Group Decis Negot (2017) 26:1091–1124
DOI 10.1007/s10726-017-9540-z

The Third Vote Experiment: Enhancing Policy Representation of a Student Parliament

Andranik Tangian[1,2]

Published online: 31 July 2017

Abstract Since voters are often swayed more by the personal image of politicians than by party manifestos, they may cast votes that are in opposition to their policy preferences. This results in the election of representatives who do not correspond exactly to the voters' own views. An alternative voting procedure to avoid this type of election failure is prompted by the approach implemented in internet voting advice applications, like the German *Wahl-O-Mat*, which asks the user a number of questions on topical policy issues; the computer program, drawing on all the parties' answers, finds for the user the best-matching party, the second-best-matching party, etc. Under the proposed alternative election method, the voters cast no direct votes. Rather, they

This experiment was made possible by the organizational and creative skills of the author's seminar students at the Karlsruhe Institute of Technology: (a) Public relations team, managed by Antonia Diemer: Tobias Bühner, Florian Groß, Arved Höfeler, Peter Jakobs, Jannis Kontermann, Lukas Mühlenhoff, Lisa Pahlow, Maxi Stauss, Christian Tobien; (b) Internet team, managed by Bastian Eßwein: Marius Amrhein, Christian Emmerich, Gregor Felix, Emre Görgülü, Mike Oesch, Simon Peterson, Dominik Schlaich, Finn Stadler, Fabian Zimmer; (c) MATLAB team, managed by Lukas Haug: Niklas Droste, Florian Gast, Salim Ghazouani, Xiaofei Guo, Björn Leuthe, Delong Liang, Markus Mohr, Matthias Strök, Zilin Qui, Lukas Reissenberger, Immanuel Riemer (d) WINWORD team, managed by Martin Schwarz: Ihlas Basha, Joli Dallamango, Kevin Rizky Putra, Marc Züfle; (e) LaTeX team, managed by Daniel Rahlfs: Helmut Breuner, Yasemin Erglu, Valeria Kirzner, Mikel Lorenz, Ling Pan, Clarissa Schrob, Chikaodi Uba. Special thanks are also due the members of the KIT student election committee: Lorenz Fischer, Claudia Nagel, Johannes Reinelt and Victoria Schemenz. The administrative intermediation by Tobias Dittrich, research fellow to the chair, is also gratefully acknowledged. Finally, Mary Beth Robinson has helped to improve the presentation and style of this paper. The author cordially thanks all the persons mentioned above for their engagement and active participation in the project.

✉ Andranik Tangian
andranik-tangian@boeckler.de

1 Institute of Economic and Social Research (WSI), Hans Böckler Foundation, 40476 Düsseldorf, Germany

2 Karlsruhe Institute of Technology, 76128 Karlsruhe, Germany

are asked about their preferences on the policy issues as declared in the party manifestos (Introduce nationwide minimum wage? Yes/No; Introduce a speed limit on the motorways? Yes/No, etc.), which reveals the balance of public opinion on each issue. These embedded referenda measure the degree to which the parties' policies match the preferences of the electorate. The parliament seats are then distributed among the parties in proportion to their indices of popularity (the average percentage of the population represented on all the issues) and universality (frequency in representing a majority). This paper reports on an experimental application of this method during the election of the Karlsruhe Institute of Technology Student Parliament on July 4–8, 2016. The experiment shows that the alternative election method can increase the representativeness of the Student Parliament. We also discuss some traits and bottlenecks of the method that should be taken into account when preparing elections.

Keywords Policy representation · Representative democracy · Direct democracy · Elections · Coalitions · Theory of voting

JEL Classification D71

1 Introduction

The late eighteenth century fundamental debate on political representation focused primarily on two questions: *Who should be represented?*, i.e. who is entitled to vote (males or also females, with which civil and property status, etc.) and *Who can be a representative?* (sons of the constituency or all trusted citizens, taxpayers of a certain level, etc.) (Manin 1997). The question *What should be represented?*, i.e. which policies should be pursued on behalf of the electorate and how well the political system represents the electorate's policy preferences, was of secondary importance. The latter started to be widely discussed only in the 1960s when the dedicated notion of policy representation was coined (Miller and Stokes 1963; Pitkin 1967).

In elections, the question *Who?* still outbalances the question *What?*, and voting for candidates or parties by name bears some of the responsibility for that. Since people are often swayed more by the personal image of politicians than by party manifestos, they may cast votes that are actually in opposition to their policy preferences, resulting in the election of representatives who do not correspond exactly to the voters' own views. This phenomenon of irrational voting behavior and this type of election failure are analyzed using as example the 2013 German federal election in Tangian (2016a).

Since the end of the 1990s, policy representation has attracted more attention, in particular due to the internet propagation of voting advice applications (VAAs) which run under various names in about 20 countries (Garzia and Marschall 2014; Vote match Europe 2014). For instance, the pioneering Dutch VAA is called *StemWijzer* (=VoteMatch) (Pro demos 2014), and its German version is called *Wahl-O-Mat* (an invented word composed from the German *Wahl* = election and *Automat*) (Bundeszentrale für politische Bildung 2014). The VAA user is asked a number of questions on topical policy issues (Introduce nationwide minimum wage? Yes/No; Introduce a speed limit on the motorways? Yes/No, etc.); the computer program, drawing on the parties' answers

to these same questions, finds for the user the best-matching party, the second-best-matching party, etc. This method removes the emotional aspect from the evaluation of the parties, relying instead on their representative capacity alone.

Basing on the VAA approach, Tangian (2016b) proposes an election procedure aimed at surmounting the partiality inherent in voting for an individual or for a party by name. In the election method proposed, the voters cast no direct votes. Rather, they are asked about their preferences on the policy issues as declared by the parties before the election through their manifestos, exactly like in the VAAs. However, unlike in the VAAs, individual choices are not prompted, but the balance of public opinion is determined for every question. In other words, voting by name is replaced with several referenda, which are used to measure the degree to which the parties' policy profiles match that of the electorate. Then the parliament seats are distributed among the parties in proportion to their indices of popularity (the average percentage of the population represented on the issues) and universality (frequency in representing a majority). This election procedure is hypothetically applied to redistribute seats in the 2013 German Bundestag (federal parliament), achieving a significant gain in its representativeness. The electorate's policy profile is constructed from 36 public opinion polls preceding the election, and the party positions are taken from the 2013 Wahl-O-Mat. Since the public opinion polls have differing levels of reliability and relevance to the 2013 election, the conclusions—as they are based on imperfect data—can be considered only with reservations.

To judge more definitively the advantages of the election method proposed, one needs a real experiment with real electoral ballots. This paper reports on just such an experiment performed during the election of the Karlsruhe Institute of Technology Student Parliament on July 4–8, 2016. The 1069 experimental ballots—with both party names and ten questions on university policies—show that the policy representativeness of the KIT Student Parliament that would have been elected using the alternative method is higher than that elected by the official method (solely party names). At the same time, a few Traits of the alternative election method are revealed which should be taken into account when preparing its application.

Section 2 outlines the context of the 2016 Karlsruhe Institute of Technology Student Parliament election.

Section 3 describes the organization of our electoral experiment.

Section 4 introduces the indices of popularity and universality to measure policy representation of both the student parties and the Student Parliament.

In Sect. 5, the policy representation of the KIT Student Parliament, as steered by eligible coalitions, is estimated.

In Sect. 6, some bottlenecks of the alternative election method are critically considered.

Section 7 summarizes the findings of the experiment and suggests a few improvements.

Appendix (Section 8) contains the student parties' answers to all the questions of the *StuPa-O-Mat*—the KIT adaptation of the Wahl-O-Mat for the 2016 KIT Student Parliament election.

2 The 2016 Election to the KIT Student Parliament

German student parliaments are university representative bodies established according to the laws of the corresponding German state. In the Karlsruhe Institute of Technology (KIT), the Student Parliament (StuPa) is constituted under the rules of the state of Baden-Württemberg. Its responsibilities include electing officers to the executive organ of the student body, AStA (*Allgemeiner Studierendenausschuss* = General Committee of Students), making decisions about the budget of the student body and participating in the university commissions and councils. During the semester, the StuPa meets bi-weekly and the meetings are open to the public (AStA 2016; StuPa 2016).

Elections to the StuPa are held every summer, and all the KIT students are eligible to vote. The StuPa seats are distributed among student parties in proportion to the number of votes they receive in elections. The 2016/17 StuPa consists of 25 MPs from seven student parties, most of which are nationwide and some having international affiliations; for their political orientation see Table 1.[1] Four of them, Juso, LHG, die Linke.SDS and die LISTE, are closely associated with and supported by German political parties. Two student parties, the RCDS and Rosa Liste, are close to the established political parties or organizations but declare their independence. And the FiPS is a local student organization of the KIT that is autonomous. It should be noted that the German student organizations are not related one-to-one with their corresponding political parties, as they have discrete historical roots. They prefer to call themselves 'a group', 'an alliance', 'a list', 'an association' or even 'a faculty experience', thereby emphasizing relaxed forms of adherence and/or no self-identification as real parties.

