converted into Euros at a commonly known fixed conversion rate at the end of the experiment.

Table 1: Subject Payoffs

	Winning Party		
Voter Type	A	B	C
E	155	75	75
F	155	105	55
G	105	155	55
H	75	155	75

distribution of voter types and the number of computer votes across periods so that subjects perceived each voting game as a separate choice situation.[3]

In each period, the N subjects in a session were randomly divided into separate electorates of differing sizes. The largest electorates contained all N subjects in one single election, the smallest contained $N/4$ (see Appendix B). In every period the number of simultaneous yet separate elections ranged from 1 to 4. Within each electorate, subjects were randomly assigned to our four voter types according to predetermined distributions. Denote N_i as the number of voters who are of type i and denote N^j as the number of voters whose first preference is party j. Therefore $N^A = N_E + N_F$ and $N^B = N_G + H_H$. In our variations across election periods, we considered two types of cases:

1. Equal Support where $N^A = N^B$

2. Unequal Support where $N^A > N^B$ or $N^A < N^B$.

The winner of the election is determined by simple majority rule. In case of a tie, a random draw selects the winner from the coequal parties. In addition to the human subjects there are also M computer voters who always participate and always vote for party C, which is common knowledge. Hereafter when we refer to voters we refer to human subjects, not to the votes cast by the computer. We varied the size of M from 0 to $1 + N^j$ where party j is the party with the larger number of supporters in case 2 above or either party in case 1 above. In Appendix B we present the distributions of voter types used in a session with 22 subjects.[4]

[3] In a first trial we used a simpler design with fixed numbers of voters in each group, similar to that used by Forsythe *et al.* (1993) in which subjects participated in a series of elections in which in each election period subjects were randomly assigned to groups and then types within groups. This design produced supergame effects (Morton and Williams, 2010, 164).

[4] As an anonymous referee has—rightfully—pointed out, the analysis of variations in N^j and M is interesting in itself. However, given the focus of our study we use these variations as controls in our factorial design.

If $M = 0$, then obviously there is no incentive for voters of types F and G to vote strategically for their second choice and all voters are essentially partisans. As M increases the incentives for strategic voting increase. Given our model, three possible quasi-symmetric equilibria exist when $M > 0$: (i) If voters participate, all voters vote sincerely. (ii) If voters participate, voters of types E, F, and H vote sincerely and voters of type G vote strategically. (iii) If voters participate, voters of types E, G, and H vote sincerely and voters of type F vote strategically. In each of these equilibria, voters choose whether or not to participate based on their realized cost of voting and their expectations of others' choices.

As stated, voting was costly and abstention was possible. We adopt the voting cost distribution from Levine and Palfrey (2007) where each voter pays a cost of participating equal to c which is independently randomly drawn from $[0, 55]$ previous to the voting decision.[5] This distribution was common knowledge but the individual voting costs were private information.

In multiparty contests such as the ones we examine, exact calculations of the pivot probabilities for the critical cost values is not possible due to the non-linearities in the equation system when endogenizing voter perceptions assuming rational and strategic calculations of the cross-effects of all voter choices on their own choices and probabilities (see Appendix A for details). One alternative is to assume that the number of voters is a random variable as in the Poisson voting games of Myerson (1998). However, such an assumption is not realistic for the subjects in our experiment given that the number of voters is finite and known.

Instead we follow the approach of Myerson and Weber (1993) which is also used in other experiments on voting in multiparty situations (e.g. Forsythe *et al.*, 1993; Forsythe and Rietz, 1996; Gerber *et al.*, 1998; Morton and Rietz, 2008; Morton and Williams, 1999). That is, we assume that voters form subjective expectations about the pivot probabilities and perceive these probabilities as positive (even if they are perceived as small). Furthermore, we assume the following:

1. Near-ties are perceived to be much more likely between two candidates than between three candidates.[6]

[5] In the experiment only integer values were allowed. In Levine and Palfrey (2007), in contrast to our experiment, subjects did not pay a cost to vote but received a bonus when they chose to abstain. In line with prospect theory (Mercer, 2005) we contend that framing voting costs as a loss is more in line with the decision problem involved in voting.

[6] In fact in our experiment we observed only one three-way tie out of 263 elections.

2. The probability that a particular ballot moves one candidate past another for the last seat is perceived to be proportional to the difference in votes cast on the ballot for the two candidates.

3. Voters seek to maximize their expected utility gain from the outcome of the election.

Given these three assumptions, three possible quasi-symmetric equilibria exist for the cases we examine in the experiments when $M > 0$: One in which, if voters participate, all voters vote sincerely, one in which, if voters participate, voters of types E, F, and H vote sincerely and voters of type G vote strategically, and one in which, if voters participate, voters of types E, G, and H vote sincerely and voters of type F vote strategically. In each of these equilibria, voters choose whether or not to participate based on their realized cost of voting as described above. The crucial complication thus is that voters are uninformed about the other voters' probability to participate.

Differing from most previous experiments on multichoice elections (see, e.g. Forsythe *et al.*, 1993) we combine partisans and swing voters. Although partisans have no incentive to vote for a second preference since voting is costly, we must take this possibility into account. Should we observe such behaviour, we will consider this as ethical voting (Feddersen *et al.*, 2009).

2.2 *Communication*

The ability of voters to decide whether to participate in an election and whether to vote sincerely or strategically is greatly enhanced by information about other voters' intentions and behaviour. According to conventional wisdom in rational choice theory, statements that can neither be verified nor result in binding commitments, such as intentions to vote before a secret ballot, should be regarded as mere cheap talk (Croson *et al.*, 2003; Austen-Smith and Feddersen, 2006; Landa and Meirowitz, 2009), and thus be inconsequential for voting behaviour and outcomes.

This expectation, however, is neither supported by more recent theoretical contributions nor by experimental findings. In an early experiment, Forsythe *et al.* (1993) have shown that coordination among voters is facilitated by information provided by polls and previous elections. Under highly structured conditions of information exchange among voters and strong restrictions on the kind of information provided, Austen-Smith and Feddersen (2006) have studied the conditions under which voters are induced to share information prior to voting. Unrestricted

communication turns out to invalidate structure-induced voting equilibria and to equalize the outcomes under a wide range of voting rules (Gerardi and Yariv, 2007). This result is corroborated by experimental findings. According to Goeree and Yariv (2011, 919-920), "[t]he results illustrate the potential effects of communication on collective outcomes, but offer little guidance on the precise product of the collective process. Our experimental results suggest stronger impacts of communication: the *selected* outcomes are the same across institutions."

Hence, formal voting theory currently offers little guidance as soon as communication among voters is allowed. Following Bardsley *et al.* (2010, Ch. 4), we thus take a more inductive perspective and try to establish some regularities that might help push forward formal reasoning in the future (Roth, 1995, 22).

Subjects learn about other voters' intentions by interpreting their statements such that they can coordinate on a joint strategy. This view of subjects' use of communication does not necessarily imply that the communicative phase prior to voting can be viewed as deliberation in the sense of "debate and discussion aimed at producing reasonable, well-informed opinions in which subjects are willing to revise preferences in light of discussion, new information, and claims made by other subjects"(Chambers, 2003, 309). In the deliberative process, there is the potential of strategic interaction as "participants aim to promote the beliefs and arguments they consider compelling because they would like to affect the positions of other decision makers" (Landa and Meirowitz, 2009, 434).

Besides this strategic content, communication can also have a cognitive dimension (Dickson *et al.*, 2008). A subject may misinterpret the situation, especially if information is imperfect or asymmetric, and communication prior to a decision helps subjects to learn about considerations relevant to their choice. In this dimension, a communicative act can be considered as a contribution to a deliberative process in which subjects exchange ideas about the best way to collectively handle a situation (Thompson, 2008; Mutz, 2008). Communication thus should improve the coordination potential in a constituency because it helps subjects learn about the collectively best solution to a problem.

