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Experimental Results about Linguistic Voting

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Abstract In this paper, we describe the results of experiments in which about 7000 voters in the Netherlands were asked in three different waves to give their most favored party and to give an evaluation on a scale of 0 till 10 of eleven major Dutch parties. We have applied five different voting rules to determine the number of seats each party would obtain in Parliament. Different from what one might think, in general voters had no problem to give an evaluation of eleven major Dutch parties. Interestingly, many voters gave the same evaluation to two or more parties, something they cannot do if they can only vote for one party. Although Majority Judgment has not been designed for a seat distribution in parliament, we describe two possible ways which enable such a distribution.

Keywords Voting experiments, linguistic voting, plurality rule, range voting, approval voting, majority judgment, Borda majority count
JEL classification D71, D72

1. Introduction

As is well known there are many different election mechanisms and the result of an election may depend strongly on the election mechanism used. In order to get an idea what shifts would be caused in the seat distribution in parliament by applying different election mechanisms, we have applied several election mechanisms to the experimental results of three waves in each of which about 7000 voters were asked to mention their most favored party and to give an evaluation of eleven major Dutch parties on a scale of 0 till 10, where 10 stands for 'excellent', 9 for 'very good', 8 for 'good', 7 for 'very satisfactory', 6 for 'satisfactory', 5 for 'almost satisfactory', 4 for 'unsatisfactory', 3 for 'very unsatisfactory', 2 for 'poor', 1 for 'very poor' and 0 for 'extremely poor'. The resulting seat distributions are summarized in Figure A1 in Appendix.

In Section 2 we will give some background information with respect to the experiments. In Sections 3 and 4 the details of the results obtained in the three waves of the experiment will be given. After a short description of the different election mechanisms, i.e., Plurality Rule, Range Voting, Approval Voting, Majority Judgment and the Borda Majority Count, we present for each of these election mechanisms the resulting seat distribution in Dutch parliament with 150 seats.

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Although Majority Judgment has not been devised for a seat distribution of parties in parliament, we describe two ways to adapt Majority Judgment to enable such a seat distribution. One way is described in Subsection 4.3, the other way is what we call the Borda Majority Count, described in Subsection 4.4, in which the different evaluations *excellent, good, acceptable, poor* and *reject* are identified with the numbers 4, 3, 2, 1, 0 respectively.

Finally, we discuss and compare the outcomes under the different election mechanisms.

2. Background of the experiments

In 2006, CentERdata at Tilburg University received major NWO funding for the project: an advanced multi-disciplinary facility for Measurement and Experimentation in the Social Sciences (MESS). This NWO subsidy was instituted by the Cabinet with a view to boosting the Dutch knowledge economy and the climate for innovation in the Netherlands. These funds have been used to establish a new online panel of 5,000 Dutch households: the LISS panel (Longitudinal Internet Studies for the Social sciences). The panel is the core component of the MESS project and is based on a true probability sample of households. The LISS core study consists of 11 projects. Project Number 8, called Politics and Values, is a longitudinal study delivering a broad range of social core information about the panel members. It focuses on politics, social attitudes and values.

The results in this paper are based on the answers of the members of the LISS panel to the following questions in an online survey conducted three times between 2007 to 2011:

- If parliamentary elections were held today, for which party would you vote?
- How sympathetic do you find the political parties? You can assign each party a score between 0 and 10. 0 means that you find the party very unsympathetic, and 10 means that you find the party very sympathetic. If you are not familiar with a party, you can indicate this using the button 'I don't know'.

The voters were unaware of the different election mechanisms; only afterwards their votes have been used to determine a seat distribution in Dutch parliament according to different voting mechanisms. So, the word 'sympathetic' does not depend on the electoral rule.

The parties in question are:

CDA (Christelijk Democratisch Appel, Christian Democrat Party)
PvdA (Partij van de Arbeid; Labor Party)
VVD (Volkspartij voor Vrijheid en Democratie; Liberal Party)
SP (Socialist Party); GL (Green Left)
D66 (Democraten 66; Social-Liberal party); CU (Christian Union)
SGP (Staatkundig Gereformeerde Partij; Christian Reformed Party)
PVV (Partij voor de Vrijheid; Party for the Freedom, Groep Wilders)

PvdD (Partij voor de Dieren; Party for the Animals)
TON (Trots op Nederland; Proud of the Netherlands; Rita Verdonk)

In wave I, December 2007, the questionnaire was presented to 8204 panel members, and it was completed by 6811 respondents (83%). In wave II, December 2008, the questionnaire was presented to 8289 panel members, and it was completed by 6037 respondents (response percentage 73%). In wave III, December 2009, the questionnaire was presented to 9398 panel members, and it was filled out by 6386 respondents (response percentage 68%).