The 2016 StuPa election was held on July 4–8, 2016. Of the 23,176 persons eligible to vote, 3671 took part in the election and cast 3648 valid ballots; 23 were deemed invalid. Thus, the turnout was 15.8%. The results are displayed in Table 1, and the complete official report is downloadable from Endgueltige Wahlergebnisse (2016). For more information about the StuPa and the 2016 StuPa election see the KIT student journal (Ventil 2016).

The AStA webpage has a link to the StuPa-O-Mat, the KIT adaptation of the Wahl-O-Mat for the StuPa election. The 2016 StuPa-O-Mat questions are selected and formulated by the four-person StuPa electoral committee; for the full list of questions see "Appendix".

3 The Experimental Election to the KIT Student Parliament

During the 2016 official election to the KIT Student Parliament, a parallel experimental election was organized. In addition to the official electoral ballot with seven student party names, each voter was offered an experimental ballot to be filled in on voluntary basis; see Fig. 1.

[1] All graphics and most of the tables in the paper were computed using MATLAB 2016a with LaTeX output.

Table 1 Results of the 2016 election to the KIT Student Parliament. (Color party logos online)

Party logo	Party description	Official votes		All experimental votes		Experimental votes of StuPaO-Mat users		Other experimental votes	
		Num	%	Num	%	Num	%	Num	%
FiPS	Fachschaftserfahrung im Parlament der Studierenden (Faculty experience in the parliament of students). A local student organization of the KIT, independent of established political parties; dedicated, close to students	1014	29.2	360	33.7	93	24.8	267	38.5
JUSO HOCHSCHULGRUPPE KARLSRUHE	Jung Sozialisten (Young Socialists). The youth wing of the SPD (Social Democratic Party of Germany). Promotes freedom, equality, and solidarity; open discussion; democracy in all parts of society, having an impact on all parts of society; representation in many forums	637	18.4	176	16.5	70	18.7	106	15.3
LHG Karlsruhe	Bundesverband Liberaler Hochschulgruppen (Federal Association of Liberal Students Groups). Associated with the FDP (Free Democratic Party). Liberal, ideology-free	557	16.1	138	12.9	59	15.7	79	11.4

Table 1 continued

Party logo	Party description	Official votes		All experimental votes		Experimental votes of StuPaO-Mat users		Other experimental votes	
		Num	%	Num	%	Num	%	Num	%
	Ring christlich-demokratischer Studenten (Association of Christian Democratic Students). Stands politically near the German conservative union CDU/CSU (Christian Democratic Union/Christian Social Union). Promotes pragmatic and factual thinking, representing the student body without ideological influence; aiming for an ideal development for learning and teaching; hoping to have greatest possible impact for students	414	11.9	100	9.4	33	8.8	67	9.7
	Die Linke.SDS. Soztialistisch-Demokratischer Studierendenverband (The Left. Social Democratic Students' Alliance). The student organization of die Linke (The Left). Promotes a more social, ecological, feminist and sustainable university; separation between economic system and research and supporting students with social projects	354	10.2	124	11.6	52	13.9	72	10.4

Table 1 continued

Party logo	Party description	Official votes		All experimental votes		Experimental votes of StuPaO-Mat users		Other experimental votes	
		Num	%	Num	%	Num	%	Num	%
Die LISTE	Die LISTE. List for Grass-Roots Democratic Initiatives, Education, Animal Breeding and Promotion of Elites, the youth organization of die PARTEI (Party for Labour, Rule of Law, Animal Protection, Promotion of Elites and Grassroots Democratic Initiative), a small party with parodical character. Promotes humanization of studies, solidarity, egalitarianism, particularly among students of different graduation levels	320	9.2	111	10.4	39	10.4	72	10.4
Rosa Liste Karlsruhe	Rosa Liste (Rosa List). Close to the Munich Gay and Lesbian Voters Initiative Rosa Liste. Promotes allowing anyone to study regardless of financial, physical, mental, or family obstacles. Stands for a more peaceful and ethical university, and against discrimination based on gender or sexual orientation	173	5.0	60	5.6	29	7.7	31	4.5
Total		3469		1069		375		694	

– EXPERIMENT –
"The Third Vote"

In this experiment, we wish to test the idea of Prof. Andranik Tangian aimed at making representative democracy more representative. With this alternative election method, the electorate's policy profile is measured using a third vote. The policy profile of the electorate is compared with that of the candidate parties, and the degree to which they match determines the election result. In this way, we endeavor to overcome irrational behavior and voting partiality.

Participation in the survey is completely **voluntary, anonymous** and has **NO** influence on the official election. Results of our analysis will be be made available on *www.studierendenwahl.econ.kit.edu*. For further questions, please do not hesitate to ask the election coordinators at the ballot boxes.

What party did you vote for on the official ballot?

- ☐ Liberale Hochschulgruppe (LHG)
- ☐ RCDS - Ring christlich-demokratischer Studenten
- ☐ Liste für basisdemokratische Initiative, Studium, Tierzucht und Elitenbeförderung (LISTE) / Liste unabhängiger studierender Tierzüchter (LUST)
- ☐ FiPS - Fachschaftserfahrung im Parlament der Studierenden
- ☐ Die Linke.SDS
- ☐ Rosa Liste
- ☐ Juso - studentisch, demokratisch, solidarisch

Did you use the StuPa-O-Mat to help you make your choice?

- ☐ yes
- ☐ no

Please answer these selected StuPa-O-Mat questions to help us define your policy profile:

	+	o	−	#
Baden-Württemberg-wide off-peak ticket with the semester fee				1
More video surveillance in insecure areas of campus, e.g. lockers				2
More vegan choices in the cafeteria, even if it limits meat meals				3
Abolish admission restrictions for courses of study				4
Sexism is a current problem at the KIT				5
Abolish the maximum duration of study				6
Promote gender-neutral restroom facilities on campus				7
Heavily restrict commercial advertising on campus				8
Special deals on tickets to cultural events with the semester fee				9
Replace low-attendance lectures with recordings and exercise classes				10

+ agree o neutral − against

Fig. 1 English translation of the experimental electoral ballot

The experimental ballot is entitled 'The Third Vote' because it complements the German two-vote system[2] with an additional vote in the form of embedded referenda. The preamble to the ballot explains the goal of the experiment—and that it does not impact the official election. For analysis purposes, the voter is asked to indicate the party he/she voted for in the official ballot and whether the StuPa-O-Mat had influenced the choice. The table at the bottom contains ten representative questions on university policies. They are heuristically selected by the electoral commission from the 27 StuPa-O-Mat questions either as most important or as discriminating between the party profiles so that each question receives Yes-answers from at least two parties, and No-answers from at least two other parties.

From the 3671 registered voters, 1098 experimental ballots were received. The 29 with incomplete responses were removed as invalid. In the rest of the paper, we focus on three sets of valid experimental ballots: all ballots, those of the StuPa-O-Mat users, and the rest, i.e. those of non-users of the StuPa-O-Mat. Correspondingly, we speak of three voter sets. By the second vote we mean the party indicated in the experimental ballot, and by the third vote we mean the answers to the ten questions underneath. We consider three hypothetical StuPas, each as if elected with one of the three sets of experimental ballots (not as in the official election).

Table 1 provides the statistics of the second vote (by party name) in the experimental ballots. Table 2 deals with the third vote, showing both the party positions on the ten selected StuPa-O-Mat questions and the balance of voters' opinions on these questions. Additionally to the percentage of protagonists and antagonists (those who answered Yes or No to the questions, respectively), Table 2 indicates the majority opinion (1 = Yes; 0 = No).

Figure 2 visualizes Tables 1 and 2. The blue bars depict the balance of opinions in the three voter groups as given in Table 2. For each question and each set of voters, the blue segment to the left of the vertical 0-axis shows the percentage of antagonists, and the blue segment on the right hand shows the percentage of protagonists. To better visualize the majority opinion, the total length of the blue bar is normalized (proportionally extended to 100%) and shown by a box. The majority opinion is on the side where the box surpasses the ±50% limit. For instance, the majority opinion on Question 1 in all three voter sets is 'Yes'.

The smaller color bars show the StuPa factions (with no adjustment to integer number of StuPa seats). The lengths of the color segments are proportional to the faction sizes, assuming that elections are made in each voter set with the second votes (by party name) whose statistics are displayed in Table 1. (Therefore, their length depends on the given voter set.) If a party has no position on a question, its color bar is not shown. The bar's position to the left or to the right of the vertical 0-axis corresponds to the party's position on the question as given in Table 2. The bias of the segmented color bars from the vertical 0-axis visualizes the Yes/No majority opinion of the StuPa. For instance, the StuPa's position on Question 1 is opposite to that of a majority of voters in all three voter sets.

[2] The first vote being for an individual representative of the constituency, the second vote for a party; the second vote is decisive because it determines the proportion of parliament factions.

