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WP 1833 – December 2018

Sincere voting, strategic voting A laboratory experiment using alternative proportional systems

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D72, C93

Working Paper

Sincere voting, strategic voting
A laboratory experiment
using alternative proportional systems[1]

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20/10/2017

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[1] Experiments funded by the project ANR DynaMITE ANR13-BSH1-0010. The authors thank Elven Priour and Quentin Thevenet for their help in carrying out the experiments.

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1 Introduction

A voter votes sincerely when she votes systematically according to her preferences ; she votes strategically if she tries to influence the outcome of the election by adapting her behavior to what she anticipates concerning other voters' behavior, as well as to the voting rule—i.e., if her vote is influenced by her expectations about attainable outcomes. As rightly pointed out in the introduction to this volume (Aldrich, Blais and Stephenson 2017), for a voter it may be the case—and hopefully is often the case—that, in a given election, strategic considerations do not conflict with sincerity. However, the political science literature usually uses the adjective "strategic" for what should really be called "non-sincere" or "strategic and non-sincere". This paper aims to shed some light on the distinction that should be made between strategic, sincere, and non-sincere voting.

As soon as three or more options are available, voting becomes a complex decision. The question of strategic, non-sincere, voting has attracted much attention from economists concerned with the theoretical aspects of elections. The definition of a "sincere" vote is unambiguous when the form of the ballot and the possible votes matches precisely what can be termed the "opinion" or the "preference" of the voter. Such is the case when the voter is required to provide the name of a single candidate, or party. Then a sincere vote consists in selecting her first preference, whatever the context, and an incentive for voting strategically is to "desert non-viable candidates" (Cox 1997). Such is also the case in the setting of "Arrovian preferences", where the voter is required to submit, as her vote, her ranking of the candidates, from best to worse. The formal social choice literature has reached the conclusion that, in this setting, rationality cannot always match sincerity (Gibbard 1973, Satterthwaite 1975).

But the definition of sincerity, and therefore the study of the question of strategic voting, is not so straightforward with other forms of voting. For instance, the literature on strategic voting in mixed-member systems has concentrated on the ticket-splitting phenomenon, a question that is obviously absent from the study of single-winner elections, but raises new questions about expressive voting (see Harfst, Blais and Bol 2017 in this volume). Another instance is "approval voting", as will be studied in this chapter ; if a voter can vote for as many candidates as she wishes then even a sincere voter has to decide—and this is already a kind of strategic decision—how many candidates she will approve : only her single most preferred candidate, or the best two, the best three... (see Lachat, Laslier and Van der Straeten 2017 in this volume).

On the other hand, the notion of strategic (sincere or not) voting is also not straightforward when one leaves the FPTP context. The conceptual guidelines are provided by the theory of rational behavior, as used in game theory. Rational behavior is characterized by intentions (in general expressed as preferences about outcomes), and by reasonable beliefs about how possible outcomes derive from possible actions. It is difficult to test the predictability of formal models of strategic behavior, since surveys can hardly provide all the necessary information on the original preferences (Sauger, Blais, Laslier and Van der Straeten 2012). Because they offer a way to control preferences (through monetary incentives), laboratory experiments have helped to bring to

light what actual strategic behavior is, and what type of cognitive process it involves (Rietz 2008, Blais, Laslier and Van der Straeten 2016).

But some ambiguities remain. First, it has been shown that monetary incentives in the laboratory are likely to overstate strategic behavior compared to a real political context (Igersheim, Baujard, Lebon, Laslier, and Gavrel 2016).

Second, the substantive definition of strategic behavior is fuzzy insofar as it heavily depends on the voting rule and the political context (Baujard, Gavrel, Igersheim, Laslier and Lebon 2014). Showing that there is a gap between the basic political preference and the observed voting behavior is a first step ; but it is not sufficient. In order to characterize strategic behavior, it should also be proven that this gap embodies an intention to individually influence the collective decision.

Third, the theory of rationality is intrinsically linked to the idea that, when it comes to deciding, a rational actor has a unique goal (expressed by her preference relation, or utility function), most probably because she is weighting in a consistent manner the conflicting objectives she might have. But, once again, some voting rules seem to offer precisely the possibility to fulfill several goals at one time. Mixed-member systems, two-round elections and approval voting are all institutions that might be understood this way by voters.

These three points frame the present study. The experiment is run the laboratory but, rather than using monetary-induced preferences, it is based on a real political situation, namely the 2014 European Parliament election. We first asked participants to directly give their opinion on the various lists. Then we asked them how they would vote under three variants of PR : voting for one (and only one) list, approving possibly several lists, and a kind of cumulative voting. In this way, each participant expressed herself four times on the actual lists proposed in the official election.

This protocol allows us to compare the votes with the opinions at the individual level, for the three rules. We describe large amounts of non-simply-sincere voting, and we launch a debate on whether these selective choices can uncontroversially be explained by strategic intentions, even for a larger definition of preferences.

The chapter is organized as follows. Section 2 presents the contextualized experiment and the issues it raises. Section 3 analyzes how voters use the voting rules and the opinion grades. Section 4 highlights the sincerity or non-sincerity of the voters' behavior from one voting system to the next. Section 5 clarifies and measures the choices that can be considered as strategic, before judging the consistency between sincere and strategic voting. Section 6 concludes.

2 Design of the experiment

The experimental data used in this chapter were collected during 11 laboratory sessions with 21 participants in each. Six sessions were held in Rennes and 5 in Ecully, in the suburban area of Lyon, on the sidelines of a non-contextualised monetarily controlled experimentation. Anonymity of responses was guaranteed by the fact that each participant used a paper-ballot that she herself had to slip into an urn before leaving the room.