It is worth noticing that most of the respondents did give an evaluation of all major political parties in the Netherlands on a scale of 0 till 10. This scale is very familiar to all Dutchmen, because it is used at all education institutions. It is frequently thought that persons are not able to give an evaluation of so many parties, but the responses to the second question show that people are able to do so. This confirms the findings of Michel Balinski (Balinski and Laraki 2007b) in his experiment at the 2007 French presidential elections where about 2000 voters were asked to give an evaluation of the twelve presidential candidates.

The results of the answers to the first question, involving Plurality Rule, will be presented in Section 3. In Section 4 we summarize the results of the answers to the second question in waves I, II and III and apply Range Voting, Approval Voting, Majority Judgment and the Borda Majority Count to the data obtained.

To the best of our knowledge there are only few data available concerning linguistic voting. The reason is that the predominant question asked to voters usually is: how do you rank the different candidates? As argued by Balinski and Laraki (Balinski and Laraki 2011), however, the predominant question should be: how do you evaluate the different candidates? From an evaluation of the candidates one may easily deduce a ranking, but not conversely. Hence, evaluations are much more informative than mere rankings. We were surprised to find that data about evaluations by the voters of the different parties were available at CentER data and we know of no other data of this type other than those collected by Balinski and Laraki in their experiments around French presidential elections in Balinski and Laraki (2007b).

3. Question 1

Many nations around the world use the Plurality voting system to determine the outcome of elections, although it is well known there are many objections against this system. In the Netherlands one uses a list system of proportional representation, where each party has a list containing the names of the candidates for that party. Although it is possible to vote for a particular candidate on that list, most voters will just vote for the first candidate on the list, in other words for the party in question. A particular candidate on the list is only sure of a seat if the number of votes he or she obtains passes a certain threshold. If a party is entitled to, say, n seats, then the first n persons on the list obtain a seat in parliament, unless someone lower on the list has already obtained a seat by his own.

Table 1. Results in wave I, II and III for Question 1

Party	Plurality vote			Party seats		
	I	II	III	I	II	III
CDA	885	727	692	30	30	24
PvdA	609	637	506	21	26	18
VVD	417	427	533	14	17	18
SP	628	454	426	21	19	15
GL	339	251	346	11	10	12
D66	162	413	703	05	17	25
CU	240	150	191	08	06	06
SGP	102	091	073	03	03	02
TON	724	143	059	24	06	02
PVV	269	333	681	09	13	24
PvdD	131	088	128	04	03	04
Total	4506	3714	4338	150	150	150

In Table 1 we list the results in wave I, II and III for Question 1: *If parliamentary elections were held today, for which party would you vote?*

We have computed the number of seats for each party by applying Jefferson's method, also known as d'Hondt's method (see Balinski and Young 1982): find a divisor x such that the whole numbers contained in the quotients of the different parties sum to the required total of 150. Each party is given its whole number of seats. The divisor that does the job is 29 for wave I, 23.8 for wave II and 28.1 for wave III.

4. Question 2

Table 2 shows the responses to Question 2: *How sympathetic do you find the political parties? You can assign each party a score between 0 (very unsympathetic) and 10 (very sympathetic).*

In Table 2, 999 stands for 'I do not know'. In the next Subsections we will apply Range Voting, Approval Voting, Majority Judgment and the Borda Majority Count to these data.

4.1 Range Voting

In Range Voting (RV), due to Smith (2015), voters are asked to evaluate the different alternatives on a scale which, for instance, may range from 0 to 99, but also other ranges may be taken. The scores for a particular candidate may be added up or one may take the average of the scores for the candidate in question. The candidate with the highest score or average wins. The larger the range of values, the smaller the probability that a tie will occur. In such an exceptional case one might simply toss a coin. Range Voting has many nice properties (see Smith 2015), but it is very vulnerable for manipulation:

Table 2. Responses to Question 2

Party	10	9	8	7	6	5	4	3	2	1	0	999
CDA-I	35	93	610	1229	1350	1130	698	487	291	154	226	495
II	28	92	514	1113	1161	1066	621	398	234	118	138	523
III	45	92	550	1055	1122	1037	582	502	319	188	222	637
PvdA-I	33	77	404	1104	1403	1236	778	525	361	193	230	454
II	24	70	491	1197	1375	1019	557	344	215	112	116	486
III	38	82	443	1086	1297	1062	579	420	326	197	226	594
VVD-I	14	57	285	768	1178	1288	946	736	458	255	274	539
II	7	40	303	735	1192	1216	744	598	305	143	148	575
III	17	72	362	843	1211	1168	737	534	335	174	200	696
SP-I	81	124	597	969	1220	1034	721	537	362	223	266	664
II	46	123	481	991	1117	995	595	444	264	135	150	665
III	37	119	419	893	1184	1042	624	467	337	196	214	817
GL-I	51	110	444	931	1151	1100	749	571	405	256	270	760
II	34	107	434	942	1083	1046	639	435	299	171	157	659
III	45	129	490	961	1110	972	656	459	318	189	224	796
D66-I	11	52	195	620	1202	1369	838	607	403	273	234	994
II	16	73	372	888	1190	1158	620	416	226	119	112	816
III	35	148	580	1195	1190	995	525	332	215	124	146	864
CU-I	40	78	299	720	1123	1049	768	645	451	314	379	932
II	23	68	202	501	860	1036	822	621	461	302	332	778
III	34	67	231	552	949	1055	745	608	500	337	376	895
SGP-I	44	40	96	207	482	869	895	790	672	477	727	1499
II	36	45	79	192	442	856	832	758	596	410	538	1222
III	31	34	85	214	537	916	817	718	603	434	653	1307
TON-I	89	111	372	539	563	663	522	537	470	447	1227	1258
II	25	20	119	295	423	736	547	615	618	541	1256	811
III	12	15	78	225	443	663	667	637	667	653	1355	934
PVV-I	66	71	220	369	472	519	521	570	630	551	2049	760
II	58	56	165	308	384	539	473	577	544	551	1702	649
III	81	84	269	384	483	488	424	472	458	528	1989	689
PvdD-I	92	91	224	536	791	863	665	639	627	565	808	897
II	74	50	186	378	619	823	562	631	583	573	790	737
III	92	74	232	502	709	830	606	640	551	610	685	818

voters who have a slight preference for A over B might strategically give 1 point to B and 99 to A in order to achieve that their favored candidate wins.

In the survey of the LISS panel the range consists of the numbers from 0 till 10. It is worth noticing that many participants gave the same evaluation to different parties.

For each of the eleven parties we have computed the average score and next we have for each wave applied Jefferson's method as described in Section 3 in order to obtain the number of seats for each party. The divisor for wave I is 0.31, for wave II 0.311 and for wave III 0.324. The resulting seat distributions for the three waves are shown in Table 3.

Table 3. Seat distributions using Range Voting

Party	AVG	Seats	Party	AVG	Seats
CDA-I	5.30	17	CU-I	4.56	14
II	5.39	17	II	4.34	13
III	5.19	16	III	4.51	13
PvdA-I	5.07	16	SGP-I	3.40	10
II	5.49	17	II	3.53	11
III	5.41	16	III	3.65	11
VVD-I	4.63	14	TON-I	3.69	11
II	4.93	15	II	2.98	9
III	5.06	15	III	2.82	8
SP-I	5.12	16	PVV-I	3.51	11
II	5.32	17	II	2.77	8
III	5.14	15	III	2.91	8
GL-I	4.93	15	PvdD-I	3.85	12
II	5.19	16	II	3.61	11
III	5.37	16	III	5.05	15
D66-I	4.62	14			
II	5.25	16			
III	5.78	17			

As one can see in wave III, the Plurality Rule attributes many more seats to CDA, D66 and PVV (24, 25 and 24 respectively) than Range Voting does (CDA 16, D66 17 and PVV 8 seats). This may be explained by the fact that relatively many voters have CDA, D66 or PVV as first choice, while at the same time relatively many voters dislike these parties. On the other hand, Range Voting is beneficial for CU (13 seats in wave III), SGP (11 seats) and TON (8 seats) which under the Plurality Rule only receive 6, 2 and 2 seats, respectively in wave III. This may be explained by the fact that there are relatively few voters who have CU, SGP and TON as their first choice, but relatively many voters who appreciate these parties.

4.2 Approval Voting

Approval voting (AV) (Brams 1976; Brams and Fishburn 1978, 1983) is a voting procedure in which voters can vote for, or approve of, as many candidates as they wish. A voter divides the candidates into two groups: those which he or she approves of and those which he or she does not approve of. Candidates who are approved by a voter receive one point, while candidates who are not approved by a voter receive zero points.