Table 2 Positions of student parties on ten StuPa-O-Mat questions (+[1]—Yes, −[1]—No, ?—Missing or abstained) and balances of opinions on these questions in three groups of voters who participated in the experiment: (a) all voters, (b) the StuPa-O-Mat users, and (c) other voters (non-users of the StuPa-O-Mat)

Questions	FiPS	Juso	LHG	RCDS	Linke	LISTE	Rosa	All voters who participated in the experiment			StuPa-O-Mat users who participated in the experiment			Others who participated in the experiment (non-users of StuPa-O-Mat)		
								Pros %	Cons %	Majority 0/1	Pros %	Cons %	Majority 0/1	Pros %	Cons %	Majority 0/1
1 Baden-Württemberg-wide off-peak ticket with the semester fee	−	−	−	?	+	+	+	46	31	1	39	37	1	50	28	1
2 More video surveillance in insecure areas of campus, e.g. lockers	−	−	−	+	−	−	−	17	49	0	20	52	0	15	48	0
3 More vegan choices in the cafeteria, even if it limits meat meals	?	?	−	−	+	−	+	31	37	0	37	33	1	28	38	0
4 Abolish admission restrictions for courses of study	−	−	−	−	?	+	+	21	54	0	22	52	0	20	55	0
5 Sexism is a current problem at the KIT	+	?	−	?	+	?	+	12	44	0	15	43	0	11	45	0
6 Abolish the maximum duration of study	−	−	+	−	+	+	+	37	39	0	39	38	1	35	39	0
7 Promote gender-neutral restroom facilities on campus	?	−	−	−	+	−	+	15	48	0	19	45	0	13	49	0
8 Heavily restrict commercial advertising on campus	−	−	−	−	+	−	+	22	41	0	21	43	0	23	39	0
9 Special deals on tickets to cultural events with the semester fee	−	?	−	−	+	−	+	34	32	1	31	39	0	36	28	1
10 Replace low-attendance lectures with recordings and exercise classes	−	−	−	?	−	?	+	31	35	0	21	46	0	36	30	1

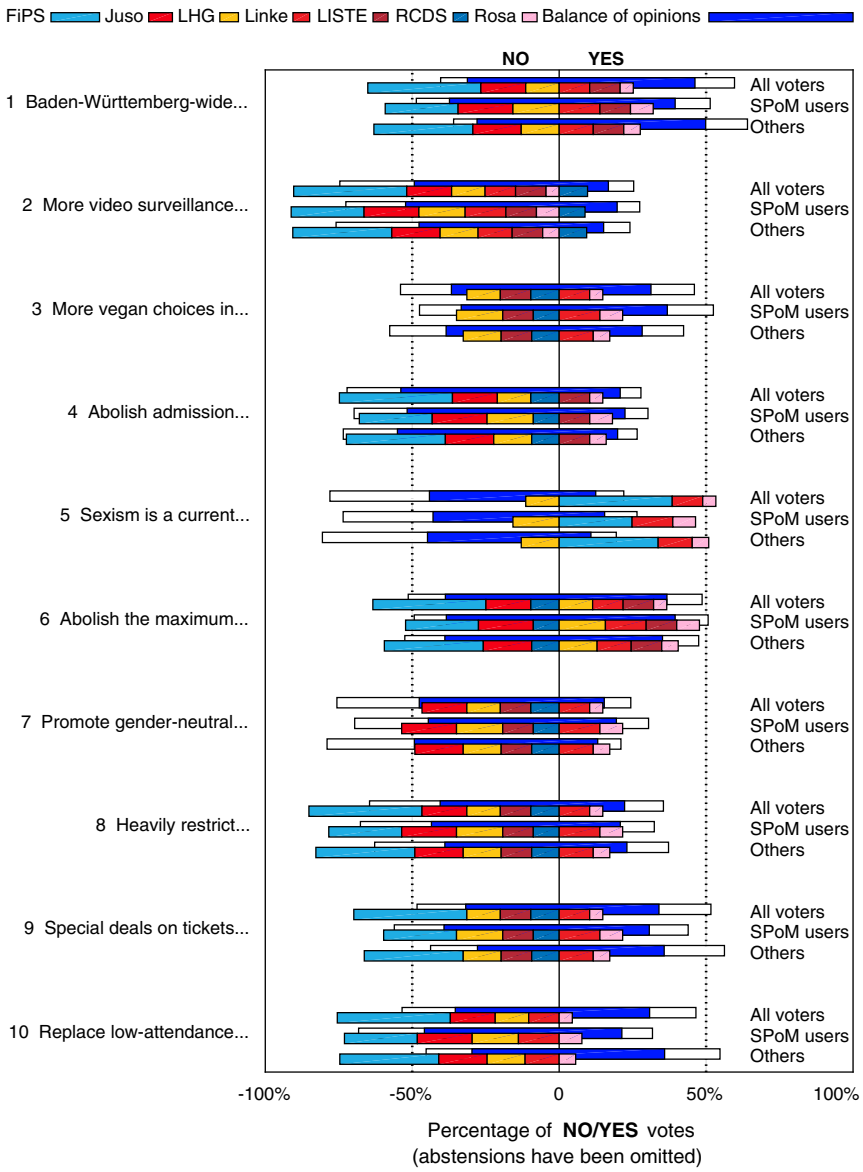

Fig. 2 Balance of opinions on ten questions (*blue*—factual, *box*—normalized) in three sets of voters who participated in the experiment and representation thereof by the 2016 KIT Student parliament as if elected within the corresponding set of voters with the second votes (by party name). The sets of voters are: (a) all voters, (b) the StuPa-O-Mat users, and (c) other voters (non-users of the StuPa-O-Mat). The size of a party's bar is proportional to the second votes received in the corresponding group. A party color segment is missing if the party's position on the question is indefinite. (Color figure online)

4 Policy Representation by the Student Parties and the Student Parliament

To measure policy representation, we use two indices, *popularity* and *universality*. Let us illustrate their construction, referring to the data from Table 2 as depicted in Fig. 2.

For purposes of illustration, we restrict our attention to the set of all voters and the FiPS party. For Question 1, 'Baden-Württemberg-wide off-peak ticket with the semester fee', the balance of public opinion, with 46% protagonists and 31% antagonists, is shown by the upper blue bar. The balance of opinions is normalized, that is, extended proportionally to 100%, as shown by the box. Thereby, we assume that abstaining voters' passive preferences for 'Yes' and 'No' are distributed in the proportion of the protagonist-to-antagonist ratio. For Question 1, the FiPS represents the actual and 'passive' antagonists, having the representativeness

$$r_{\text{FiPS},1} = \frac{0.31}{0.31 + 0.46} \approx 0.40.$$

With the 'No' answer to Question 2, 'More video surveillance in insecure areas of campus, e.g. lockers', the FiPS expresses the opinion of 49% of antagonists versus 17% of protagonists. Taking into account the 'passive' antagonists, we obtain the FiPS' representativeness for Question 2:

$$r_{\text{FiPS},2} = \frac{0.49}{0.49 + 0.17} \approx 0.74,$$

and so on. Taking the average representativeness of the FiPS over the questions with the FiPS' positions (there are eight such questions, and two answers are missing), we obtain the party's popularity index:

$$\mathsf{P}_{\text{FiPS}} = \sum_{q=1}^{8} \frac{r_{\text{FiPS},q}}{8} = \frac{0.403 + 0.74 + \cdots}{8} \approx 0.53\ (=53\%).$$

The FiPS universality index is the fraction of the questions on which the FiPS represents a majority of voters. Again, we consider only the eight questions with known FiPS positions. Since the FiPS represents a majority on five out of eight questions,

$$\mathsf{U}_{\text{FiPS}} = \sum_{q:r_{\text{FiPS},q} \geq 0.5} \frac{1}{8} = \sum_{q=1}^{8} \frac{\text{round}\,[r_{\text{FiPS}}, q]}{8} = \frac{5}{8} \approx 0.63\ (=63\%).$$

The indices of popularity and universality for the other sets of voters and other parties are computed in the same way. Since for each party we consider only the questions on which the party gave definitive answers, question weights vary from one party to another (1/8 for FiPS, 1/7 for Juso, 1/10 for LHG, etc.). Assuming that the StuPa's decision on every question is made by a majority vote, we can define the StuPa's policy profile using the Yes/No answers to all the questions and compute its