Hence, the way in which a subject deals with information gained through communication from other subjects depends on her assessment of the others' trustworthiness. Given that it is often the case that a rational strategy without communication is to abstain, it is by building

up mutual trust during the communication phase that the volunteer's dilemma entailed in the voting decision may be overcome (Ostrom and Walker, 2003). Honest statements may not be believed and deception may succeed. Communication may thus be used to update beliefs about other subjects' interaction orientations (Scharpf, 1997, 84–89). Thus the development of mutual trust in the other subjects' decisions to opt for the cooperative solution by not abstaining crucially depends on each other's assessment based on the communication phase: "What is truly incompatible with consensus-oriented discussion is *competitive interaction orientations*, which [...] will transform any interaction into a zero-sum conflict in which common interests have no chance of being realized"(Scharpf, 1997, 165, emphasis in original).

If communication is allowed, the challenge for participants is one of coordination by deliberation, under the threat of a victory by party C as the default outcome. With Thompson (2008) we contend that the success or failure of a deliberative process, which is critically dependent on this mutual assessment of trustworthiness, depends on the deliberative setting. We focus on two settings—deliberation *within* a party and deliberation *across* parties. The former, in which all voters' statements are only received by members of the party to which a voter belongs, is a setting of a general joint interest with heterogeneous but not diametrically opposed preference orders and uncertainty about the other party members' actions. It should induce cooperative interaction orientations. The latter, in which all voters' statements are received by the whole electorate, is a setting of two camps with conflicting preference orders that need to coordinate on joint action. Hence it should evoke competitive interaction orientations.

Deliberation within a party is characterized by two facets. First, although there may be a dissenting faction, subjects can assume that for a majority of this party's (say, A) members the first preference is to vote for precisely this party. Voting for one's own party is thus a focal point. Second, however, the party members can also assume that the other party's (say, B) members follow exactly the same reasoning. This point is where the dissenting factions in the parties may become pivotal players, because their votes may be the crucial votes needed for a victory of either party. Within a party, the subjects have to collectively solve the problem of gathering a sufficient number of votes for their jointly preferred outcome under the condition of ignorance about the other party members' reasonings. The deliberative process will thus be geared toward a problem-solving mode.

In deliberation across parties, the incentives described in Table 1 are such that the parties are pitched against each other. Since all communication is public, the preference orders of party A and party B members serve as a clearly visible divide that defines competitive orientations which inhibit an "effective commitment to *common* problem solving" (Scharpf, 1997, 166, emphasis in original).

2.3 *Treatments*

We implemented four treatments, *Baseline*, *Party Label*, *Party Chat*, and *All Chat*. While the treatments all share the previously described features, the differences are as follows:

1. *Baseline Treatment*: Voters are informed about their voter types, their voting costs, the number of voters in the election, the distribution of voter types, and the number of computer voters M.

2. *Party Label Treatment*: In addition to the voter types, subjects are assigned a party affiliation. Partisans are always assigned to their preferred party (E to A and H to B), but swing voters are divided, with some assigned to party A and some assigned to party B. The exact distributions of party assignments are provided in Table B1 (Appendix B). The information provided to the subjects is the same as in the baseline treatment, amended by their own party affiliation. The affiliations are pure labels with no effects on voting or the payoffs. These assignments are common knowledge.

3. *Party Chat Treatment*: All settings from *Baseline* and *Party Label* prevail, additionally voters were allowed to communicate with the other members of the same party via free-form chat before voting.

4. *All Chat Treatment*: Identical to *Party Chat*, but now voters could communicate with the whole electorate.

In a setting with costly voting and multiparty elections, these treatments enable us to successively test a number of hypotheses. We now formulate these considerations in the form of predictions for turnout, strategic voting, and deliberation strategies for the comparisons between the four treatments.

2.4 *Hypotheses*

Examining the *Party Label* treatment, we expect the labels to instil party identities, thereby fostering coordination amongst voters. Evidence from the minimal group literature in social psychology shows that subjects are often influenced by such assigned identities (Tajfel *et al.*, 1971; Kerr and Tindale, 2004).[7] Giving voters an artificial party- or group-identity should facilitate willingness to participate, regardless of whether they are partisans or swing voters. We expect furthermore that swing voters assigned to their second-preferred party are more likely to vote strategically than swing voters assigned to their first-preferred party.

Prediction 1 (Party Label Effects) *Voter turnout will be higher in the* Party Label *than in the* Baseline *treatment. Swing voters in the* Party Label *treatment assigned to their second-preferred party will vote strategically more often than those assigned to their first-preferred party.*

We now consider the effect of communication. Although coordination cannot be based on binding agreements, the probability of beating party C can be gauged with more precision: "(C)ommunication appears to play an important reassurance role, allowing subjects to coordinate on more efficient equilibria by reducing their uncertainty about each other's decisions" (Crawford, 1998, 294). Errors in assessment can be addressed during the deliberative process and potential strategic voters can be persuaded and mobilized.

Prediction 2 (Effects of Communication on Turnout) *We expect to find higher turnout in the* Party Chat *and in the* All Chat *treatments than in the* Party Label *and in the* Baseline *treatments. Concomitantly, Party C will win less elections in the* Party Chat *and in the* All Chat *treatments than in the* Party Label *and in the* Baseline *treatments.*

Prediction 3 (Effects of Communication on Strategic Voting) *We expect to find more instances of strategic voting in the* Party Chat *and in the* All Chat *treatments than in the* Party Label *and in the* Baseline *treatments.*

Prediction 4 (Effects of Communication on Outcomes) *In consequence of the effect of communication on individual behaviour, Party C will win less elections in the* Party Chat *and*

[7] Bassi *et al.* (2011) find evidence that voters may be influenced by such identities, particularly if they perceive that their payoffs are unaffected by their choices, i.e. when voting expressively.

in the All Chat *treatments than in the* Party Label *and in the* Baseline *treatments. This results in generally larger payoffs of individual subjects.*

Finally, the only difference between the chat treatments are the communication restrictions. While in the *Party Chat* treatment, communication is carried out in two separate groups, the whole electorate is consolidated in one communication network in the *All Chat* treatment. Restrictions on communication could have three effects in our experiments:[8]

First, communication within parties will affect turnout. However, the overall impact is conflicted because of two counteracting effects. On the one hand, partisan voters and swing voters assigned to their first preferred parties may be more likely to participate when communication is restricted within these parties than when it is unrestricted because of the higher degrees of group identity. However, such identity effects cannot be expected from swing voters assigned to their second preferred party. On the other hand, in the unrestricted chat voters obtain information about the whole electorate, thereby reducing uncertainty about the expected voting behaviour of others. For partisans and swing voters assigned to their first preferred party, social pressure will increase because the effect of free-riding is more clearly observable. Reduced uncertainty about others' intentions will motivate swing voters assigned to their second preferred party to cast their votes in order to either contribute to the victory of their first-preferred party or to avoid a victory of party C, which would be their worst outcome.

Prediction 5 (Effects of Restricted Communication on Turnout) *According to the group identity effect, turnout of partisans and swing voters assigned to their first-preferred party will be higher in the* Party Chat *than in the* All Chat *treatment. Turnout of swing voters assigned to their second-preferred party will be higher when communication is unrestricted because of the uncertainty-reducing effect.*

Second, communication within parties might lead swing voters who are assigned to their second-preferred party to be more likely to vote strategically. This effect might be fostered by persuasive arguments in the group and the missing information concerning the fraction of the electorate that constitutes the other party. We therefore expect to observe higher rates of

[8]We use the terms "restricted" and "unrestricted" communication in relation to the number of other agents that a communication can reach, hence within-party communication is restricted, and communication with the whole electorate is unrestricted. This usage is different from restrictions in the informative content of communication that we address by comparing treatments with communication to no-communication treatments.

strategic voting from this group of swing voters than in the*Party Label* treatment. In the *All Chat* treatment potential swing voters are exposed to the arguments of partisans from both parties and the effect of group identity is undermined by the communication across groups.