2.1 Political context

The experiment was performed on the occasion of the elections of the European Parliament, in May 2014. The sessions took place in France during the campaign period. Members of the European Parliament (MEP hereafter) are elected under proportional systems that vary from one country to the other. France uses a typical closed-list system and is divided in 8 districts. The electoral rule is proportional, with a threshold of 5%. French citizens, and thus probably most participants in the survey, are used to the closed-list system, which is common in this country.

Elections are independent from one district to the other. The main parties propose lists in all districts, but some other lists are specific, for instance regional ones. As indicated above, we worked in two places. The city of Rennes (Britanny) belongs to the electoral region "West", where 9 MEPs had to be elected and where there were 25 lists on the ballots. The city of Ecully-Lyon (Rhône-Alpes), belongs to the electoral region "South East", where 13 MEPs had to be elected and where there were 23 lists.

Despite the different numbers of MEPs to be elected, only 6 lists can be considered viable in each district. These viable lists, specified in Appendix A, are the ones presented by the 6 main French political parties. These lists are also the ones whose scores exceeded 5% of votes in the real official vote,[7] and this result was also predicted by the polls at the time of the sessions. Because no other list could hope to have elected candidates in either region, these were quite clearly the only "viable" lists.

2.2 Experimental protocol

At the beginning of the session, each participant received a leaflet containing the official campaign material of the various lists (one page for each list) and was given time to go through these documents. Then the three voting rules under study were explained to the participants, and they were asked to vote under each of the three rules. They were also asked to evaluate the different parties on a scale 0,1,...,20.

The paper-ballot[8] is presented, and participants are invited to first express their opinion on the various lists (*OP21*, here after), and then to vote in the following order : (1) for a single list as in the official voting (*ONE*, here after), (2) by providing support to as many lists as they want, knowing they bring a full vote to each of them (list-approval, *LAppr*, here after), (3) by providing support for as many lists as they want knowing they share their unique vote between them (list-split vote, *LSplit*, here after). Specifically, the following recommendations were given to the participants :

[7] Note that no candidate is elected in the main list of the extreme left in the West Region although this list passed the 5% threshold, because the number of members of the European parliament in this area is only 9.

[8] See appendix A for the ballots with the lists of the regions "South-East" and "West", respectively in figures 3 and 4. These ballots were printed on both sides and folded in half.

OP21 : evaluations of the parties. The variable OP21 contains either the evaluation of each party on the 21-step numerical scale, 0,...,20, or the answer "no opinion". The "Opinion" page of the ballot pointed out the following : "*Apart from any voting procedure, we wish to know anonymously your opinion about the different French political parties presenting lists for the European elections of May 2014. At the extreme, you will give 20/20 to a party whose program perfectly matches your opinion ; and 0/20 to a party that is totally opposite to what you think. If you cannot decide on a political party, inscribe "NO" (no opinion) in the box.*" Given the way we phrased the question, there are reasons to think that OP21 conveys reliable information about the voters' true political rankings of parties in terms of ideological congruence. First, the 0,...,20 scale is the standard scale in used in France to grade essays and exams at school ; for the participants, this is thus a familiar way to evaluate quality. Second, the scale is sufficiently wide to express a minute opinion, even with a large number of competing lists. Third, voters have the possibility to say that they have no opinion about some of the lists.

ONE : one-name voting. (The official voting rule.) Here the voter simply votes for one list. As the participants were recalled, the number of seats allocated to a party depends on the number of votes that party received. The seats are allocated to the parties that pass the threshold in proportion to their vote shares.

LAppr : list-approval rule. Here the voter approves as many lists as she wishes. Voting for two, or more, lists confers one full point to each list ; the approval score of a list is the number of voters who approved the list. The seats are allocated to the parties that pass the threshold in proportion to their approval scores.[9]

LSplit : split-my-vote rule. Here the voter can split her unique vote among as many lists as she wishes. Voting for two parties gives half a point to each, voting for three parties gives third of a point to each, and so on. The vote score of a party is the sum of points received this way. The seats are allocated to the parties that pass the threshold in proportion to their vote scores.

2.3 Definitions and expectations

We trust that the participants, even if they had no monetary incentives to do so, would play the game and answer the fake vote questions by really trying to imagine how they would vote in these hypothetical scenarios.[10] Similarly,

[9] Note that we use the list-approval rule for the purpose of this experiment on voters' behavior even if it might be quite silly to use such a rule in practice : list-approval offers obvious incentives for a (main) party to present *several* lists simultaneously in the same district.

[10] Note that, as is usually the case in Experimental Economics, we made no effort to have representative samples of participants. Most of them are students and their social status and political opinions are what they are. We are not interested in predicting electoral results, but rather we wish to compare the participants' behavior under the three rules with their evaluation of the parties.

we can hope that our opinion question (OP21) was an opportunity for participants to honestly express their perception of each list. This direct access to the preferences of voters, combined with the three voting procedures that are tested, allow us to raise several issues related to sincere and strategic voting.

The simplest issue is to estimate the amount of sincere and strategic voting in the "official" vote, which forces the voter to select a single list, via an analysis of the types of parties that are then selected, or not, by the participants. When the vote has to be unique, a voter is considered to be sincere if she chooses her, or one of her, best-evaluated parties, and to be strategic (in the broad sense) if she chooses a viable party. However, more complex questions arise from the two original voting rules that we used ; these rules have not to our knowledge been studied in the literature.