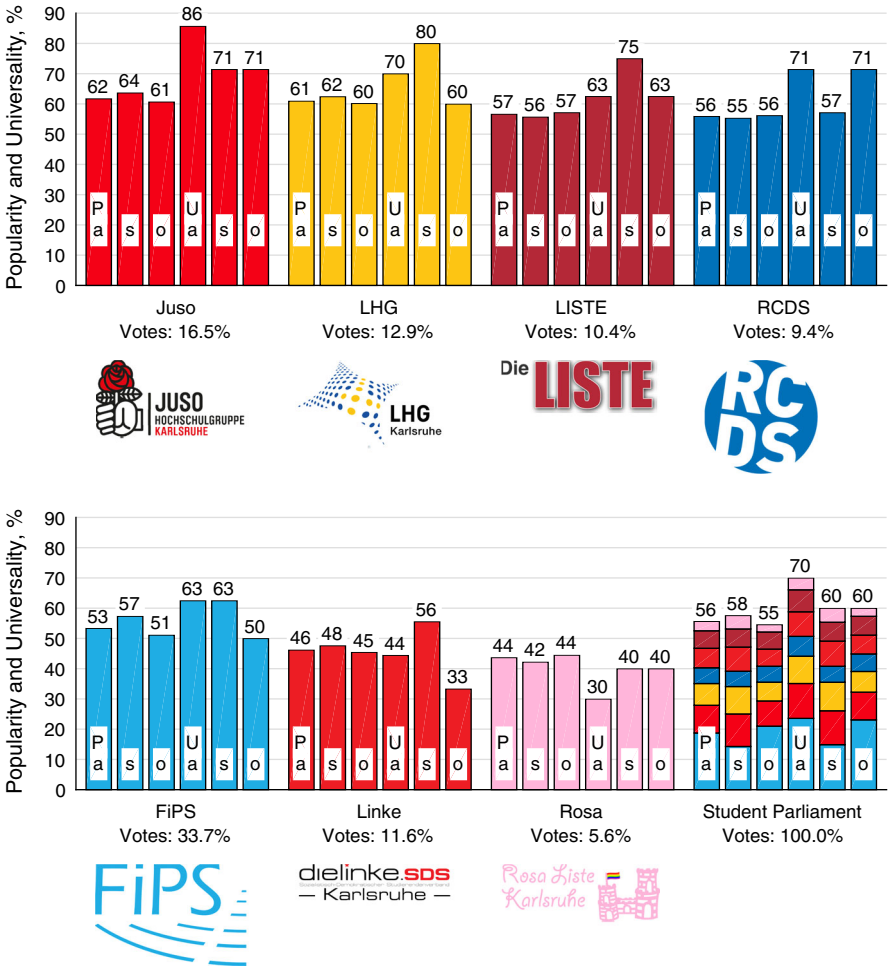

Fig. 3 Indices of popularity (P) and universality (U) of the KIT student parties and that of the KIT Student Parliament, as if elected by second votes within the following voter sets: (a) all voters; (s) the StuPa-O-Mat users; and (o) others (non-users of the StuPa-O-Mat). The percentages of party second votes are indicated for the set of all voters. (Color figure online)

indices of popularity and universality in the same way as for a party; for the indices of the student parties and the StuPa see Fig. 3.

In Fig. 3, the parties are sorted in decreasing order of the mean of their six indices. We use the mean index because the popularity and universality indices are highly correlated, as shown in Table 3. The same is observed for the second votes (by party name) both in the official election and in all three sets of voters in the experimental election. The high correlation between the second votes across our voter sets means that a voter's party self-identification exerts little influence on his/her use (or not) of the StuPa-O-Mat.

Table 3 Pearson correlation between eleven (7 × 1)-vectors with: (1) official party votes (in the official election), (2) all experimental second votes, (3) those of the StuPa-O-Mat users, (4) other experimental votes (i.e. those of non-users of the StuPa-O-Mat), (5–13) party popularity (P) and universality (U) indices and their means based on answers to ten questions in experimental ballots by voter set

	Second votes				Representativeness indices		
	Party votes in the official election	Party votes in the experiment	Party votes of StuPa-O-Mat users	Party votes of non-users of StuPa-O-Mat	P of parties for all experiment participants	U of parties for all experiment participants	Mean index of parties for all experiment participants
	1	2	3	4	5	6	7
Second votes							
1 Party votes in the official election	1.00	0.96***	0.95***	0.94***	0.44	0.53	0.51
2 Party votes in the experiment	0.96***	1.00	0.93***	0.99***	0.22	0.32	0.30
3 Party votes of StuPa-O-Mat users	0.95***	0.93***	1.00	0.89***	0.35	0.42	0.41
4 Party votes of non-users of StuPa-O-Mat	0.94***	0.99***	0.89***	1.00	0.18	0.28	0.26
Representativeness indices							
5 P of parties for all experiment participants	0.44	0.22	0.35	0.18	1.00	0.95***	0.97***
6 U of parties for all experiment participants	0.53	0.32	0.42	0.28	0.95***	1.00	1.00***
7 Mean index of parties for all experiment participants	0.51	0.30	0.41	0.26	0.97***	1.00***	1.00
8 P of parties for StuPa-O-Mat users	0.62	0.43	0.56	0.38	0.97***	0.95***	0.97***
9 U of parties for StuPa-O-Mat users	0.39	0.25	0.39	0.20	0.88***	0.76**	0.80**
10 Mean index of parties for StuPa-O-Mat users	0.49	0.32	0.47	0.27	0.94***	0.85**	0.89***
11 P of parties for non-users of StuPa-O-Mat	0.31	0.09	0.20	0.05	0.99***	0.92***	0.95***
12 U of parties for non-users of StuPa-O-Mat	0.21	0.01	0.03	0.01	0.87**	0.88***	0.88***
13 Mean index of parties for non-users of StuPa-O-Mat	0.25	0.04	0.08	0.02	0.93***	0.91***	0.92***

Table 3 continued

	Representativeness indices					
	P of parties for StuPa-O-Mat users	U of parties for StuPa-O-Mat users	Mean index of parties for StuPa-O-Mat users	P of parties for non-users of StuPa-O-Mat	U of parties for non-users of StuPa-O-Mat	Mean index of parties for non-users of StuPa-O-Mat
	8	9	10	11	12	13
Second votes						
1 Party votes in the official election	0.62	0.39	0.49	0.31	0.21	0.25
2 Party votes in the experiment	0.43	0.25	0.32	0.09	0.01	0.04
3 Party votes of StuPa-O-Mat users	0.56	0.39	0.47	0.20	0.03	0.08
4 Party votes of non-users of StuPa-O-Mat	0.38	0.20	0.27	0.05	0.01	0.02
Representativeness indices						
5 P of parties for all experiment participants	0.97***	0.88***	0.94***	0.99***	0.87**	0.93***
6 U of parties for all experiment participants	0.95***	0.76**	0.85**	0.92***	0.88***	0.91***
7 Mean index of parties for all experiment participants	0.97***	0.80**	0.89***	0.95***	0.88***	0.92***
8 P of parties for StuPa-O-Mat users	1.00	0.88***	0.95***	0.92***	0.77**	0.83**
8 U of parties for StuPa-O-Mat users	0.88***	1.00	0.98***	0.86**	0.59	0.69*
10 Mean index of parties for StuPa-O-Mat users	0.95***	0.98***	1.00	0.91***	0.68*	0.76**
11 P of parties for non-users of StuPa-O-Mat	0.92***	0.86**	0.91***	1.00	0.91***	0.96***
12 U of parties for non-users of StuPa-O-Mat	0.77**	0.59	0.68*	0.91***	1.00	0.99***
13 Mean index of parties for non-users of StuPa-O-Mat	0.83**	0.69*	0.76**	0.96***	0.99***	1.00

*** PVAL $\leq$ 0.01
** 0.01 $<$ PVAL $\leq$ 0.05
* 0.05 $<$ PVAL $\leq$ 0.10

The correlation between the parties' second votes and their representativeness indices is much lower, meaning that the second vote fails to produce high-quality policy representation. The lowest correlation between second votes and indices of representativeness is inherent in the set of non-users of the StuPa-O-Mat, which is not surprising given that these voters did not test the parties with respect to their policy preferences. The low consistency between second votes and expressed policy preferences is particularly evident when comparing the FiPS' position in Table 1 and Fig. 3. In the experiment, the FiPS is the absolute winner, garnering 33.7% of all second votes, twice more than its next competitor. However, it is ranked only fourth with respect to policy representation in Fig. 3.

5 Evaluation of Coalitions

In real politics, parliament factions unite in coalitions, and only those with >50% of the parliament seats are eligible to govern. The eligible coalitions are usually *minimal*, i.e. they contain no more parties than necessary, because the more parties, the more complex the negotiations and the less power enjoyed by each faction; cf. Riker's minimum winning coalitions (Riker 1962). For instance, the coalition FiPS–Juso–LHG is eligible but not minimal; that is, the coalition FiPS–Juso, being itself eligible, does not need LHG.

Another important condition is the parties' political compatibility, which we measure with the index of *unanimity*—the percentage of the questions on which all the coalition factions agree. A high degree of unanimity facilitates coalition formation, because parties with close positions cooperate more easily. If the unanimity is below 50% the coalition is more incompatible than compatible. Therefore, we consider only minimal eligible coalitions with the unanimity >50%. Such coalitions we call *probable governing coalitions*.

If a coalition is unanimous on a certain question, then its position on it is the same as of every member. If coalition members disagree on an issue, then the probabilities of the coalition's Yes/No answer to this question could be assumed proportional to the protagonist-to-antagonist ratio within the coalition. As expressed in a personal conversation by Tobias Lindner, Bundestag member (GRÜNE), the reality is even more uncertain.