Prediction 6 (Effects of Restricted Communication on Strategic Voting) *Swing Voters in the* Party Chat *treatment assigned to their second-preferred party vote strategically more often than those assigned to their first-preferred party and all swing voters in the* All Chat *treatment or in treatments without communication.*

Third, unrestricted communication may affect the choices of partisan voters. Specifically, if communication across parties increases ethical voting, we expect to find that partisan voters are more likely to vote ethically than when communication is restricted. A larger number of chat participants might affect the choices over several channels: Obviously peer pressure may increase; a larger number of arguments might be forwarded; and the social distance to the "other party" is reduced despite the more confrontative setting of deliberation in the unrestricted communication condition. When we understand ethical voting as driven by responsibility concerns, this effect is definitely reinforced as individuals may feel responsible for a growing number of group members.

Prediction 7 (Effects of Unrestricted Communication on Ethical Voting) *Partisan voters will vote ethically more frequently when communication is unrestricted than when it is restricted.*

If our data corroborate these hypotheses concerning the effect of restricted and unrestricted communication on voting behaviour, we still have to ask whether the deliberative process of the two different chat conditions has made any impact or, alternatively, voting behaviour is purely structure-induced. We can study effects of deliberation by comparing initial statements about intentions with actual voting behaviour. Among the voter types differentiated above, it is the swing voters (F and G) whose preference ranking deviates from their party because they are assigned to their second preference and are thus induced a preference for strategic voting behaviour. However, the communication context makes a difference for them. In the restricted communication treatment, they are a minority within the party, and do not know how the members of the other party will behave. In view of this uncertainty, they have an

incentive to support their party from the outset in order to avoid the worst outcome, party C's victory. From the perspective of structure-induced behaviour (Shepsle, 1979), we should thus observe that they indicate at the outset a plan to vote for their second preference. By contrast, under unrestricted communication the other party's tendency is revealed to them. They can thus indicate a plan to vote for their first preference to help realize a majority for the other party, which gives them the highest payoff. But if they observe a rally in favour of their own party, they have an incentive to change their intention, also in order to avoid a victory of C. We summarize this reasoning as follows:

Prediction 8 (First Intentions) *We should find that more sincere voting intentions are stated by swing voters assigned to their second preference in the* All Chat *treatment, who subsequently shift to actually vote for their second preference if a majority for their first preference becomes unlikely.*

Prediction 9 (Structure-induced Preferences) *In the restricted communication environment of the* Party Chat *condition swing voters assigned to their second preference change intentions less often than in other conditions.*

3 Design and Procedure

3.1 *Sequences and Sessions*

We used a within and between subjects design to evaluate these predictions. The voting task was repeated for 19 periods. Specifically, we conducted four sequences. In sequence 1, subjects first participated in 5 periods using the Baseline Treatment, 7 periods using the Party Label Treatment, and then 7 periods using the Party Chat Treatment. In sequence 2, we replaced the Party Chat Treatment with the All Chat Treatment. In sequence 3 subjects participated in the Baseline Treatment for all 19 periods and in sequence 4 subjects participated in the Baseline Treatment for the first 5 periods and the Party Label Treatment for the remaining 14 periods. We ran Sequence 3 and Sequence 4 in order to control for learning effects that might confound our comparisons of the communication treatments with the other two treatments.

The communication treatments came last because they involved the most complex interaction situation which was difficult to explain to subjects without some prior experience with the Baseline and Party Label Treatments.

Upfront, subjects were informed that the experiment would consist of three parts. However, the instructions for each part were only distributed after the previous part had been completed. We ran two sessions with 24 subjects, three sessions with 22 subjects and one with 20 subjects.[9] Appendix C summarizes the sequences by session and the number of subjects.

In the *Party* and *All Chat* treatments the communication phase was limited to a maximum duration of 10 minutes (which was hardly ever actually exhausted). Subjects were not allowed to communicate any information that might identify them to other subjects in the experiment. A subject could leave the chat before the communication time was over. The communication stage was closed, once all participants had left the chat.

3.2 *Laboratory Procedure*

Our experiments were conducted at the MSW experimental laboratory of the Carl-von-Ossietzky University in Oldenburg, Germany. Participants were undergraduate students recruited from all departments of the university. The experiments were implemented computerised using the software z-Tree (Fischbacher, 2007). The experimental code is available from the authors upon request.

Upon arrival in the lab, the participants were randomly assigned to workstations separated by blinds. The instructions for the first part of the treatment (The instructions used in sequence 1 can be found as an online appendix) were read aloud, and questions were answered privately by the experimenters. A short comprehension test was run to make sure all participants had understood the experiment. Of the total 19 periods in every sequence, 4 were randomly chosen for payment, which was common knowledge. The experimental currency were "points" with an exchange rate of 2.5 points per Euro or each point was worth 0.40 Euro. The experimental sessions lasted on average two hours, average payoffs were 29.3 Euro. After the experiment the participants filled in a short questionnaire, they were paid privately in cash and left the lab.

[9]Due to a computer network failure during the experiment, the data was improperly recorded for five periods in session 3. We do not use the data for those periods. Our results are robust to excluding session 3 altogether.

4 Results

We restrict the analysis to periods 13-19 in order to compare the same periods across treatments. Periods 1-12 are here considered a learning phase. Given our procedure of several treatments per session we could have run within-subjects tests as well. We decided to test between subjects only to exclude interferences of learning and treatment effects, assuring the highest possible comparability of the observations from all treatments.

The facts that very few voters choose C and that the likelihood of strategic voting is much larger when $M > 0$ than when $M = 0$, as it should (see Appendix D, Table D1),[10] suggest that the induction of preferences was successful, payoff maximization by strategic voting holds and voters recognized the benefit of strategic voting.[11]

Whilst the theoretical argument runs from individual behaviour to aggregate outcomes, we organize the presentation of results in reverse order. In the first step, we discuss voting outcomes. At the election level, we analyse the extent to which parties A and B are able to defeat party C in the four treatments. At the individual level, we compare the voters' payoffs in the different treatments. In the second step we proceed to individual voting behaviour leading to the outcomes. Finally, we explore the impacts of the treatments on the deliberative process in more detail by analysing differences in stated voting intentions.

4.1 *Voting Outcomes*

We start with prediction 4. Do voters actually coordinate better when communication is unrestricted? In Table 2 we compare the outcomes of elections in the four treatments when $M > 0$. We also compute the average probability that A or B wins by treatment, which is reported in the last column.

Not surprisingly, we find an overwhelming majority of wins by C in the baseline and the Party Label treatments. As with voting behaviour, we find no significant difference in the probability that A or B wins between the two treatments ($Z = 1.01$, $p = 0.31$). The effect

[10] If the number of computer votes equals zero we expect no strategic voting by swing voters. Comparing all sessions, the Party (All) Chat Treatment 28% (22%) of swing voters vote strategically when $M > 0$ and only 6% (6%) do so when $M = 0$, t = -3.98 (-3.07), p = 0.00 (0.01).

[11] Because the number of subjects varied slightly by session, there were some minor differences across sessions in the voter type distributions. We separated out the results for subjects in the sessions with 22 subjects as the voter type distributions were identical in these sessions. The reported results for all sessions and those for sessions with 22 subjects were qualitatively similar and differences were inconsequential.

Table 2: Percentage Outcomes, $M > 0$

Treatment	C Wins	A or B tie with C	A or B wins	Obs.	Avg. Prob. A or B wins
Baseline	100	0	0	17	0
Party Label	88.24	5.88	5.88	17	0.28
Party Chat	50.00	12.50	37.50	32	43.75
All Chat	20.59	11.76	67.65	34	73.53

of communication is impressive: The percentage of times Party C wins the election drops to 50% and 20.6%, for restricted and unrestricted communication, respectively. The Z statistic comparing Baseline with Party Chat is 2.91, $p = 0.00$, and comparing Party Label with Party Chat $Z = 2.12$, $p = 0.03$. The values for the same comparisons with All Chat are $Z = 4.58$, $p = 0.00$, and $Z = 4.34$, $p = 0.00$, respectively. It is also clear that when communication is unrestricted voters find it easier to coordinate and there is a much higher probability of a win by either A or B and this difference is statistically significant ($Z = 2.45$, $p = 0.01$).