The LAppr and LSplit rules have in common that the voter has the possibility of voting for as many parties as she wishes. Under these conditions, a sincere voter should support all parties that have a grade higher than, or equal to, a threshold that she sets. Because the multiplication of votes is more costly under LSplit, where the support given to each party weakens when their number increases, than under LAppr, where the voter gives an entire vote to each selected party, we expect the selection of parties to be slimmer under LSplit than under LAppr. The proportion of sincere voters should therefore be higher under LAppr than under LSplit and, a fortiori, than under ONE.

The notion of strategic behavior is more difficult to grasp under procedures with multiple votes. Under the LSplit rule, which discourages the dispersion of votes, a rational voter might at first glance always wish to concentrate her vote on a single party, in order to maximize the efficiency of her vote. However, ballots in which voters take advantage of the opportunity for multi-supports can also be interpreted strategically. We regard as strategic two types of ballots : those in which only viable parties are supported (type 1 strategy), and those in which the only excluded parties are non-viable parties that are at least as well evaluated as the supported parties (type 2 strategy). Below we show several examples of ballots that are considered as sincere or not, and strategic or not, given the opinion of the voter and the viability of the parties.

Under the LAppr rule, the same choices between supported and unsupported parties seem more difficult to justify, insofar as supports have the same weight regardless of their number. Nevertheless, as we show later, they can be rationalized ; we call this behavior the sophisticated strategy, and we distinguish, just as for the LSplit rule, sophisticated strategies of types 1 and 2. Logically, such behavior should be rare.

The expectations provided by the rational theory are thus as follows.

1. The proportion of sincere voters should be the largest in LAppr and the lowest in ONE. More generally, the coincidence between preferences and votes should be the best under LAppr and the worst under ONE.
2. The proportion of strategic voters should be the highest in ONE and the lowest in LAppr.
3. The number of supported parties should be smaller under LSplit than under LAppr.

2.4 Examples of sincere and non-sincere, strategic and non-strategic ballots under multi-vote systems

We precise our definitions of sincere voting and of strategic voting by examining examples of ballots that can be issued when a multi-vote is possible, for given political preferences. In Table 1, parties are labeled *A* to *J* and, in this example, *B* and *C* are equally preferred, with grade 18, as are *D*, *E* and *F*, with grade 15. There are 4 viable parties, as indicated in the third column.

Tab. 1 – Examples of ballot-types

List	Opinion grade	Viability (V or NV)	Ballot 1	Ballot 2	Ballot 3	Ballot 4	Ballot 5
A	20	V	X	X	X	X	
B	18	NV		X			X
C	18	V		X	X	X	X
D	15	V				X	
E	15	NV					
F	15	NV				X	
G	10	NV					
H	8	V					
I	5	NV					
J	0	NV					
Sincerity			Sinc.	Sinc.	Sinc. but Select.	Insinc.	Insinc.
Strategy			Strat. type 1	Non Strat	Strat. type 1	Strat. type 2	Non Strat

Concerning sincerity :

- In ballots 1 and 2, voters are simply sincere. All supported candidates have a strictly better opinion grade than unsupported ones.
- In ballot 3, the voter is sincere but selective, she doesn't support candidate B who has the same grade, 18, than the least well-evaluated supported candidates, C.
- In ballots 4 and 5, voters are insincere. Some of the unsupported candidates have a strictly better opinion grade than supported ones (ballot 4 : B is better evaluated than D, ballot 5 : A is better evaluated than B).

Concerning strategy :

- In ballots 1 and 3, only viable parties are supported. The voters thus show a (type 1) strategic behavior.
- In ballot 4, the voter supports both viable and non-viable parties, but she deserts parties (B, E) that have at least the same opinion grade than supported ones, and these parties are all non-viable. Because this behavior benefits the viable parties she prefers and sustains, it is considered as strategic (of type 2).
- In ballots 2 and 5, voters are non-strategic. Either they support their preferred candidates indifferently whether they are viable or non-viable, or they

do not support viable lists that are strictly better evaluated than supported ones.

3 Use of voting rules and expression of opinions

3.1 Consistency among rules

The experimental sessions provided 126 and 105 ballots respectively in Rennes and in Lyon. Because they were not filled, 3 ballots are not valid. Consequently, there are 228 useful ballots : 123 for the "West" region and 105 for the "South-East" region.

The multiple-votes rules LSplit and LAppr introduce flexibility, but it seems reasonable to expect that voters would not, under these rules, stop voting for the unique party they vote for under the official rule. We therefore call ballots "inconsistent" where the party chosen under the official rule is no longer chosen under the alternative rule. There are very few such ballots. The chosen candidate according to ONE is also among the supported candidates in LAppr or in LSplit in 96-99% of the ballots, as shown in the two first columns of Table 2.

In addition, the prospect of sharing her single vote should lead the participant to support a smaller number of lists under the LSplit rule than under the LAppr rule, with the lists supported under LSplit also being supported under LAppr. This third type of consistency is tested in the last column of Table 2. One can see that 96.05% are in line with the expectations in this regard. All these observations also confirm the consistency of participants' answers and the quality of the collected data.

TAB. 2 – Consistency checks

Consistency ONE/LSplit	Consistency ONE/LAappr	Consistency LSplit/LAppr
96.49%	99.13%	96.05%

3.2 The use of opinion grades

Despite the documents at their disposal, and the time that they had to study them, participants often experienced difficulties in evaluating all the presented lists. Only 54 of the 228 participants graded all the lists. On average, a ballot contains 5.1 "no opinion" answers.