To deal with the uncertainty in coalition decision making, we introduce the parameter p—*proportionality of influence to size of the faction*—$0 \le p \le 1$, which we explain here with an example. Suppose that, for a certain question, the protagonist-to-antagonist ratio within a coalition is 3:1, that is, the Yes-faction is three times larger than the No-faction (the number of parties plays no role). The $p = 1$ denotes the exact proportionality of influence to size, when the coalition answers 'Yes' with the probability equal to the weight of the Yes-faction $3/(3 + 1) = 3/4$, and 'No' with the probability equal to the weight of the No-faction $1/4$. The $p = 0$ denotes no proportionality of influence to size, that is, the coalition adopts each alternative opinion with equal chances $1/2$. The medium uncertainty $p = 1/2$ means that the influence of faction sizes on the coalition answer is a mix of the two extreme cases in proportion $p = 1/2$ and $1 - p = 1/2$:

$$\text{Prob (Yes)} = \underbrace{p}_{1/2} \times \underbrace{3/4}_{\substack{\text{Size influence}\\ \text{of Yes-faction}}} + \underbrace{(1-p)}_{1/2} \times \underbrace{1/2}_{\substack{\text{No influence}\\ \text{of size}}} = 5/8 \tag{1}$$

$$\text{Prob (No)} = \underbrace{p}_{1/2} \times \underbrace{1/4}_{\substack{\text{Size influence}\\ \text{of No-faction}}} + \underbrace{(1-p)}_{1/2} \times \underbrace{1/2}_{\substack{\text{No influence}\\ \text{of size}}} = 3/8. \tag{2}$$

In the rest of the paper, all computations are made for the medium uncertainty $p = 1/2$.

The coalition position on an issue is derived only from definite opinions of the coalition members, i.e. by reducing the coalition to those members who have definite positions on the given issue. Since the coalition position on an issue depends on the ratio of Yes-group and No-group, the number of coalition members is not important.

As having positions on policy issues, coalitions can be characterized with the indices of popularity and universality which, under uncertainty, turn into random variables. Then the coalition's popularity and universality are understood as the *expected* size of the group represented and the *expected* frequency in representing a majority, respectively. These indices are no longer exact magnitudes but estimates, with their standard deviation regarded as the estimation accuracy. Below, the coalition indices and their standard deviations are computed with formulas from Tangian (2014, p. 338).

The goal of our experiment is to compare the policy representation capacity of the StuPa elected solely with the second votes and the StuPa elected using the third votes (the StuPa redistributed). In the latter case the party faction sizes are made proportional to the party mean indices of popularity and universality (without adjustments of percentages to integer numbers of seats). Taking a page from real politics, we consider the StuPa dominated by the most probable governing coalition, that is, by the minimal eligible coalition with the highest unanimity, which is most important for coalition formation.

The upper sections of Tables 4, 5 and 6 characterize probable governing coalitions in the 2016 StuPa elected within the three voter sets by just their second votes (by party name); the lower sections characterize the same thing but with StuPa seats redistributed according to the third vote. The coalitions are numbered by decreasing unanimity, and the numbers of the coalitions in the redistributed StuPa are marked with an 'R'. Note that, for all the indices, larger values mean 'better' and are ranked higher, whereas greater standard deviations are ranked lower, because they mean a lower index accuracy. The most probable governing coalitions, that is, those with the highest degree of unanimity, have the numbers 1 and R1 in Tables 4, 5 and 6 and are located at the tops of the table sections.

Tables 4, 5 and 6 are illustrated with 3D Figures 4, 5 and 6, where coalitions are depicted by concatenated color bars whose lengths are proportional to the faction sizes. The coalition's unanimity is shown by the height of the flagstaff, and its X–Y coordinates are the coalition indices of popularity and universality. The blue flagstaffs distinguish the coalitions of the StuPa elected with the second vote, and the red flagstaffs those of the StuPa elected with the third vote. The coalition numbers in these figures are the same as in the associated table.

For the set of all voters, the top coalition in the StuPa elected by the second vote, FiPS–Juso, has the popularity and universality indices of 41.9 and 61.8, respectively.

Table 4 Indices of probable governing coalitions in the StuPa elected by the second vote within the set of all voters and of that elected by the third vote (redistributed), as computed for the impact of faction weights on the coalition decisions $p = 0.50$

	Bundestag seats	Unanimity	Popularity		Universality	
			Expectation	Standard deviation	Expectation	Standard deviation
	%/Rank	%/Rank	%/Rank	%/Rank	%/Rank	%/Rank
Coalitions						
1 FiPS–Juso	50.1/4	100.0/1	53.2/2	±5.1/4	61.8/1	±14.4/3
2 FiPS–LHG–RCDS	55.9/2	70.0/2	52.6/3	±3.3/1	58.2/3	±11.5/2
3 FiPS–LHG–LISTE	57.0/1	60.0/3	52.2/4	±3.4/2	54.2/4	±10.6/1
4 FiPS–RCDS–LISTE	53.4/3	60.0/3	53.6/1	±3.6/3	59.1/2	±10.6/1
Coalitions by the third vote (T)						
1T Juso–LHG–RCDS	50.4/3	80.0/1	55.3/2	±4.1/3	66.2/2	±12.2/2
2T FiPS–Juso–LHG–LISTE	63.8/1	60.0/2	54.9/3	±3.4/1	61.1/3	±10.6/1
3T FiPS–Juso–RCDS–LISTE	63.3/2	60.0/2	56.3/1	±3.6/2	66.4/1	±10.6/1

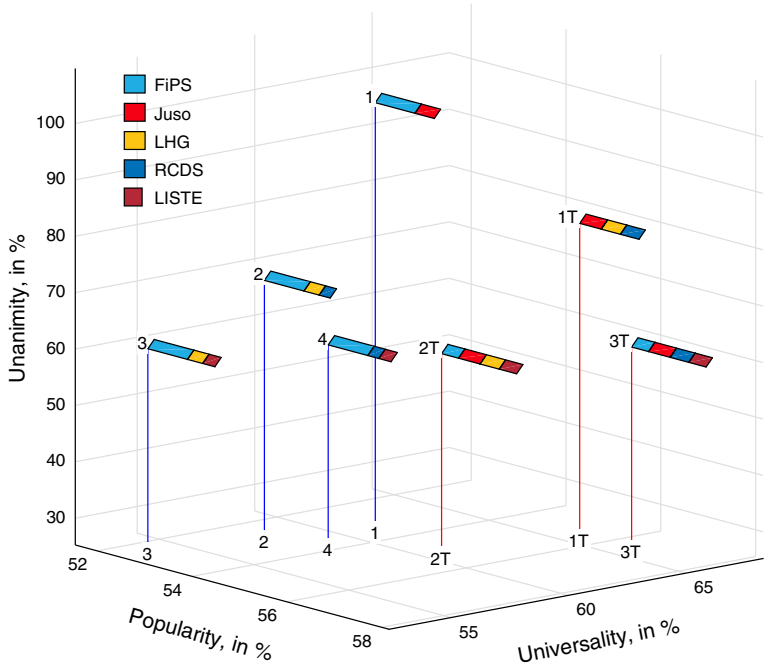

Fig. 4 Visualization of Table 4. (Color figure online)

These indices for the top coalition in the StuPa elected by the third vote, Juso–LHG–RCDS, are superior: 44.1 and 66.2; see Table 4.

For the set of StuPa-O-Mat users, no increase in policy representation due to election by the third vote is observed; see Table 5. The representativeness indices of the top coalition in the StuPa elected by the second vote are 45.0 and 62.3, whereas that of the StuPa elected by the third vote are 43.8 and 63.1—one index is little lower, the other is little higher. It seems that those who test the parties' policy profiles with the StuPa-O-Mat vote quite consistently with their policy preferences, leaving little room for the third vote to improve the StuPa policy representation.

The most significant improvement in the StuPa policy representation is inherent in the set of non-users of the StuPa-O-Mat: the representativeness indices of the top coalition in the StuPa elected by the second vote, FiPS–Juso, are 40.6 and 53.3, and in the StuPa elected by the third vote, the indices of the top coalition Juso–LHG–RCDS are significantly higher—44.0 and 62.8; see Table 6. This means that non-users of the StuPa-O-Mat vote least consistently with their policy preferences.