4.2 *Payoffs*

Do these larger numbers of wins by A and B have a significant positive effect on voters' payoffs? It might be the case that by voting more often, subjects actually see a reduction in payoffs given they are paying higher costs of voting. Moreover, not all voters may be affected equally since we observe that partisans' and swing voters' behaviours are different and that swing voters' behaviours vary depending on the party to which they are assigned. In order to determine the effects of restrictions on communication on voter payoffs, we calculated each subject's net expected payoff (NEP). NEP equals the subject's expected gross payoff given the outcome of the election (i.e. actual payoff when the election was not a tie, expected payoff when the election was a tie) minus the realized voting cost.

Table 3 summarizes payoffs by voter type and treatment when $M > 0$. Two observations are noteworthy: First, as expected the greater coordination capacity of voters in the two communication treatments results in generally higher payoffs. Compared to the baseline, swing voters are able to double their earnings, while partisans' earnings increase by about one third. Second, there is a clear convergence in payoffs from the baseline and Party Label treatments to the two communication treatments, with an additional effect of unrestricted communication.

Table 3: Net Expected Payoffs, $M > 0$

Treatment	Type	Mean	Std. Dev.	Min.	Max.	Observations
Baseline	Swing	48.97	11.98	9	55	96
	Partisans	72.14	8.97	30	75	36
Party Label	1st Pref.	50.93	13.37	5	88	54
	2nd Pref.	55.61	24.18	3	151	46
	Partisans	73.55	18.40	23	155	44
Party Chat	1st Pref.	79.96	36.87	13	155	73
	2nd Pref.	74.48	37.60	1	155	96
	Partisans	85.94	35.72	25	155	63
All Chat	1st Pref.	93.46	34.10	11	155	94
	2nd Pref.	99.37	33.35	16	155	102
	Partisans	97.28	31.01	21	155	80

4.3 *Voting Behaviour*

The above two sections demonstrate that both election outcomes and individual payoffs vary significantly across treatments. We now explore individual behaviour resulting in these outcomes. Table 4 summarizes individual voting behaviour for periods 13-19 and constellations in which the voters have to coordinate on some positive turnout in order to win against Party C ($M > 0$). The table differentiates between swing voters and partisans, and between swing voters attached to their first- and second-preferred party. Recall that, in principle, swing voters have four strategies: abstaining, voting for their first preference, voting for their second preference, and voting for party C, which is dominated by the other strategies. Partisans also have four strategies, but for them, voting for both party C and the other party is dominated by voting for their own party and abstaining. In the table, we therefore label voting for their own party "sincere voting" and voting for the other party "ethical voting".

Table 4: Voter Choices, $M > 0$

Swing Voters (F and G)						
Treatment	Party Label	Abstain	1^{st} Pref.	2^{nd} Pref.	Voted C	Obs.
Baseline	None	65.62	19.79	9.38	5.21	96
Party Label	1^{st} Pref.	72.22	14.81	12.96	0	54
	2^{nd} Pref.	65.22	17.39	15.22	2.17	46
Party Chat	1^{st} Pref.	34.25	41.10	24.66	0	73
	2^{nd} Pref.	41.67	26.04	31.25	1.04	96
All Chat	1^{st} Pref.	34.04	41.49	24.47	0	94
	2^{nd} Pref.	29.41	50.00	20.59	0	102
Partisans (E and H)						
Treatment	Party Label	Abstain	Sincere	Ethical	Voted C	Obs.
Baseline	None	77.78	16.67	5.56	0	36
Party Label	1^{st} Pref.	65.91	27.27	4.55	2.27	44
Party Chat	1^{st} Pref.	50.79	42.86	6.35	0	63
All Chat	1^{st} Pref.	37.50	53.75	8.75	0	80

Contrary to the social psychological expectation of a labelling effect according to prediction 1, there is no significant difference in swing or partisan voting behaviour between the Baseline Treatment and the Party Label Treatment ($\chi^2 = 2.24$, $p = 0.52$ for the comparison of partisans and $\chi^2 = 4.20$, $p = 0.24$ for the comparison of swing voters). This also holds for the difference between all swing voters in the Baseline Treatment and swing voters assigned to their first or second preferred party in the Party Label Treatment ($\chi^2 = 3.93$, $p = 0.27$, and 1.71, $p = 0.63$, respectively).

Prediction 2 refers to the effect of communication on turnout. We first compare the two communication treatments to the two non-communication treatments. Communication has a remarkable impact on the likelihood of participating in the election. While about two thirds of the voters in the Baseline and Party Label treatments abstained, this share dropped to about one third in the two communication treatments, except for partisans in the Party Chat treatment, of whom 50% abstained. Comparing partisans to swing voters, we observe that the former tend to abstain more often than swing voters within a communication treatment. However, this effect is not statistically significant at conventional levels. When we compare swing voters and partisans in the two communication treatments with their behaviour in the Baseline Treatment, we find significantly less abstention for both partisans and swing voters.[12]

We now turn to the comparison of restricted and unrestricted communication following prediction 5. Table 4 suggests that the effect of restrictiveness in communication on turnout is nuanced. Specifically, swing voters assigned to a party of their second preference are less likely to abstain in the All Chat Treatment than in the Party Chat Treatment ($\chi^2 = 3.25$, $p = 0.07$). This is not the case for swing voters attached to their first preferred party ($\chi^2 = 0.001$, $p = 0.98$), although, contrary to our prediction, the comparison between the two types of swing voters within the Party Chat Treatment is not significant ($\chi^2 = 0.96$, $p = 0.33$). Turning to partisans, we observe that they appear somewhat less likely to abstain in the unrestricted communication treatment than in the restricted communication treatment. However, this effect is not statistically significant at conventional levels ($\chi^2 = 2.54$, $p = 0.11$). Hence, the restriction in communication is only behaviourally consequent for swing voters attached to their second preferred party.

[12] Party Chat v. Baseline: $\chi^2 = 6.99$, $p = 0.01$, for partisans, and 18.09, $p = 0.00$, for swing voters. For All Chat v. Baseline we have $\chi^2 = 16.11$, $p = 0.00$, and $\chi^2 = 30.04$, $p = 0.00$, respectively.

Our second major topic is strategic voting. According to prediction 3 we should observe an increase in strategic voting if communication is possible. Strategic voting is most likely observed among swing voters assigned to their second preferred party. Indeed we find that, compared to the assignment of party labels, the likelihood of voting strategically doubled by allowing for communication within parties (from 15.22 percent to 31.25 percent). When we compare swing voters in the two communication treatments with their behaviour in the Party Label Treatment, we find significantly more strategic voting in both communication treatments (Party Chat v. Party Label $\chi^2 = 7.35$, $p = 0.01$; All Chat v. Party Label $\chi^2 = 3.00$, $p = 0.08$). These results are nuanced by a more detailed analysis of the behaviour of voters attached to their first and second preferred party. When we compare the two different types of swing voters in the Party Label Treatment with the same voters in the Party Chat treatment we find marginally significantly more strategic voting when communication is allowed for those attached to their first-preferred party ($\chi^2 = 2.69$, $p = 0.10$), and significantly more strategic voting for those attached to their second preferred party ($\chi^2 = 4.15$, $p = 0.04$). For the comparison of these voter types between the Party Label and the All Chat treatments, the effect is statistically significant for voters assigned to their first-preferred party ($\chi^2 = 2.81$, $p = 0.09$), but not for those assigned to their second preferred party ($\chi^2 = 0.60$, $p = 0.44$).