Before commenting on Table 3, which summarizes the information about opinion grades, recall that, as pointed above, the 0,...,20 scale has a special meaning for French people, because it is the one used in the education system to evaluate pupils and students. This familiar scale gives them at least one common point of reference : 10/20 is usually the minimum grade (or average rating) required to pass a test.

As expected, participants generally used the whole extent of the scale 0,...,20 to express their preferences for the proposed political parties. The

average difference between the lowest and highest grades is 15.5. Beyond the size of this gap, most participants chose to precisely specify their opinion about the lists, using on average 8.8 different grades.

Let us call the "preferred party" the party which attracted the best grade in OP21. Given the meaning of the scale 0,..., 20 for French people, it is unsurprising to observe that all the participants attributed a grade of at least 10 to their preferred party (see minimax in Table 3). In the same line, the worst-rated party never has a score strictly greater than 10 (see maximin in Table 3). The distribution of the grades leads to an average of the awarded grades that is well below this threshold, being equal to 7.84.

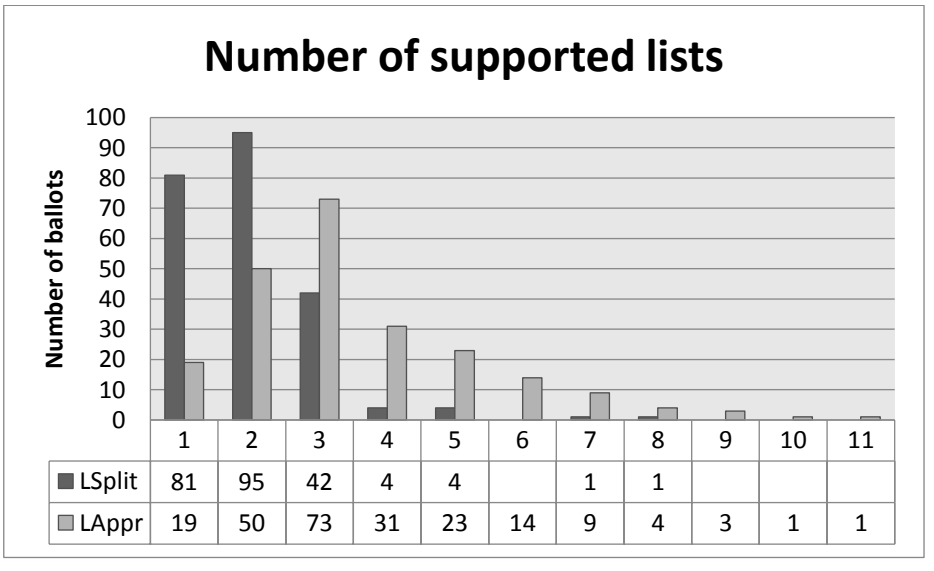
TAB. 3 – Evaluations of the lists

Proportion of evaluated lists	Average grade	Maximin	Minimax	Average amplitude of grades
78.95%	7.84	10	10	15.5

3.3 The multiple votes under LSplit and LAppr

Figure 1 proposes a visualization of the voting behavior of participants in the experiments. Clearly, a large proportion of them have used the possibilities offered by both alternative voting rules to support multiple lists simultaneously. Unsurprisingly, they also supported as many or more parties under LAppr as under LSplit when they had to share their single vote (the only exceptions are 6 participants). The average number of supported lists is 1.84 with LSplit and 3.3 with LAppr.

FIG. 1 – Distribution of the number of supported lists under the LSplit and LAppr rules

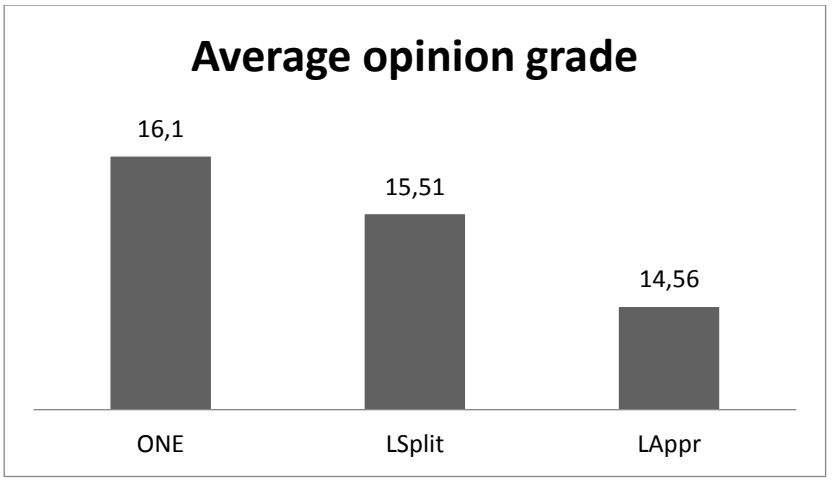


	1	2	3	4	5	6	7	8	9	10	11
LSplit	81	95	42	4	4		1	1			
LAppr	19	50	73	31	23	14	9	4	3	1	1

Looking at the ballots in more detail, it is interesting to note that 32.89% of the participants have exactly reproduced their official vote in the LSplit rule. Some voters also chose to express exactly the same supports under LSplit and LAppr, amounting to 28.53% of the participants. Among them, some voters chose to retain only one list, always the same, in the three voting rules, amounting to 18 participants, that is 7.89% of the total.

Because the average number of supported lists is significantly larger than 1 under LSplit, the average level of opinion scores for supported lists is lower under the LSplit rule than under the official rule (15.51 against 16.10). This means that, with LSplit, participants have extended their support to lower-rated parties, i.e. parties ranked lower in their preference order. As Figure 3 shows, the increase in the number of supported parties from LSplit to LAappr translates into a further decrease in the average score (14.56 against 15.51).