Since in the Dutch education system a mark below 6 is considered as insufficient, it seems reasonable to identify approval with a mark between 6 and 10 and disapproval with a mark between 0 and 5. Doing so, Table 4 above shows the election outcomes for the three different waves in our survey.

Table 4. Seat distributions using Approval Voting

Party	Approved Vote			Party Seats		
	I	II	III	I	II	III
CDA	3317	2908	2864	21	20	19
PvdA	3021	3157	2946	19	22	19
VVD	2302	2277	2505	14	16	16
SP	2991	2758	2652	19	19	17
GL	2687	2600	2735	17	18	18
D66	2080	2539	3148	13	18	20
CU	2260	1654	1833	14	11	12
SGP	869	794	901	5	5	6
TON	1674	882	773	10	6	5
PVV	1198	971	1301	7	6	8
PvdD	1734	1307	1609	11	9	10
Total	24133	21847	23267	150	150	150

The seat allocation of the different parties in Table 4 has again been calculated by using Jefferson's method, described in Section 3. The divisor for wave I is 155, for wave II 139 and for wave III 150.

What strikes us is that the traditionally larger parties like CDA and PvdA get more seats under Approval Voting than under Range Voting; the same holds for the parties SP and GL. However, parties like SGP, TON, PVV and PvdD are clearly worse off under Approval Voting than under Range Voting.

4.3 Majority Judgment

Balinski and Laraki (2007a, 2011) ask the voters to give an evaluation of the candidates, like in Range Voting. While from an evaluation of all alternatives one can construct a (weak) preference ordering of the alternatives, conversely, from a given (weak) preference ordering of the alternatives—as assumed in the original Borda Count—one

cannot deduce an evaluation of the alternatives. So, an evaluation of the alternatives by an individual voter gives (much) more information than a preference ordering of the alternatives by the voter in question.

In their experiments Balinski and Laraki (2007b) use the grades in the set {*excellent, very good, good, acceptable, poor, reject*}. But in order to decrease the possibilities for manipulation, they do not take the average or the sum of the evaluations as the final result of a candidate, but the (lower) median value of the evaluations. They call their election mechanism Majority Judgment (MJ), and define the *majority grade* $f^{maj}(A)$ of candidate A as the lower median value of the grades assigned by the voters to A. For instance, if A gets the evaluations 2, 5, 7, 8, 9, its majority grade will be 7, and if A gets the evaluations 2, 5, 7, 9, its majority grade will be 5.

Clearly, when the majority grade of A is greater than the majority grade of B, we declare that $A \succ_{maj} B$, i.e., A is socially preferred to B according to Majority Judgment. In their recent paper Balinski and Laraki (2016) explain how to define the social ranking $\succ_{maj}$ also in the case that A and B have the same majority grade. It goes too far to repeat their definition and motivation at this place. Here we restrict ourselves to an alternative definition, $\succ_{mg}$ which is useful in the case of large electorates and which corresponds with the original definition $\succ_{maj}$ in all cases where it gives a decision. Balinski and Laraki (2016) define the *majority gauge* of a candidate A as a triple (p_A, α_A, q_A), where $\alpha_A = f^{maj}(A)$ is the majority grade of A, p_A is the number of grades given to A strictly above its majority grade, q_A is the number of grades given to A strictly below its majority grade.

Now A is socially preferred to B according to the majority gauge, $A \succ_{mg} B$, or $(p_A, \alpha_A, q_A) \succ_{mg} (p_B, \alpha_B, q_B)$, iff $\alpha_A \succ \alpha_B$ or ($\alpha_A = \alpha_B$ and $p_A > max\{p_B, q_A, q_B\}$) or ($\alpha_A = \alpha_B$ and $q_B > max\{q_A, p_A, p_B\}$). So, e.g., (20, *good*, 30) $\succ_{mg}$ (40, *ac*, 10), (30, *good*, 20) $\succ_{mg}$ (25, *good*, 10), and (20, *good*, 22) $\succ_{mg}$ (20, *good*, 25). Balinski and Laraki also show that if $A \succ_{mg} B$, then $A \succ_{maj} B$.