Focusing on the comparison of restricted and unrestricted communication following prediction 6, Table 4 again suggests that the effect of restrictiveness in communication on strategic voting only holds for swing voters attached to their second preferred party. More specifically, swing voters assigned to a party of their second preference in the Party Chat treatment are more likely to vote strategically (31.25 percent) than those of the same type in the All Chat Treatment (20.59 percent) or those that are assigned to a party of their first preference in the Party Chat Treatment (24.66 percent). However, the difference in behaviour between the two communication treatments for those assigned to their second preference is only marginally significant ($\chi^2 = 2.94$, $p = 0.09$), and the difference between voters attached to their first preferred party and those attached to their second preferred party in the Party Chat treatment is not statistically significant ($\chi^2 = 0.89$, $p = 0.35$). Thus, the differences support our Prediction 6 only for those voters that are attached to their second preferred party.

The results above do not control for differences in voting costs and for the fact that observa-

tions are clustered by subjects. In order to determine if the differences in treatments are robust to voting cost differences and subject identities, we estimated multinomial logit equations in all treatments for periods 13-19, $M > 0$. Tables D2 and D3 in Appendix D present the analysis for swing voters and partisans, respectively. Communication clearly leads to significantly higher turnout and more strategic voting for swing voters and to significant increases in the participation rate of partisan voters. We also find weak evidence that unrestricted communication increases ethical voting of partisans (the effect is significant at the 7 percent level).[13] There are significant differences in behaviour of swing voters assigned to their second preferred party and we control for differences in voting costs and subject identities. In particular, when communication is unrestricted, abstention is significantly lower and sincere voting is significantly higher than when it is restricted, but there is no significant difference in strategic voting. Thus, our ambivalent findings with respect to Prediction 6 are confirmed when we control for confounding factors. Our results suggest that restricting communication lowers turnout of those voters assigned to parties that are not their first preference. However, these voters are not voting strategically more often than when communication is not restricted.[14] From these results we can conclude that communication prior to voting is indeed a crucial condition for overcoming the voluntarist's dilemma involved in multichoice elections with voting costs.

Finally, we turn to prediction 7 on ethical voting of partisans. Ethical voting—a vote cast against the first preference, thereby incurring losses as compared to abstention—is a rather marginal phenomenon (less that 10 percent) under the conditions of this experiment. Nevertheless, the share of ethical voting almost doubles from the Party Label treatment to the All Chat treatment, but even this difference does not attain statistical significance ($\chi^2 = 0.75$, $p = 0.39$).[15] [16]

[13] Table D4 in Appendix D presents a multinomial logit model of vote choice of swing voters by whether they are assigned to a party of their first preference in the two treatments in the sessions with 22 subjects (thus the only difference in treatments is restriction on communication), clustered by subject id.

[14] We also estimated a multinomial logit model (not reported) for partisans in sessions with 22 subjects that controls for voting costs and subject identities and found no significant differences in behaviour that can be explained by restrictions to communication. The results are available from the authors.

[15] A side result is that abstention is much higher if $M = 0$ (see Appendix D, Table D1). This is plausible given that the strategic problem reduces to a choice between A and B and the known distribution of preferences will induce those with a first preference for the smaller party to abstain and those with a first preference for the larger party to take a free ride in order to save voting costs.

[16] As with the swing voters, we also estimated a multinomial logit model (not reported) for partisans in sessions with 22 subjects that controls for voting costs and subject identities and found no significant differences in behaviour that can be explained by restrictions to communication. The results are available from the authors.

4.4 *Voting Intentions*

When allowing for free-form communication, the experimental design effectively implements a deliberative phase in the decision process. We thus need to analyse whether subjects changed their minds about their vote choices as a consequence of being exposed to deliberation. Voters' choices may be the result either of an ex ante understanding of the situation or of persuasion in the course of deliberation. We differentiate between these two possibilities by comparing first statements in the communicative phase to final decisions.[17] If first statements and final decisions are identical, then we conclude that deliberation did not affect the vote choice. If they differ, then something must have happened during the communication phase that made the subject change her mind. This change can be studied by an in-depth analysis of the chat protocols.

Our approach is related to the techniques for coding natural language in experimental chats used by Charness and Dufwenberg (2006), Kimbrough *et al.* (2008) and Goeree and Yariv (2011). We summarize the apparent meaning of statements and classify these into different categories. In our analysis we focus on the first statements made by voters about their intentions in the upcoming election (see Kalwitzki *et al.*, 2012). That is, we code the first statement where a voter said what he or she planned to do in the election. Subsequently, we compare these statements to actual voting behaviour and study the distribution of subjects across the categories.

In the case of swing voters, the possibilities are that the voter planned to abstain, vote sincerely, vote strategically, or did not communicate a first intention. In the case of partisans, the possibilities are that the voter planned to abstain, vote sincerely, vote ethically for the choice of A or B that was not their first preference, or did not communicate a first intention. We did not observe either swing voters or partisans communicating a first intention to vote for C. Of course, in some cases the statements made about first intentions have been influenced by statements made by previous voters about what others should choose. When it is obvious that a voter is stating that he or she plans to follow some previous suggestion of earlier communicators, we classify that voter's statement as providing no communication as to his or her first intention.

We examine two aspects of voters' first intentions: First, we consider whether voters' state-

[17] An alternative approach would be to ask for a private or public statement prior to the communication phase as part of the experimental protocol. While this approach would result in a more valid categorization of first statements, we are also interested in the question whether subjects make such statements or withhold this information. By eliciting a statement, this question cannot be answered any more.

ments of first intentions are affected by whether communication is restricted or not. Second, we consider whether fulfilment of these first intentions—whether voters ended up making the choices they stated—is affected by whether communication is restricted or not. Jointly, these comparisons provide us with evidence about the influence of communication on voter behaviour and whether that influence is affected by restrictions in communication.

Table 5: First Intentions, $M > 0$

Treatment	Party Affiliation	Stated first intention				
		Abstain	1^{st} Pref.	2^{nd} Pref.	None	Obs.
Party Chat	Swing 1^{st} Pref.	28.77 (66.67)	42.47 (77.42)	21.92 (56.25)	6.85	73
	Swing 2^{nd} Pref.	35.42 (70.59)	29.17 (64.29)	29.17 (78.57)	6.25	96
	Partisans	28.57 (83.33)	52.38 (63.64)	0	19.05	63
All Chat	Swing 1^{st} Pref.	13.83 (61.54)	73.40 (46.38)	7.45 (57.14)	5.32	94
	Swing 2^{nd} Pref.	11.76 (41.67)	68.63 (62.86)	9.80 (60.00)	9.80	102
	Partisans	11.25 (77.78)	83.75 (68.66)	0	5.00	80

Percentage who fulfilled stated first intentions is in parentheses

In Table 5 we present a summary of the results from our analysis of voters' first intentions and how these intentions matched voting behaviour in the cases where $M > 0$. The percentage who fulfilled their first intentions of those having stated a particular intention are presented in parentheses. The column marked "None" contains those subjects who either did not communicate or gave too vague information about their intention to code it. Note that we do not observe any partisan voters expressing first intentions to vote ethically.

Most of the voters made a first statement indicating whether they intended to abstain, to vote sincerely for the first preference, or strategically for the second preference. Nevertheless, as shown in the column marked "None", we find that partisans are about three times as likely not to make such a statement than swing voters in the Party Chat condition, while in the All Chat condition those swing voters who were assigned to their second preference were about twice as likely to withhold such information than either swing voters assigned to their first preference or partisans. Thus, in the Party Chat condition, partisans are more reluctant to disclose their intentions while in the All Chat condition potential swing voters assigned to their second preference are more cautious in their communication strategy.

In Table 6 we refine this picture by cross-tabulating stated first intentions of swing voters (types F and G) by their assignment to their first or second preference and by the type of chat treatment. We observe a major effect for the Chat condition indicating that a larger share of

Table 6: First Intentions by Treatment and Assignment, $M > 0$

	Assignment to Preference			
	First		Second	
Treatment	All Chat	Party Chat	All Chat	Party Chat
Intention Abstain or Strategic	13	21	12	34
Intention Sincere Vote	69	31	70	28
χ^2 (p)	10.11 (0.00)		26.25 (0.00)	
χ^2 (p)	5.40 (0.00)			

the voters in the restricted communication treatment (Party Chat) intend to abstain or vote strategically while there is a clear preference for reporting sincere voting intentions in the All Chat condition. The effect of the party assignment is somewhat less pronounced. It is largely due to the higher incidence of intentions to abstain or vote strategically among swing voters assigned to their second preference. These voters have a strong incentive to vote strategically under restricted communication because they do not know what the other party will do, while they have a clearer picture of the voting intentions in the other party (whose victory results in a higher payoff for them) in the unrestricted communication condition.