FIG. 2 – Average opinion grade of supported lists under the different voting rule



All these elements lead us to think that, overall, participants in the experiment expressed their preferences on the lists with seriousness and precision. The behavioral analysis may therefore be based on these opinion grades. This analysis allows us in turn to judge the sincerity of the choices of the voters according to the different voting rules, and to judge to what extent these choices can be considered as strategic in relation to the viability of the lists.

4 Evidence of sincere voting

4.1 Voting rules and proportion of sincere ballots

The analysis of sincerity will be based on the comparison between the preferences of participants, which we assume to be captured by OP21, and the choices they expressed through each of the voting rules (see Table 4). We

distinguish three categories of ballots : (i) the “sincere” ballots in which all unsupported list(s) have lower opinion grades than the supported ones ; (ii) the “insincere” ballots in which some unsupported list(s) have better opinion grades than supported ones ; (iii) the “sincere but selective” ballots in which some unsupported list(s) have the same opinion grade than the worst-rated of the supported ones. (See the examples provided at the end of section 2.)

Regarding the “sincere but selective” category, note that there is a significant difference between the ONE rule and the others. Under ONE, sincere voters are forced to choose between their favorite lists, so they are obliged to be selective ; this is not the case under LSplit and LAppr, which confer a possibility to support as many lists as desired, and where voters are then not obliged to be selective.

TAB. 4 – Voting rules and sincere voting

	ONE	LSplit	LAppr
Sincere	62.7%	60.1%	50.9%
Sincere but selective	25.9%	17.1%	21.5%
Insincere	11.4%	22.8%	27.6%

4.2 The possibility of multiple vote does not promote sincere voting

The single-list vote results indicate that only 11.4% of voters cast a non-sincere ballot and that 25.9% had to choose one among their favorite parties.

Table 4 provides more details about the decisions of participants under the LSplit rule, as compared with the ONE rule. As the decline in the average rating indicates, voters have not used the opportunity to support multiple lists simultaneously for the sole purpose of making their votes exactly match their stated preferences. In fact, the proportion of ballots in which the supported lists have strictly better opinion grades than those who are not (sincere ballots) has even slightly decreased. On the contrary, the percentage of ballots in which at least one unsupported party has a higher grade than the least-favorite supported parties (insincere ballots), increased compared to the single-vote “official" rule (22.8% against 11.4%). Clearly, many participants chose to give additional votes to parties without following the order of their preference ; for (part of) their vote they deliberately selected parties with lower grades. We shall see later whether these decisions can be rationalized as “strategic”.

Under the LSplit rule, many ballots therefore seem to reflect some degree of insincere choice. In addition to the ballots we just described, we must add those in which the lowest evaluated of the supported and unsupported parties have the same opinion grade (they are 17.1% of the observations), insofar as the voting rule allows voters to support them all simultaneously.

Thus, the importance of this “selective” voting (sincere or not) can be estimated at around 40%. This is obviously very high, and it is legitimate to ask whether the obligation to share a single vote could be the cause of such behavior. The comparison with the list-approval rule may now help to

determine whether LAppr, where voters can grant a full point to as many lists as they wish, frees them from precisely this constraint.

As for the LSplit rule, the usual definition of "sincere" behavior under approval voting simply requires that the voter approves all candidates above a threshold and none below. It is actually logically possible that strategic intentions should lead to non-sincere ballot, as first noticed by Brams and Fishburn (1978), but this phenomenon is rather counterintuitive, and some models even rule it out for large electorates (Laslier 2009). If approval balloting is used to elect several candidates, non-sincere rational behavior should also be quite rare (Laslier and Van der Straeten 2016). The same thing should occur in the case of List-Approval Voting, even if the detailed strategic consideration are complex. It therefore seems reasonable to expect a large majority of voters to be perfectly sincere, that is, to cast ballots such that the approved candidates all have better opinion grades than the non-approved ones.

Nevertheless, this is not what we observe. In 49.1% of the cast ballots, approval behaviors cannot be said to reflect opinions through a simple threshold. More precisely, 21.5% of the participants approve parties for which they have the same opinion as parties they do not approve, and 27.6% approve parties to whom they assign lower grades than parties which they do not approve. Among them, some participants exclude their preferred party from their vote under all systems, including under the LAppr rule. For instance in Rennes, among 123 voters, 2 choose not to approve the unique party to which they give their best opinion grade. There are also 7 cases in which one of the parties having the highest grade is not approved.

These results are especially puzzling : It is with approval voting that the voters are most frequently not sincere (27.6% under LAppr against 22.8% under LSplit and 11.4% under ONE). The possibility of multiple voting seems to generate a greater selectivity than the single vote (49.1% and 39.9% respectively under LAppr and LSplit against 37.3% under ONE). After a cross-sectional study of the (in)sincerity of voters, an analysis of the viability of the supported parties should enable us to verify whether this selectivity is based on strategic considerations.

4.3 Sincerity : fairly stable behavior from one voting system to the next

As we have seen above, it is under list-approval voting that voters are most often insincere. With this voting rule, only 72.4% of the voters do not rate an unsupported party strictly better than a supported party. This observation leads us to inquire into the stability of sincere behavior from one voting system to the next. Stability is indeed dominant since 61.8% of voters are sincere (selective or not) regardless of the proposed voting rule, accounting for 85.3% of voters who are sincere under the LAppr rule. In contrast, only 6.5% of voters are always insincere, namely 56.8% of insincere voters under the ONE rule.