6 Discussion

6.1 The Approach of the StuPa-O-Mat and that of Our Experiment

Although the StuPa-O-Mat and our experiment are based on the same data structures, the underlying ideas are different. The StuPa-O-Mat finds the party whose policy

Table 5 Indices of minimal eligible coalitions in the StuPa elected within the set of the StuPa-O-Mat users by the second and by the third vote (T = third vote) computed for the impact of faction weights on the coalition decisions $p = 0.50$

	Bundestag seats	Unanimity	Popularity		Universality	
			Expectation	Standard deviation	Expectation	Standard deviation
	%/Rank	%/Rank	%/Rank	%/Rank	%/Rank	%/Rank
Coalitions						
1 FiPS–Juso–RCDS	52.3/4	90.0/1	56.6/1	±3.9/4	62.3/2	±13.0/4
2 FiPS–Juso–LHG	59.2/1	80.0/2	55.7/4	±3.8/3	60.0/5	±12.2/3
3 FiPS–Juso–LISTE	53.9/2	70.0/3	56.3/2	±4.0/5	60.5/3	±11.5/2
4 FiPS–LHG–LISTE	50.9/5	60.0/4	54.5/5	±3.4/1	60.5/4	±10.6/1
5 Juso–LHG–RCDS–LISTE	53.6/3	60.0/4	56.3/3	±3.5/2	62.3/1	±10.6/1
Coalitions by the third vote (T)						
1T FiPS–Juso–LHG–RCDS	61.7/3	70.0/1	56.1/2	±3.3/1	61.1/4	±11.5/2
2T FiPS–Juso–LHG–LISTE	63.9/1	60.0/2	55.9/3	±3.4/2	62.6/1	±10.6/1
3T FiPS–Juso–RCDS–LISTE	60.3/4	60.0/2	56.4/1	±3.5/3	62.0/2	±10.6/1
4T Juso–LHG–RCDS–LISTE	63.0/2	60.0/2	55.4/4	±3.5/3	61.6/3	±10.6/1

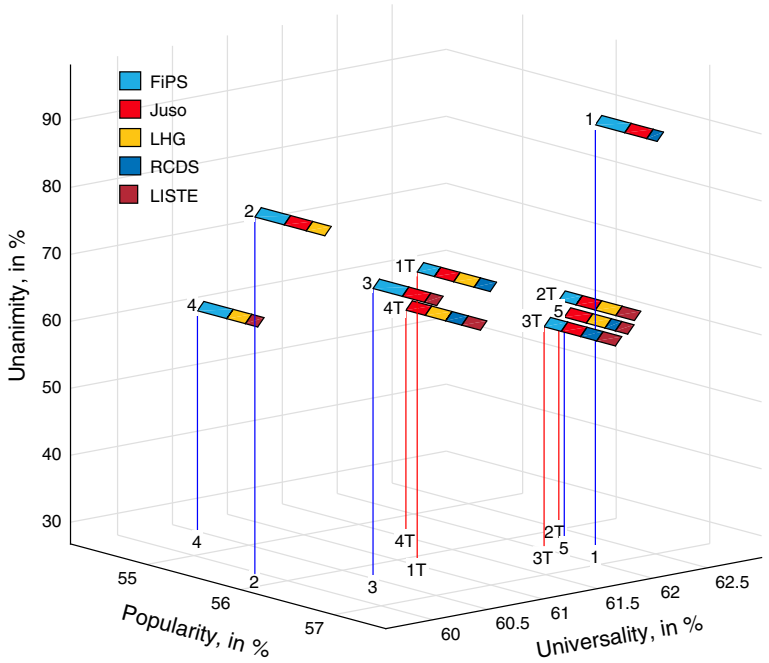

Fig. 5 Visualization of Table 5. (Color figure online)

profile best matches that of the voter. It is supposed that individuals cast their votes as usual, by party names, taking into account the StuPa-O-Mat advice. This approach follows the philosophy of individual determination.

In our experiment, the electorate is considered as a single body with its collective policy profile. Unlike in the StuPa-O-Mat, individual choices are not prompted, but the balance of public opinion is determined for every question. In other words, voting by name is replaced with several referenda, which are used to measure the degree to which the parties' policy profiles match that of the electorate. This approach follows the philosophy of public determination; see Tangian (2016b, Section 2).

6.2 Selection of Questions

Since the proposed election method is based on the set of questions, their selection and wording are of prime importance. In VAAs, the topics and their formulation is on the responsibility of a supposedly neutral official commission, providing that certain criteria are met. However, this task can be hardly performed impartially. To avoid manipulation of electoral outcomes by posing questions favorable for one candidates and unfavorable for others, the questions can be drawn up by the parties themselves. This can be done implicitly, within the party manifestos, or explicitly, by announcing a list of program policy issues. The questions formulated by one party can be shared

Table 6 Indices of probable governing coalitions in the StuPa elected by the second vote within the set of non-users of the StuPa-O-Mat and of that elected by the third vote (redistributed), as computed for the impact of faction weights on the coalition decisions $p = 0.50$

	Bundestag seats	Unanimity	Popularity		Universality	
			Expectation	Standard deviation	Expectation	Standard deviation
	%/Rank	%/Rank	%/Rank	%/Rank	%/Rank	%/Rank
Coalitions						
1 FiPS–Juso	53.7/4	100.0/1	51.7/2	±5.6/4	53.3/2	±14.4/3
2 FiPS–LHG–RCDS	59.5/2	70.0/2	51.3/3	±3.7/2	52.9/3	±11.5/2
3 FiPS–LHG–LISTE	60.2/1	60.0/3	50.7/4	±3.7/1	49.0/4	±10.6/1
4 FiPS–RCDS–LISTE	58.5/3	60.0/3	52.6/1	±3.9/3	55.8/1	±10.6/1
Coalitions by the third vote (T)						
1T FiPS–Juso–LHG–RCDS	63.0/2	70.0/1	55.0/3	±3.7/2	61.6/2	±11.5/2
2T FiPS–Juso–LHG–LISTE	61.9/4	60.0/2	54.4/4	±3.7/1	56.7/4	±10.6/1
3T FiPS–Juso–RCDS–LISTE	62.9/3	60.0/2	56.2/1	±3.9/3	64.7/1	±10.6/1
4T Juso–LHG–RCDS–LISTE	65.4/1	60.0/2	55.1/2	±3.9/3	61.5/3	±10.6/1

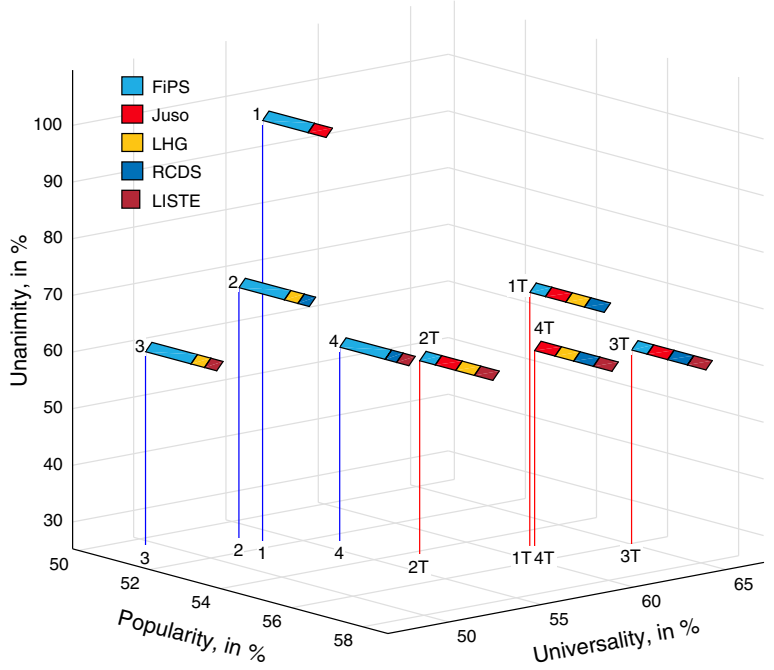

Fig. 6 Visualization of Table 6. (Color figure online)

with all other parties giving them an opportunity to make their positions comparable. Furthermore, competing parties can negotiate on the formulation of questions in order to prevent misinterpretations. This process, regarded as a part of electoral campaign, excludes all claims to election organizers and to partiality in selection and formulation of questions.

The questions proposed by candidates (parties) have however three shortcomings. Firstly, they can be simply too numerous to include all of them into electoral ballots. For instance, even if each of 30 German parties is entitled to only five questions, their total number rises to one and half hundred—then most voters will likely just skip most of them. Secondly, if the questions are numerous, some, though formulated differently, can in fact deal with the same topic, resulting in its overweight compared with others. Thirdly, numerous questions cause a latent dependence between answers due to the background party ideologies. In most extreme cases, some questions, like the StuPa-O-Mat Questions 2, 5, 16, 17 and 25 (see "Appendix"), receive the same answers from all the parties. Including questions with similar and/or correlated answers reduces the discrimination between party policy profiles, implying closeness of the party indices of representativeness and equalization of parliament factions, i.e. leads to a malfunction of the third vote.

To overcome these shortcomings, the questions included in the ballots should be rather few and maximally discriminate between the parties. In our experiment, ten questions out of 27 are selected heuristically—most important, as decided by the electoral commission, and those with at least two pros and two cons in the party answers

(=having the largest variance of the party answers, assuming the independence of questions—a rather artificial condition). To make such a selection rigorously optimal, a dedicated mathematical model should be designed.