Swing voters assigned to their first preferred party have no incentive to vote strategically. However, we find the same pattern for them as well. They are more likely to state first intentions of abstaining or voting strategically and less likely to state first intentions of voting sincerely when communication is restricted than when it is unrestricted. All of these differences are statistically significant.

Table 7: First Intentions and Vote Choice of Swing Voters, $M > 0$

	Vote Choice							
	Assigned to First Preference							
	Party Chat				All Chat			
Intention	Abstain	Sincere	Strategic	Total	Abstain	Sincere	Strategic	Total
Abstain	14	4	3	21	8	4	1	13
Sincere	4	24	3	31	20	32	17	69
Strategic	5	2	9	16	1	2	4	7
Not Stated	2	0	3	5	3	1	1	5
Total	25	30	18	73	32	39	23	94
Mantel-Haenszel $\chi^2 = 6.17, p = 0.01$ (excl. Not Stated)								
	Assigned to Second Preference							
	Party Chat				All Chat			
Intention	Abstain	Sincere	Strategic	Total	Abstain	Sincere	Strategic	Total
Abstain	24	5	4	33	5	5	2	12
Sincere	8	18	2	28	17	44	9	70
Strategic	4	2	22	28	2	2	6	10
Not Stated	4	0	2	6	6	0	4	10
Total	40	25	30	95	30	51	21	102
Mantel-Haenszel $\chi^2 = 12.36, p = 0.00$ (excl. Not Stated)								

Table 7 presents in more detail changes between stated first intentions and actual voting decisions of potential swing voters after deliberation.[18] About two-thirds to three-quarters of the swing voters who stated a first intention to abstain stuck to this intention except for those assigned to their second preference in the All Chat treatment, of whom only half maintained their initial intention. Those abandoning their intention to abstain in the Party Chat chose sincere and strategic voting in roughly equal proportion, while those in the All Chat developed a preference for sincere voting by odds of about 2-3 to 1 during the deliberation phase. Turning to those intending to vote sincerely, we find no difference in the propensity to change initial intentions between the Party Chat and the All Chat condition for those assigned to their second preference (for both about 60 percent), while there is a clear effect for those assigned to their first preference: Two-thirds maintained their initially stated preference in the Party Chat condition, while less than 50 percent stuck to it in the All Chat condition. The share of those shifting to strategic voting instead of abstaining is larger in the All Chat condition. Finally, 80 percent those who initially stated an intention to vote strategically maintained their initial strategy if they were assigned to their second preference in the Party Chat condition, while this share is only just over 50% in all three other conditions. As the Mantel-Haenszel statistics show, these behavioural differences between the Party Chat and the All Chat treatment are statistically significant for both types of swing voters, but they are more pronounced in the case of voters assigned to their second-preferred party.

4.5 *Summary*

Our results can be summarized as follows:

1. Communication raises turnout levels and increases the proportion of strategic voting. This result confirms findings from previous research suggesting that communication undermines structure-induced equilibria by providing a mechanism of coordination.

2. As a result of higher turnout and more strategic voting, the number of times either Party A or Party B beats Party C and the average payoffs increase substantially.

3. Indications that the communication treatments (unrestricted and restricted to within-party communication) have a noteworthy impact on the distribution of individual voting

[18] One subject who voted C after having stated a first intention to abstain has been excluded.

behaviour are nuanced. Swing voters assigned to their second preferred party tend to abstain more often and vote strategically more often than those assigned to their first preferred party.

4. In the Party Chat condition, voters tend stick to first intentions more often than in the All Chat condition. In particular, a larger share of voters stating an intention to vote sincerely finally votes strategically in the All Chat condition.

5. Ethical voting is a rather marginal phenomenon among partisan voters and its occurrence does not seem to be affected by the communication condition.

5 Conclusion

In this paper we provide an analysis of multiparty elections with costly voting and pre-voting communication. To our knowledge these are the first such experiments which combine all three elements. Given the complexity of the model, there is currently no analytic solution from which clear expectations can be derived. This complexity is mirrored in the observed voting behaviour: If no communication among subjects is allowed, the majority abstains. This result is not affected by assigning subjects to a party. We investigate the effect of communication on voting by designing two conditions, a restricted format in which computerized chat communication is possible only among members of a party, and an unrestricted format in which all subjects participate in a joint chat facility. Once communication is allowed, whether restricted or not, voters are much more likely to participate in elections in general and to engage in strategic voting. There are little differences in the overall results of the two communication conditions.

In addition, in our experiments we are able to measure the effects of communication restrictions directly by analysing the transcripts of the communications. We find that swing voters' choices appear to be influenced by communication, particularly in the unrestricted communication setting. In particular, we find evidence that a substantial number of swing voters who initially intended to vote sincerely, have been influenced by unrestricted communication to vote strategically. This is in contrast to the larger proportion of strategic intentions from the outset in the restricted communication mode. This finding, however, is in line with the proposition

that deliberation is geared toward a problem-solving mode. Swing voters do understand the structure of their decision problem and anticipate the necessary choices, which results in a greater likelihood to take an accommodating position at the outset of the deliberation process. At the same time, the lower turnout can be explained by the greater uncertainty about the choices of the other party's members that triggers abstention.[19]

Communication thus strongly improves the ability of groups to overcome the incentives to abstain involved in the voting decision. Although statements are non-verifiable, they appear to help subjects assessing the probability of different outcomes and in particular to discard unlikely ones. While the strategic incentive to defect—either because free-riding yields additional expected payoff if the preferred party wins or because abstaining yields a higher payoff than voting—does not change, communication apparently allows subjects to build up sufficient mutual trust to take the risk of casting a vote. Secondly, the importance of information about intentions of the full electorate is revealed by the fact that the restricted communication treatment resulted in higher abstention rates than the unrestricted communication condition. The uncertainty about the other party's members voting intentions increased the attractiveness of abstention. And thirdly, the more competitive setting of the unrestricted communication environment induces agents to state their first preferences while the restricted communication environment is conducive to more accommodating strategies such as stating the intention to vote for the second preference.

In view of our initial discussion of individual voting decisions, we interpret these result as evidence in favour of a dominating strategic calculus that is conditioned on the informational environment. Cutting communication across parties removes an important piece of information for assessing the likelihood of election outcomes. Although statements by other subjects are non-verifiable, knowing about the direction a rally is taking is sufficient to update the individual estimate of the odds of outcomes. Subjects enter a deliberative process with a clear understanding of the strategic situation and act such that they maximize expected payoffs.

This interpretation is consistent with the high abstention rates in the no-communication conditions, with lower abstention rates and higher strategic voting rates among agents assigned to their second preferred party but not among agents assigned to their first preferred party,

[19]Note, however, the similarity in behaviour of those assigned to their first and second preferred party. This remains puzzling. One possible explanation may be interference with subject identities and vote costs. Multinomial logit models (not reported), however, suggest that the results robust against the inclusion of vote costs.

and with the higher percentage of first statements indicating an intention to vote for the first-preferred party in the unrestricted communication condition as compared to the restricted communication condition. This does not mean that there is neither space for the cognitive dimension of communication nor for the impact of deliberation on the outcome. Also there is some space for ethical voting. But these are rather marginal effects. Instead, agents mainly seem to make strategic use of the information obtained in the process of deliberation and take into account the communication conditions. They assess the trustworthiness of each other's stated intentions and they vote strategically if that maximizes expected payoffs. How much more detailed knowledge on cognition, deliberation, and ethical voting can add to the assessment of voting in small, structured groups, is an issue for further exploration.