5 Evidence of strategic voting

5.1 Voting rules and proportion of strategic ballots

It is fairly simple to define strategic voting when voters are forced to choose a single list. If this list is viable the choice is considered as strategic, and it is non-strategic in the opposite case. The issue becomes more complex with the rules LSplit or LAppr.

Under the LSplit rule, because voters have to split their unique vote, it makes sense to anticipate that they will make strategic choices by deserting non-viable parties. But it is still necessary to precisely define the decisions which will be considered as such. Overall, a selection of parties can be considered as strategic when it increases the support received by a set of parties that are viable and can be labeled as "favorite" for that voter. Comparing opinion grades and LSplit votes allows us to determine these favorite viable parties, which are the viable parties that achieve at least a support threshold, the lowest opinion grade obtained from the voter by a party she supports. In this logic, two types of ballots can be labeled as "strategic" (examples of which are provided in Table 1) :

- The ballots in which supports are given only to viable parties. They are referred as "type 1 strategic ballots".
- The ballots in which the unsupported parties, while they are at least as well rated as the most poorly evaluated of the supported parties, are all non-viable. They are referred as "type 2 strategic ballots".

We now turn to the strategic question under LAppr. In standard approval voting which is for the election of a single candidate, an additional vote for a non-viable candidate is harmless in the sense that the other votes (e.g. for viable candidate) remain as influential with or without the vote for the non-viable candidate. But this argument needs to be amended when approval voting is used for proportional representation, as in this experiment.

In a context of proportional representation, the main concern of the voter may indeed be to increase the gap between the share of votes obtained by parties that she endorses and the share obtained by the parties she does not approve. Because the seats are allocated in proportion of the total votes received, giving one more vote to a party has two effects. Firstly, the score of this party is increased by one. This directly increases the vote share of the targeted party, the size of this effect being (for a large electorate) inversely proportional to the total number of votes. Secondly, the total number of votes, which serves as the denominator in the computation of all the vote shares, is increased by one. This decreases the share of all parties, the size of this effect being inversely proportional to the square of the total number of votes (a "second order effect", smaller than the main effect). In this light, it is possible to show that for such a voter, who we label "sophisticated strategic", it is better not to vote for small parties that she likes but that do not get a sufficient proportion of votes to be elected (see Appendix B). The idea that "I should not waste my vote on a non-viable candidate", which is eliminated by Approval Voting when used for the election of a single candidate, comes back as a

second-order effect for sophisticated voters when several candidates must be elected.

In these conditions, the following ballots are considered as sophisticated strategic under LAppr rule :

- The ballots in which supports are given only to viable parties (type 1 sophisticated strategy).
- The ballots in which the unsupported parties, while they are at least as well rated as the most poorly evaluated of the supported parties, are all non-viable parties (type 2 sophisticated strategy).

Given these definitions, the account of strategic votes is presented in Table 5.

TAB. 5 – Voting rules and strategic voting

ONE rule				
	Sincere	Sincere but selective	Insincere	Total
Strategic	48.2%	17.1%	7.9%	73.2%
Non strategic	14.5%	8.8%	3.5%	26.8%
LSplit rule				
	Sincere	Sincere but selective	Insincere	Total
Type 1 Strategic	39.9%	10.2%	7.3%	57.4%
Type 2 Strategic	-	4%	3.5%	7.5%
Non strategic	19.7%	3.1%	12.3%	35.1%
LAppr rule				
	Sincere	Sincere but selective	Insincere	Total
Type 1 Strategic	20.2%	5.3%	2.6%	28.1%
Type 2 Strategic	-	7%	7%	14%
Non strategic	30.7%	9.2%	18%	57.9%

5.2 More strategic behavior under single-vote

The official voting rule requires voters to support only one list. It is logical to assume that upon some voters this constraint imposes strategic choices. For efficiency concerns, they can favor a party that will garner enough votes to be represented in the European Parliament, even if it is not their preferred party.

Table 5 clearly shows that the single-vote rule effectively generates more strategic choices than the multi-vote ones. Under ONE rule, 73.3% of voters support a viable party. The opportunity to support several parties under LSplit leads to an increase of more than 8% in non-strategic ballots (35.1% against 26.8%). When they have to share their unique vote, the vast majority of voters continue to support only viable parties (57.4% of type 1 strategic ballots). This is not the case when multiplying votes is less costly under LAppr, since only 28.1% of voters implement a sophisticated strategy of type 1. On the other hand, voters under LAppr are twice as likely as those under LSplit to exclude some well-rated but non-viable parties (14% of type 2 strategic ballots under LAppr against 7.5% under LSplit). Overall, more than 42% of the ballots would remain strategic under LAppr rule.

However, the implementation of a sophisticated strategy in the sense defined in the preceding paragraph is not the only possible explanation for such behavior. Another, simpler, reason could explain why voters only select some parties, and particularly the main ones, when it comes to the vote, despite the good opinion they may express about some small lists. Participants may see a difference between having a good opinion of a party and supporting this party in the election. Opinions might concern appreciation, or good evaluation, of parties for themselves, while voting concerns the willingness to pick out the members of parliaments. A "political preference" may pre-suppose either a dichotomous classification (acceptable/non acceptable), or a ranking over political parties from the most to the least preferred, or a more sophisticated preference mixing ranking and dichotomous classification, or a quantitative "utility". But to appreciate a party does not imply that you want this party actually to be in charge. You may express a good opinion about, for instance, a regional party only because you think that this party is doing a good job as a regional lobby. This could explain why some "specialized" parties obtain very high opinion grades but not many votes. An individual may then hold different rankings, each of them adapted to a specific exercise : this implies a diversity of underlying preference relations for a single individual (see Sen 1977, Igersheim 2007).