6.3 Unequal Importance of Questions

Since not all questions are equally important for voters, the StuPa-O-Mat allows the user to be neutral on an issue, to agree or disagree with it, and to double its weight to emphasize its importance. In other words, the evaluation scale is $-2, -1, 0, +1, +2$. A scale with $-5, -4, \ldots +5$ points would be even better. However, the importance of an issue to a voter should be distinguished from his/her degree of preference. Otherwise, for instance, a weak preference for an important issue can be erroneously coded with $+1$ instead of $1 \times 2 = +2$.

Our experiment assumes no weighting of issues—just negative, neutral (abstaining, missing) or positive opinion, i.e. we use a simplified scale $-1, 0, +1$ which is supposed to be extended in future applications. Even lexicographic preferences of voters, when one or a few issues have an absolute priority over all others, can be taken into account. Such preferences can explain the observed disagreement between the direct and the third votes. The degree of public preference can be also measured by the imbalance of public opinion on every question—the greater the imbalance, the stronger the public preference; an imbalance of zero means indifference.

6.4 Missing or Neutral Answers of Parties

A party can take a prudent 'neutral' position on most of the issues if it fears repelling electors with definitive statements. Indefinite positions either mean that a party is not ready to represent the public on a broad range of issues or that it is intentionally concealing its plans. When information is lacking, matching the electorate's and the party's profiles with a few issues results in a low statistical confidence in the party index. The statistical confidence in the party representativeness is studied in Tangian (2014, Chapter 9), and the related estimates can be used to discount the party index. The way how to do this is a subject of further discussion.

6.5 Missing or Neutral Answers of Voters

If numerous voters provide no definite position on an issue, the normalization of balance of public opinion, as described in Sect. 4, artificially boosts the indices of representativeness. Then small majorities on marginal issues, on which most voters are indifferent, influence the party indices to the same degree as large majorities on intensively debatable issues, on which everybody has a definite position. To avoid this small–large majorities equalization effect, the representativeness can be calculated for the voters with definite opinions only, ignoring 'passive' voters. For this purpose, the representativeness should be counted without normalization in Sect. 4. In other words, only the blue bars rather than boxes should be considered in Fig. 2.

6.6 Evaluation of the Experiment

The evaluation of coalitions with the indices of popularity and universality used to redistribute the parliament seats is not a tautology. The party indices are computed for each party individually, and the collective performance of parliament coalitions, whose opinions are not unanimous, is not directly characterized by the indices of the coalition members. Indeed, by virtue of (1)–(2) if a coalition is not unanimous then there is a room for decisions by chance in favor of either the society's majority or minority. In particular, if some coalition members share the same definitive opinion on an issue and others abstain or their opinions are missing, the coalition is formally considered unanimous and then this issue is accounted in the coalition's indices of representativeness, but not in the indices of representativeness of the abstaining coalition members. This and similar effects can violate the proportionality between the indices of representativeness of a coalition and those of its members. Nevertheless, our experiment proves that the coalitions' representative capacity can be improved by adjusting the size of parliament factions according to individual party indices, though not too much. As seen from Figs. 4, 5 and 6, the gain in the coalition indices due to the redistribution of parliament seats is at most 10%, and still their popularity indices does not surpass 50%. This is explained by a low representative capacity of the parties themselves, whose popularity indices seldom attain the 50% threshold—see Fig. 3.

6.7 Combination with the Existing Voting Method

The proposed election method can be combined with the traditional one when votes are cast by name. To express trust in creditable parties, as opposed to their non-liable competitors who freely over-promise, the second and third votes can be counted in a weighted combination. This way voters can also enhance their identification with particular parties. For a missing third vote either only the second vote can be used, or the voter can agree to substitute his/her third vote by the policy profile of the favorite party indicated in the second vote. In the latter case one has to be aware that some support is given to the parties with close policy profiles.

Some other options are discussed in Tangian (2016b, Section 2) and we do not repeat them here. In any case, the proposed scheme requires further detailed elaboration and approbation.

7 Conclusions

7.1 Potential of the Third Vote

The experiment shows that the third vote can improve policy representation of political bodies elected. The voters who follow the VAA recommendations vote much more consistently with their policy preferences, so that the third vote only barely improves election outcomes with regard to policy representation.

7.2 Statistical Justification for Dividing Experimental Votes into Sets

The statistical significance of different outcomes in the three voter sets in our experiment has to be studied.

7.3 Suggestions Regarding the Experimental Ballots and StuPa-O-Mat

To better study the third vote and the StuPa-O-Mat effect on the election outcomes, the experimental ballots should include a 'clone' of the full StuPa-O-Mat questionnaire with the option of assigning double weights to important questions. It makes sense to provide also lexicographic preferences for the issues both in the StuPa-O-Mat and electoral ballots. Finally both questionnaires have to be optimized to maximally discriminate between the parties.

8 Appendix: StuPa-O-Mat Questions and Student Party Positions

The following table contains all the KIT 2016 StuPa-O-Mat questions in full, in German and translated into English, together with the student party positions on them (+[1]—Yes, −[1]—No, ?—Abstained, neutral position or missing answer). The questions included in the experimental ballot are denoted by boxes around their numbers.

	German question with short title	English translation	LHG	RCDS	LISTE	FiPS	Linke.SDS	Rosa	Juso
1	Finanzierung der Studierendenschaft. Die Studierendenschaft soll sich ausschließlich aus freiwilligen Beiträgen finanzieren	Financing the student body. The student body should be financed exclusively by voluntary contributions	+	?	−	−	−	−	−
2	Säuglings- und Kleinkindraum. Am KIT soll es ein für Studierende zugänglicher Raum für die Verpflegung von Säuglingen und Kleinkindern geben	Room for children and infants. There should be a room at the KIT for child and infant care that students can use	?	+	+	+	+	+	+
3	Baden-Württemberg-weites ÖPNV-Ticket. Ein durch den verpflichtenden Semesterbeitrag finanziertes baden-württembergweites Feierabend- und Wochenendticket soll eingeführt werden	Baden-Württemberg-wide off-peak ticket. A Baden-Württemberg-wide transport ticket for evenings and weekends, funded through the mandatory semester fee, should be introduced	−	?	+	−	+	+	−

	German question with short title	English translation	LHG	RCDS	LISTE	FiPS	Linke.SDS	Rosa	Juso
4	Mililitärische Forschung. Militärische Forschung soll am KIT eingeschränkt werden. Antwortmöglichkeiten: 'Militärische Forschung soll gänzlich verboten sein'; 'Forschung zu rein militärischen Zwecken soll verboten sein'; 'Militärische Forschung soll ohne Einschränkungen erlaubt sein'	Military research. Military research should be heavily restricted at the KIT. Possible answers: 'Military research should be completely prohibited'; 'Research for purely military objectives should be prohibited'; 'Military research should be allowed with no restrictions'	−	−	?	?	+	+	?
5	Vergangenheitsaufarbeitung am KIT. Die Studierendenschaft soll sich mit der Aufarbeitung der Vergangenheit des KIT und der Vorgängerinstitutionen auseinandersetzen	Dealing with the KIT past. The student body should take up a debate accounting for the past of the KIT and its predecessors	?	+	?	+	+	+	?
6	Videoüberwachung. Der Campus soll in sicherheitsrelevanten Bereichen (z.B. Spinde) verstärkt videoüberwacht werden	Video surveillance. There should be more video surveillance in security-sensitive areas (e.g., lockers) on campus	−	+	−	−	−	−	−

	German question with short title	English translation	LHG	RCDS	LISTE	FiPS	Linke.SDS	Rosa	Juso
7	Mensa-Gerichte. In der Mensa sollte es mehr vegane und nachhaltige Wahlmöglichkeiten geben, auch unter Einschränkung des Angebots fleischhaltiger Gerichte	Canteen meals. The canteen should offer more vegan and sustainable options, even if this limits the offer of meals containing meat	−	−	−	?	+	+	?
8	Berufseinstieg. Die Studiengänge am KIT sollen auf einen schnellen Berufseinstieg ausgelegt sein	Career launch. Courses of study at KIT should be designed to promote quick entry into a career	−	+	−	−	−	−	−
9	Hochschulwettbewerb. Der Wettbewerb zwischen den Hochschulen soll reduziert werden	University competition. Competition between universities should be reduced	−	−	−	?	+	+	?
10	KiTa-Plätze für Studis. Es soll mehr KiTa Plätze in Campusnähe für Studierende geben	Child care places for students. There should be more places in daycare facilities near the KIT for the children of students	?	?	?	+	+	+	?
11	Raum der Religionen. Es soll ein immer zugänglicher Raum zur Religionsausübung durch das KIT bereitgestellt werden	Religion room. The KIT should provide a room that is always open for the exercise of religion	−	?	+	−	?	+	−
12	BaföG. Das BAföG soll elternunabhängig ausgezahlt werden.	BAFöG. The BAFöG (student financial aid in Germany) should be independent of parental income	+	+	+	+	+	+	−