However, the observation that agents have an incentive to misrepresent their preferences under certain preference constellations under incomplete information is sobering because it implies that structural conditions may undermine the very foundation of the idea of democracy: If voters misrepresent their preferences at the outset of a deliberation process because they expect their preferences to be on loosing ground anyway, the amount of commonality and agreement in a constituency may be systematically overestimated and the condition of "free and open exchange of information and reasons sufficient to acquire an understanding of [...] the opinion of others" (Bohman, 1996, 16), which is a necessary requirement of deliberative democracy, is seriously violated.

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Appendix A: Voting Equilibria

We focus on quasi-symmetric equilibria where all voters of the same type vote with the same probability. Define p^*_{ij} as the equilibrium probability that a voter of type i votes for party j. We assume that voters do not choose weakly dominated strategies, so $p^*_{EB} = p^*_{HA} = 0$ and $p^*_{iC} = 0$, all i. When $M = 0$, if voters participate they will vote sincerely, choosing whether to participate or not based on their realized cost of voting, the distribution of voter preferences, and their expectations of other voters' participation choices. Given our assumptions three possible quasi-symmetric equilibria exist for the cases we examine in the experiments when $M > 0$, one in which if voters participate, all voters vote sincerely, one in which if voters participate, voters of types E, F, and H vote sincerely and voters of type G vote strategically, and one in which if voters participate, voters of types E, G, and H vote sincerely and voters of type F vote strategically. In each of these equilibria, voters choose whether or not to participate based on their realized cost of voting and their expectations of others' choices.

Define p^*_{ij} as the equilibrium probability that a voter of type i votes for party j. We assume that voters do not choose weakly dominated strategies, so $p^*_{EB} = p^*_{HA} = 0$ and $p^*_{iC} = 0$, all i.

When $M = 0$ our experiments are comparable to Levine and Palfrey's experiments since party C receives zero votes in equilibrium with the exception that unlike Levine and Palfrey, voters' benefits from their preferred party winning vary depending on their voter type.[20] When $M = 0$, a quasi-symmetric equilibrium is given by a set of cutpoints for each voter type c^*_i where the cutpoint represents the cost at which a voter is indifferent between abstaining and voting for their first preference. Because $M = 0$, then $p^*_{FB} = p^*_{GA} = 0$. In equilibrium, these cutpoints are given by the following equations:

$$c^*_i = \left(\frac{155 - 75}{2}\right) PIVAB^*_i = 40 PIVAB^*_i,\ i = E, H \tag{1}$$

$$c^*_i = \left(\frac{155 - 105}{2}\right) PIVAB^*_i = 25 PIVAB^*_i,\ i = F, G \tag{2}$$

where $PIVAB^*_i$ is the probability that a vote by a voter of type i will be pivotal in the contest between parties A and B, that is, make or break a tie given the equilibrium voting strategies of other voters. These probabilities depend on the probabilities of voting and the number of voters of each type as given by standard binomial formulas. The equilibrium probability of each voter type participating is equal to the probability that his or her voting cost is less than their voter type cutpoint. Thus, given that voting costs are uniformly distributed, $p^*_{iA} = \frac{c^*_i}{55}$ for $i = E, F$ and $p^*_{iB} = \frac{c^*_i}{55}$ for $i = G, H$. In this equilibrium all voters either vote sincerely for their first preference or abstain, depending on their cost of voting.

[20] Levine and Palfrey also provide subjects with a bonus for abstaining rather than having them pay a cost of participating.

When $M > 0$, voters face a more complicated choice situation. There are four possible situations where a voter's choice may be pivotal–the election is a close race between A and B, the election is a close race between A and C, the election is a close race between B and C, and the election is a a close three-way race. By close race we mean either that the election is a tie and so the voter, by casting his or her vote, can break the tie, or the election is one vote short of a tie and the voter, by casting his or her vote, can force a tie. Following the notation used above for $PIVAB_i^*$, $PIVAC_i^*$ is the probability that a vote by a voter of type i will be pivotal in a close race between A and C given the equilibrium voting strategies of other voters, and $PIVBC_i^*$ is the probability that a vote by a voter of type i will be pivotal in a close race between parties B and C given the equilibrium voting strategies of other voters. For close three-way races we define the following pivot probabilities: $PIVABCT_i^*$ is the probability that a vote by a voter of type i will force a three-way tie and $PIVABCW_i^*$ is the probability that a vote by a voter of type i will break a three-way tie.[21]

For voters of types E and H, the equilibrium voting cost cutpoints are determined as follows since they either vote for their first preference or abstain:

$$
\begin{aligned}
c_E^* &= \left(\frac{155-75}{2}\right)(PIVAB_E^* + PIVAC_E^*) && (3)\\
&\quad + \left(\frac{2\,(155)-150}{6}\right)PIVABCT_E^* + \left(\frac{2\,(155)-150}{3}\right)PIVABCW_E^* && (4)\\
&= 40(PIVAB_E^* + PIVAC_E^*) + 80\left(\frac{PIVABCT_E^* + 2PIVABCW_E^*}{3}\right) && (5)\\
c_H^* &= \left(\frac{155-75}{2}\right)(PIVAB_H^* + PIVBC_H^*) && (6)\\
&\quad + \left(\frac{2\,(155)-150}{6}\right)PIVABCT_H^* + \left(\frac{2\,(155)-150}{3}\right)PIVABCW_H^* && (7)\\
&= 40\,(PIVAB_H^* + PIVBC_H^*) + 80\left(\frac{PIVABCT_H^* + 2PIVABCW_H^*}{3}\right) && (8)
\end{aligned}
$$

For voters of types F and G the equilibrium strategies are more complicated since these voters choose whether to vote and, if they participate, whether to vote sincerely or strategically. Assuming that these voters find it optimal to vote sincerely, then the equilibrium voting cost cutpoints can be similarly determined as for voters of types E and H:

[21] We need to distinguish between these two situations in the case of three way ties because the difference in utility varies depending on the situation. In contrast, in the situations in the case of two-way ties, the difference in utility is the same whether a voter's vote breaks a tie or makes a tie.

$$
\begin{aligned}
c_F^*\,(\text{sincere}) &= \left(\frac{155-105}{2}\right) PIVAB_F^* + \left(\frac{155-55}{2}\right) PIVAC_F^*) && (9)\\
&\quad + \left(\frac{2\,(155)-105-55}{6}\right) PIVABCT_F^* + \left(\frac{2\,(155)-105-55}{3}\right) PIVABCW_F^* && (10)\\
&= 25PIVAB_F^* + 50PIVAC_F^* + 25PIVABCT_F^* + 50PIVABCW_F^* && (11)\\
c_G^*\,(\text{sincere}) &= \left(\frac{155-105}{2}\right) PIVAB_G^* + \left(\frac{155-55}{2}\right) PIVBC_G^* && (12)\\
&\quad + \left(\frac{2\,(155)-105-55}{6}\right) PIVABCT_G^* + \left(\frac{2\,(155)-105-55}{3}\right) PIVABCW_G^* && (13)\\
&= 25PIVAB_G^* + 50PIVBC_G^* + 25PIVABCT_G^* + 50PIVABCW_G^* && (14)
\end{aligned}
$$

If these voters find it optimal to vote strategically, then the equilibrium voting cost cutpoints are determined as follows:

$$
\begin{aligned}
c_F^*\,(\text{strategic}) &= \left(\frac{105-155}{2}\right) PIVAB_F^* + \left(\frac{105-55}{2}\right) PIVBC_F^*) && (15)\\
&\quad + \left(\frac{2\,(105)-155-55}{6}\right) PIVABCT_F^* + \left(\frac{2\,(105)-155-55}{3}\right) PIVABCW_F^* && (16)\\
&= -25PIVAB_F^* + 50PIVBC_F^* && (17)\\
c_G^*\,(\text{strategic}) &= \left(\frac{105-155}{2}\right) PIVAB_G^* + \left(\frac{105-55}{2}\right) PIVAC_G^* && (18)\\
&\quad + \left(\frac{2\,(105)-155-55}{6}\right) PIVABCT_G^* + \left(\frac{2\,(105)-155-55}{6}\right) PIVABCW_G^* && (19)\\
&= -25PIVAB_G^* + 50PIVAC_G^* && (20)
\end{aligned}
$$