Whatever the true justification for "strategic" behavior under LAppr, it is important to note that it is with this voting rule that there is the greatest proportion of non-rationalizable ballots, in the sense that they are neither sincere nor strategic (18% under LAppr against 12.3% and 3.5% under respectively LSplit and ONE). More flexibility in the available ballots leads to more complex choices, and one might conclude that arbitration by voters between potentially contradictory objectives will lead to this situation.

5.3 Strategic voting broadly compatible with sincerity

Table 5 also shows that it would be artificial to oppose sincere voting to strategic voting. A very high proportion of voters who have show strategic behavior with regard to the parties they select are also sincere in the broad sense (selective or not) (65.3%, 54.1% and 38.5% of all voters under respectively ONE, LSplit and LAppr).

Moreover, strategic behavior is much more frequent among voters who make sincere choices than among those who are insincere, regardless of the method of voting : 73.7% against 69.3% under the ONE rule, 70% against 47.4% under the LSplit rule, 39.7% against 34.8% under the LAppr rule.

In addition, among the 32.5% of voters who are strategic for the 3 voting systems, 24.1% are also always sincere. Conversely, only 0.8% of the voters are strategic and insincere in the 3 cases.

However, it would be a little too hasty to conclude that voters do not express selective choices that can be considered as strategic. Under the LSplit and LAppr rules, voters who are sincere but selective (without obligation) are in fact more often strategic than those who are simply sincere (83% against 66.4% under LSplit, 57.2% against 39.7% under LAppr).

6 Conclusion

The participants in the experiment described in this chapter were given the lists presented for the European elections of 2014 in their district. They were asked their opinions about the different lists, where their opinions were defined as the answer to a question framed in the following way : "give 20/20 to a party whose program perfectly matches your opinion ; and 0/20 to a party that is totally opposite to what you think." Comparing what the participants expressed as opinions to what they expressed as votes, we observed many discrepancies at the individual level.

The link between preferences and vote reveals complex and partly unexpected choices. Contrary to intuition, the non-simply-sincere ballots are more frequent when approval-type, multiple, votes are available than under a single-vote rule. In fact, voters used the flexibility of the original LAppr and LSplit voting rules to give multiple supports and, perhaps surprisingly, often voted under these rules in apparent contradiction with their own evaluations.

Among the selections that voters made between their favorite parties, a large proportion can be interpreted as strategic voting in view of the viability of parties. This proportion is almost as high under LAppr as under LSplit (22% against 25%). Yet the dispersion of votes is less costly under the LAppr rule than when the voter has to split a unique vote. The large increase in the average number of supported parties shows that the voters are well aware of this. Two types of explanations could justify such a behavior under list approval-voting.

(1) A sophisticated strategy : In a proportional voting system, not voting for nonviable parties slightly increases the relative score of the viable parties.

(2) Expressing an opinion and deciding to support a party for election are distinct exercises : Voters may well appreciate small parties, often linked to a specific political theme, although they would raise doubts about their capacity to field effective members the Parliament. For instance, a voter may well consider that a given party perfectly represents her own ideas (that was the precise label of the "opinion question") but that the candidates presented by this same party in her district would not make good MEPs.

Conversely, in terms of strategic voting, the main expected result is verified : the single-vote rule leads to more strategic voting than multi-vote systems. Under this single-vote rule, almost all ballots can thus be rationalized in terms of strategy and/or sincerity (only 3.5% ballots cannot). On the other hand, as soon as the choices of voters are made more complicated, the share of such insincere and non-strategic ballots markedly increases, since the 3.5% obtained under the ONE rule becomes 12% under the LSplit rule and 18% under the LAappr rule.

Let us not, however, conclude that some voters become simply illogical ; the comparison of votes from one rule to another has demonstrated the consistency of voters throughout the experiment. The largest number of supports highlights the fact that other elements can influence voters' decisions.

In particular, it is known that, in France, the European Parliament election is an opportunity for a large number of protest votes. In fact, the party in government in 2014, a viable party, is well-evaluated but non-voted in a number of ballots. Voters can thereby show that they are ideologically close to this party, but that they oppose its governance practice. We cannot exclude that

the experimental protocol, which allows participants to express their opinion and, in parallel, to vote, may have reinforced this behavior.

In any case, we can see that neither the "sincere voting" nor the "strategic voting" paradigms are able to entirely explain how opinions are translated into votes in our experiment. Having a good or bad opinion of a party is not always sufficient to explain a vote in a certain context and for a certain voting rule. Voting behavior either captures the opinion or the expression of a protest message, or it captures the willingness to support a party for election.

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Appendices

Appendix A : Experimental ballots

In the two ballots presented below (figures 3 and 4), the lists appear in the official order (randomly) determined by the Constitutional Council. The 6 lists considered as viable are the following :

- Choisir notre Europe
- Front de Gauche - Rompre avec l'austérité pour refonder l'Europe
- Liste Bleu Marine - Non à Bruxelles, Oui à la France
- Liste Europe Ecologie
- Pour la France, Agir en Europe
- UDI MoDem Les Européens

TAB. 6 – Votes for the 6 main parties

	ONE	LSplit	LAppr
Prop. of votes obtained by the 6 viable parties	75.1%	72.5%	54.7%

FIG. 3 – Experimental ballot in Lyon Ecully, region "South East"

EUROPEAN ELECTIONS: Approval voting

Approval voting gives you the opportunity to vote for as many parties as you wish by entering a cross in the box corresponding to that party or parties.
Imagine that each party receives a number of seats proportional to the number of votes it gathers, that is, the number of approvals for that party / the total number of approvals for all parties.