	German question with short title	English translation	LHG	RCDS	LISTE	FiPS	Linke.SDS	Rosa	Juso
13	Zulassungsbeschränkungen. Zulassungsbeschränkungen zu Studiengängen sollen abgeschafft werden	Admission restrictions. Admission restrictions for courses of study should be abolished	−	−	+	−	?	+	−
14	Sexismus. Sexismus ist aktuell ein Problem am KIT	Sexism. Sexism is a current problem at the KIT	−	?	?	+	+	+	?
15	Maximalstudienzeit. Die Maximalstudienzeit in den Studiengängen soll abgeschafft werden	Maximum study duration. The upper limit on duration of study should be abolished	+	−	+	−	+	+	−
16	Gremien der Studierendenschaft. Das Studierendenparlament und die Fachschaftenkonferenz sollen zu einem Gremium verschmolzen werden	Committees of the student body. The Student Parliament and the Conference of Faculties should be merged together	−	−	−	−	−	−	−
17	Sponsoring. Auf dem Unifest und bei anderen Kulturveranstaltungen der Studierendenschaft sollen Sponsoren eingesetzt werden können	Sponsoring. The student body should make use of sponsors at events like the University festival and other cultural events	+	+	+	+	?	+	+
18	Geschlechtsneutrale Toiletten. Die Studierendenschaft soll sich für geschlechtsneutrale Toiletten auf dem Campus einsetzen	Gender-neutral restrooms. The student body should campaign for gender-neutral restroom facilities on campus	−	−	−	?	+	+	−

	German question with short title	English translation	LHG	RCDS	LISTE	FiPS	Linke.SDS	Rosa	Juso
19	Bezahlung AStA-Referenten. Studierende, die ein AStA-Referat besetzen, sollen ausschließlich unentgeltlich arbeiten	Payments for AStA speakers. Students who get involved at AStA should do so on a strictly unpaid basis	+	−	?	−	−	−	−
20	Wohnheimsausbau. Der Wohnheimsausbau soll durch Studierendengelder finanziert werden	Dormitory construction. The expansion of dormitory facilities should be paid for by student grants	−	?	−	−	+	−	−
21	Untertitel Vorlesungsaufzeichnungen. Alle aufgezeichneten Vorlesungen sollen mit Untertiteln hochgeladen werden. Erklärung: Dies dient der Barrierefreiheit für Hörgeschädigte	Subtitles in lecture videos. All recorded courses should be uploaded with subtitles (for inclusion of hearing-impaired students)	+	?	?	+	+	+	−

	German question with short title	English translation	LHG	RCDS	LISTE	FiPS	Linke.SDS	Rosa	Juso
22	fzs. Die Studierendenschaft soll Mitglied im fzs (Freier Zusammenschluss von StudentInnenschaften) werden. Erklärung: Der fzs ist ein bundesweiter und überparteilicher Dachverband der Studierendenschaften. Er vertritt Studierende auf Bundesebene und ist Mitglied in der europäischen Studierendenvertretung (ESU). Die Mitgliedschaft kostet aktuell 4−ct pro Studierendem pro Semester	fzs. The student body should become a member of the fzs (Freier Zusammenschluss von Studenten). Explanation: the fzs is a nationwide and politically neutral alliance of student bodies. It represents students at the federal level and is a member of European Student Union (ESU). Currently the member fee is 4− ct. per student per semester	−	−	−	−	+	+	?
23	Werbung auf dem Campus. Werbung von Unternehmen auf dem Campus soll stark eingeschränkt werden	Advertisements on campus. Promotion and advertisements from companies should be heavily restricted on campus	−	−	−	−	+	+	−

	German question with short title	English translation	LHG	RCDS	LISTE	FiPS	Linke.SDS	Rosa	Juso
24	Kulturveranstaltungen. Die Studierendenschaft soll sich für vergünstigte Eintritte zu Kulturveranstaltungen mithilfe eines verpflichtenden Semesterbeitrags einsetzen	Cultural events. The student body should advocate special deals on entrance fees and cultural events by introducing a mandatory semester fee	−	−	−	−	+	+	?
25	Barrierefreiheit. Alle Räume des KIT sollen barrierefrei zugänglich sein	Accessibility. All areas of the KIT should be accessible without restrictions	+	+	+	?	+	+	+
26	Schlecht besuchte Vorlesungen. Schlecht besuchte Vorlesungen sollen durch Aufzeichnungen und übungen ersetzt werden	Poorly attended lectures. Lectures with low attendance rates should be replaced by recordings and exercise classes	−	?	?	−	−	+	−
27	Politisches Mandat. Die Studierendenschaft soll sich weiterhin allgemeinpolitisch äußern dürfen. Erklärung: Der Koalitionsvertrag der neuen grün-schwarzen Landesregierung sieht Einschränkungen im politischen Mandat der Studierendenschaft vor. Sie soll sich nur noch hochschulpolitisch äußern dürfen	Political mandate. The student body should participate in the general political debate. Explanation: the coalition agreement of the latest green-black (Green-CDU/CSU) state government intends to limit the political mandate of student bodies, restricting them to issues of university policy only	+	−	+	+	+	+	+

References

Association of Christian Democratic Students (2016) Wikipedia. https://en.wikipedia.org/wiki/Association_of_Christian_Democratic_Students. Cited 16 Aug 2016

AStA (2016) https://www.asta.kit.edu/de/asta. Cited 16 Aug 2016

Bundeszentrale für politische Bildung (2014) Wahl-O-Mat. http://www.bpb.de/methodik/XQJYR3. Cited 7 Feb 2014

Endgültige Wahlergebnisse (2016) https://wahl.asta.kit.edu/. Cited 16 Aug 2016

Federal Association of Liberal Students Groups (2016) Wikipedia. https://en.wikipedia.org/wiki/Federal_Association_of_Liberal_Students_Groups. Cited 16 Aug 2016

FiPS (2016) http://www.fips-ka.org/. Cited 16 Aug 2016

Freie Demokratische Partei (2016) Wikipedia. https://de.wikipedia.org/wiki/Freie_Demokratische_Partei. Cited 16 Aug 2016

Garzia D, Marschall S (eds) (2014) Matching voters with parties and candidates: voting advice applications in a comparative perspective. ECPR Press, Colchester

Juso (2016) http://www.jusos-karlsruhe.de/. Cited 16 Aug 2016

Juso-Hochschulgruppen (2016) Wikipedia. https://en.wikipedia.org/wiki/Juso-Hochschulgruppen. Cited 16 Aug 2016

Linke.SDS (2016a) https://de.wikipedia.org/wiki/Die_Linke.SDS. Cuted 16 Aug 2016

Linke.SDS (2016b) http://www.linke-sds.org/. Cited 16 Aug 2016

LISTE (2016) http://liste-ka.de/. Cited 16 Aug 2016

Manin B (1997) The principles of representative government. Cambridge University Press, Cambridge

Miller WE, Stokes DE (1963) Constituency Influence in Congress. Am Polit Sci Rev 57:45–56

PARTEI (2016) Wikipedia. https://en.wikipedia.org/wiki/Die_PARTEI. Cited 16 Aug 2016

Pitkin H (1967) The concept of representation. University of California Press, Berkeley

Pro demos: house of democracy and the rule of law (2014) StemWijzer. http://www.stemwijzer.nl/

RCDS (2016) http://rcds-ka.de/. Cited 16 Aug 2016

Riker WH (1962) The theory of political coalitions. Yale University Press, New Haven

Rosa Liste (2016) https://rosa.einhoerner.club/. Cited 16 Aug 2016

Rosa Liste München (2016) https://de.wikipedia.org/wiki/Rosa_Liste_M%C3%BCnchen. Cited 16 Aug 2016

StuPa (2016) https://www.asta.kit.edu/de/studierendenschaft/stupa. Cited 16 Aug 2016

StuPa-O-Mat (2016) https://wahl.asta.kit.edu/Wahl16/stupaomat/. Cited 16 Aug 2016

Tangian A (2014) Mathematical theory of democracy. Springer, Berlin

Tangian A (2016a) Policy representation of a parliament: The case of the German Bundestag 2013 elections. Group Decis Negot (Forthcoming; published online on Sep 24, 2016)

The Left (Germany) (2016) Wikipedia. https://en.wikipedia.org/wiki/The_Left_(Germany). Cited 16 Aug 2016

Tangian A (2016b) An election method to improve policy representation of a parliament. Group Decis Negot (Forthcoming; published online on Sep 09, 2016)

The Third Vote (2016) https://www.facebook.com/Thethirdvote/posts/1740434669566682. Cited 16 Aug 2016

Ventil (2016) Ausgabe 134. https://wahl.asta.kit.edu/Wahl16/wahlventil2016.pdf. Cited 16 Aug 2016

Vote match Europe (2014) http://www.votematch.eu/. Cited 10 Feb 2014

Young Socialists in the SPD (2016) Wikipedia. https://en.wikipedia.org/wiki/Young_Socialists_in_the_SPD. Cited 16 Aug 2016