If they participate, voters of types F and G will choose as follows assuming that when indifferent, voters vote sincerely ($i = F, G$):

$$
\begin{aligned}
&\text{If } c_i^*\,(\text{sincere}) \geq c_i^*\,(\text{strategic}) \quad \text{vote sincerely}\\
&\text{If } c_i^*\,(\text{sincere}) < c_i^*\,(\text{strategic}) \quad \text{vote strategically}
\end{aligned} \tag{21}
$$

Substituting in for these critical cost values we have that if they participate, type F voters vote sincerely if the following is true and vote strategically otherwise:

$$
50PIVAB_F^* + 50PIVAC_F^* + 25PIVABCT_F^* + 50PIVABCW_F^* \geq 50PIVBC_F^* \tag{22}
$$

And if they participate, type G voters vote sincerely if the following is true and vote strategically otherwise:

$$50PIVAB^*_G + 50PIVBC^*_G + 25PIVABCT^*_G + 50PIVABCW^*_G \geq 50PIVAC^*_G \quad (23)$$

Appendix B: Distributions of Voter Types in Sessions with 22 Subjects

Table B1: Distribution of Voter Types By Period in Sessions with 22 Subjects							
NP = Control, P = Party Label, C = Communication							
		Party A			Party B		
Treatment-Period	C Voters	E Voters	F Voters	G Voters	F Voters	G Voters	H Voters
NP-1, P-7	6	2	2	2	2	2	1
NP-2, P-11	2	1	1	1	1	1	1
NP-3, P-11	0	2	2	0	0	2	2
NP-3, P-8, C-13, C-18	4	1	0	2	2	1	0
NP-3, P-8, C-13, C-18	3	1	0	1	2	1	0
NP-4, P-12, C-16, C-19	7	1	2	2	2	2	2
NP-5	10	3	4	4	4	4	3
P-6	4	2	2	2	2	2	1
P-6	4	1	2	2	2	2	1
P-7, C-16, C-19	6	1	2	2	2	2	2
P-9	12	3	4	4	4	4	3
P-10	4	1	3	3	1	2	1
P-10	4	1	1	2	3	3	1
P-12	7	2	2	2	2	2	1
C-14	4	1	1	1	1	1	1
C-14	4	2	2	0	0	2	2
C-15	0	3	4	4	4	4	3
C-17	7	2	2	2	3	1	1
C-17	7	1	1	3	2	2	2

Appendix C

Table C1: Sequence by Session					
		Periods			
Sequence	Session	1-5	6-12	13-19	Subjects
1	1	Baseline	Label	Party Chat	22
1	3	Baseline	Label	Party Chat	20
2	2	Baseline	Label	All Chat	22
2	4	Baseline	Label	All Chat	24
3	5	Baseline	Baseline	Baseline	22
4	6	Baseline	Label	Label	24

Appendix D: Additional Tables

Table D1: Pct. Choices of Swing Voters in Communication Treatments							
$M = 0$							
Party Chat	All	1^{st} Pref.	62.50	25.00	12.50	0	16
	All	2^{nd} Pref.	68.75	31.25	0	0	16
	22 subj.	1^{st} Pref.	37.50	50.00	12.50	0	8
	22 subj.	2^{nd} Pref.	87.50	12.50	0	0	8
All Chat	All	1^{st} Pref.	68.75	25.00	6.25	0	16
	All	2^{nd} Pref.	75.00	18.75	6.25	0	16
	22 subj.	1^{st} Pref.	75.00	12.50	12.50	0	8
	22 subj.	2^{nd} Pref.	75.00	12.50	12.50	0	8

Table D2: Multinomial Logit Estimation of Swing Voters' Choices								
All Treatments with $M > 0$, Periods 13-19								
Abstention in Baseline Treatment is Base Outcome, C Votes Omitted								
	Voters Assigned to 2nd Preferred Party				Voters Assigned to 1st Preferred Party			
Indep. Var.	Coeff.	R. Std. Err.	z	Pr $> \|z\|$	Coeff.	R. Std. Err.	z	Pr $> \|z\|$
Sincere Vote								
Party Label	-0.29	0.48	-0.60	0.55	-0.51	0.42	-1.23	0.22
Party Chat	1.01	0.42	2.42	0.02	1.28	0.36	3.52	0.00
All Chat	1.93	0.38	5.05	0.00	1.46	0.36	4.06	0.00
Vote Cost	-0.06	0.01	-5.61	0.00	-0.05	0.01	-4.62	0.00
Constant	0.41	0.39	1.04	0.30	0.09	0.39	0.23	0.82
Strategic Vote								
Party Label	0.32	0.60	0.53	0.60	0.08	0.68	0.11	0.91
Party Chat	2.00	0.57	3.48	0.00	1.49	0.59	2.52	0.01
All Chat	1.83	0.57	3.21	0.00	1.69	0.56	3.03	0.00
Vote Cost	-0.07	0.01	-6.01	0.00	-0.06	0.01	-6.07	0.00
Constant	-0.15	0.49	-0.30	0.77	-0.31	0.47	-0.66	0.51
	Obs. = 333, Clusters = 126				Obs. = 312, Clusters =126			
	L. Like. = -292.09, P. $R^2 = 0.15$				L. Like. = -273.87, P. $R^2 = 0.14$			

Table D3: Multinomial Logit Estimation of Partisans' Choices				
All Treatments with $M > 0$, Periods 13-19				
Abstention in Baseline Treatment is Base Outcome, C Votes Omitted				
Sincere Vote				
Party Label	0.78	0.65	1.19	0.23
Party Chat	1.42	0.58	2.45	0.01
All Chat	2.02	0.57	3.56	0.00
Vote Cost	-0.04	0.01	-4.03	0.00
Constant	-0.67	0.54	-1.23	0.22
Other or Ethical Vote				
Party Label	0.28	1.23	0.23	0.82
Party Chat	0.67	0.85	0.80	0.43
All Chat	1.44	0.80	1.81	0.07
Vote Cost	-0.08	0.02	-3.46	0.00
Constant	-1.04	0.80	-1.31	0.19
	Obs. = 222, Clusters =114 , L. Like. = -172.32, P. $R^2 = 0.12$			

Table D4: Multinomial Logit Estimation of Swing Voters' Choices								
Chat Treatments with $M > 0$, Sessions with 22 Subjects								
Abstention in Party Chat is Base Outcome, C Votes Omitted[22]								
	Voters Assigned to 2nd Preferred Party				Voters Assigned to 1st Preferred Party			
Indep. Var.	Coeff.	R. Std. Err.	z	Pr $> \|z\|$	Coeff.	R. Std. Err.	z	Pr $> \|z\|$
Sincere Vote								
All Chat	1.14	0.55	2.07	0.04	0.21	0.57	0.37	0.71
Vote Cost	-0.05	0.02	-3.37	0.00	-0.03	0.02	-1.59	0.11
Constant	0.90	0.67	1.34	0.18	0.63	0.54	1.17	0.24
Strategic Vote								
All Chat	0.14	0.59	0.23	0.816	0.62	0.69	0.90	0.37
Vote Cost	-0.07	0.02	-3.47	0.00	-0.06	0.02	-3.31	0.00
Constant	1.43	0.54	2.65	0.01	0.95	0.65	1.47	0.14
	Obs. = 111, Clusters = 42				Obs. = 80, Clusters = 40			
	L. Like. = -102.98, P. $R^2 = 0.12$				L. Like. = -81.29, P. $R^2 = 0.07$			

[22]Only one subject voted for C in one period. However, including this observation results in a failure of the multinomial logit estimation.