Parties	Cross if vote (one or several crosses possible)
Union pour un mouvement populaire (UMP)	
Europe Ecologie / Les Verts (EELV)	
Parti socialiste (PS)	
Union des Démocrates et Indépendants (UDI)	
Mouvement démocrate (MoDem)	
Front de gauche (FG)	
Front national (FN)	
Citoyenneté Action Participation pour le 21ème siècle (Cap21)	
Mouvement pour la France (MPF)	
Parti radical de gauche(PRG)	
Alliance centriste	
Debout la République	
Force Vive	
Abstention	

EUROPEAN ELECTIONS: Cumulative voting

With the cumulative voting, you have, as a voter, a single vote that you can possibly split between several parties.

So you can vote for as many parties as you want. Be careful, the weight of each vote decreases with the number of selected parties. For example, if you support only one party you bring 1 point to this party; if you vote for 2 parties, you bring to each of them ½ = 0.5 point; if you vote for 3 parties, you bring to each one 1/3 = 0.33 point ...
Imagine that each party receives a number of seats proportional to the number of points it gathers, that is the sum of points for that party / total number of completed ballots.

Parties	Cross if vote (one or several crosses possible)
Union pour un mouvement populaire (UMP)	
Europe Ecologie / Les Verts (EELV)	
Parti socialiste (PS)	
Union des Démocrates et Indépendants (UDI)	
Mouvement démocrate (MoDem)	
Front de gauche (FG)	
Front national (FN)	
Citoyenneté Action Participation pour le 21ème siècle (Cap21)	
Mouvement pour la France (MPF)	
Parti radical de gauche(PRG)	
Alliance centriste	
Debout la République	
Force Vive	
Abstention	

FIG. 4 – Experimental ballot in Rennes, region "West"

OPINION

All information you will mark on this ballot is strictly anonymous and will only be used for scientific purposes.
Apart from any voting procedure, we wish to know anonymously your opinion about the different French political parties presenting lists for the European elections of May 2014. At the extreme, you will give 20/20 to a party whose program perfectly matches your opinion; and 0/20 to a party that is totally opposite to what you think. If you cannot decide on a political party, inscribe "NOP" (no opinion) in the box.
The professions of faith of the different parties are at your disposal to help you in your evaluation.

Parties	Grade : …/20 ou « NOP »
Union pour un mouvement populaire (UMP)	
Europe Ecologie / Les Verts (EELV)	
Parti socialiste (PS)	
Union des Démocrates et Indépendants (UDI)	
Mouvement démocrate (MoDem)	
Front de gauche (FG)	
Front national (FN)	
Citoyenneté Action Participation pour le 21ème siècle (Cap21)	
Mouvement pour la France (MPF)	
Parti radical de gauche(PRG)	
Alliance centriste	
Debout la République	
Force Vive	

EUROPEAN ELECTIONS: « Official » voting

For the election of Members of the European Parliament, vote for only one of the parties presenting a list in the European elections by putting a cross in the corresponding box. Here and for other experimented voting systems, as in the official voting, imagine that MEPs are allocated proportionally to the votes given to each party, provided that they obtain at least 5% of the votes.
Like your opinions, this vote and the following are totally anonymous.

Parties	Vote Cross only once
Union pour un mouvement populaire (UMP)	
Europe Ecologie / Les Verts (EELV)	
Parti socialiste (PS)	
Union des Démocrates et Indépendants (UDI)	
Mouvement démocrate (MoDem)	
Front de gauche (FG)	
Front national (FN)	
Citoyenneté Action Participation pour le 21ème siècle (Cap21)	
Mouvement pour la France (MPF)	
Parti radical de gauche(PRG)	
Alliance centriste	
Debout la République	
Force Vive	
Abstention	

Appendix B : Sophisticated strategic behavior under list-approval voting

In this appendix we elaborate on the behavior of a "sophisticated strategic" voter, whose objective is to increase the difference in vote share between the main parties she likes and the parties she rejects.

This voter distinguishes among the *n* proposed lists between :

- The lists that she appreciates and thinks they may be elected (because they are likely to pass the 5% threshold). Let n_1 be the number of such lists.
- The lists that she appreciates and thinks they can not be elected (because they probably will not pass the 5% threshold). Let n_2 be the number of such lists.
- The lists that she does not support (she rejects). Let n_3 be the number of such lists.

The voter thus aims at increasing the gap between the percentage of votes obtained by the type 1 lists and that obtained by the type 3 lists, taking as given the approvals granted by other voters. Let *A* be the overall number of approvals granted by other voters. Among these, A_1 go to type 1 lists, and A_3 to type 3 lists.

– If this voter only approves the type 1 lists, the gap of the proportion of votes between type 1 lists and type 3 lists is :

$$\frac{A_1 + n_1}{A + n_1} - \frac{A_3}{A + n_1}$$

– If this voter approves all the lists he likes (type 1 and type 2), the gap of the proportion of votes between type 1 lists and type 3 lists is :

$$\frac{A_1 + n_1}{A + n_1 + n_2} - \frac{A_3}{A + n_1 + n_2}$$

It is easy to show that the first difference is larger than the second :

$$\frac{A_1 + n_1}{A + n_1} - \frac{A_3}{A + n_1} > \frac{A_1 + n_1}{A + n_1 + n_2} - \frac{A_3}{A + n_1 + n_2}$$

even if the effect is small, of the order of magnitude of the inverse of A^2. The voter thus should not support the small lists she appreciates (the type 2 lists).