In Table 5 we have translated the LISS panel data which used the evaluations from 10 till 0 into the grades used by Balinski and Laraki (2007b), by identifying 10 with *ex*(cellent), 9 with *vg* (very good), 8 with *go*(od), 7 and 6 with *ac*(ceptable), 5 and 4 with *po*(or), 3, 2, 1 and 0 with *re*(ject), more or less in accordance with the meaning of the marks 10 till 0 in the Dutch education system. We have computed the majority grade of each party and shown it in Table 5 by using boldface digits. In addition, we have indicated the values p_A and q_A for each party A. We did not take into account the voters who said that they could not give an evaluation of the party in question.

To illustrate, in wave III the majority gauge of D66 is (763, *ac*, 2337) and the one of CDA is (687, *ac*, 2850). Because $q_{CDA} > max\{q_{D66}, p_{D66}, p_{CDA}\}$, by definition D66 is socially preferred to CDA according to the majority gauge, D66 $\succ_{mg}$ CDA and hence also D66 $\succ_{maj}$ CDA in wave III.

It is not self evident how one may allocate seats to parties using Majority Judgment. We see two possibilities: the one that is described in Subsection 4.4, identifying the grades {*ex(cellent), go(od), ac(ceptable), po(or), re(ject)*} with the numbers 4, 3, 2, 1, 0 respectively, and the procedure described below in this Subsection.

The procedure we apply in this subsection is as follows: given a wave, let γ be

the highest majority grade of the different parties. In our example, $\gamma = ac$ for all three waves. For each party A let $\beta(A)$ be the number of voters who gave A an evaluation higher or equal to γ. Next apply Jefferson's method described in Section 3 to determine the number of seats of each party, such that the total number of seats is 150. The divisor for wave I is 157, for wave II 140 and for wave III it is 150.

As one can see in Figure A1 in Appendix, using this procedure there are only minor differences between the seat distributions under Approval Voting and the Majority Judgment. This comes as no surprise, since for the seat allocation we have taken into account the number of voters who gave a grade higher than or equal to $\gamma = ac$ which is more or less the number of voters who approved of the party in question. With this procedure for determining the number of seats, in all three waves SGP, TON, PVV and PvdD receive less seats under Majority Judgment than under Range Voting.

4.4 The Borda Majority Count

Let A be an alternative and $\{g_1, g_2, \ldots, g_k\}$ be the set of grades, with $g_1 > g_2 > \ldots > g_k$. Let p_j be the number of voters who gave grade g_j to A, where $j = 1, 2, \ldots, k$. The *Borda Majority Count* BMC(A) of A is defined by BMC(A) := $p_1 \cdot (k-1) + p_2 \cdot (k-2) + \ldots + p_k \cdot 0$.

$$\mathrm{BMC}(A) = \sum_{j=1}^{k} p_j \cdot (k-j)$$

For instance, suppose we have five grades: *ex*(cellent), *go*(od), *ac*(ceptable), *po*(or) and *re*(ject). Then we assign 4 points to grade *ex*, 3 points to grade *go*, 2 points to grade *ac*, 1 point to grade *po* and 0 points to grade *re*. Now suppose that 10 voters evaluate a party A as follows:

ex	*go*	*ac*	*po*	*re*
1	2	3	3	1

Then BMC(A) = $1 \times 4 + 2 \times 3 + 3 \times 2 + 3 \times 1 + 1 \times 0 = 19$. It is illuminating to realize that BMC(A) equals the sum of the cumulative evaluations (numbers) as shown in the following table:

at least	*ex*	*go*	*ac*	*po*
	1	3	6	9

Notice that 1 + 3 + 6 + 9 = 19 = BMC(A). This is explained by the fact that in the last table of cumulative grades the grade *ex* is taken into account 4 times, the grade *go* is taken into account three times, etc.

In order to transform the data from the LISS panel into evaluations in terms of the language just mentioned, i.e. $\{ex, go, ac, po, re\}$, we have identified *ex* with the grades 10 and 9, *go* with 8 and 7, *ac* with 6 and 5, *po* with 4 and 3, and *re* with 2, 1, 0 and 999. The seat distribution among the different parties has been computed by applying Jefferson's method to the Borda Majority Counts of the different parties. The resulting

Table 5. Seat distributions using Majority Judgment

Party	*p*	*ex*	*vg*	*go*	*ac*	*po*	*re*	*q*	$\beta(A)$	#Seats
CDA-I	0738	35	93	610	**2579**	1828	1158	2986	3317	21
II	0634	28	92	514	**2274**	1687	0888	2575	2908	20
III	0687	45	92	550	**2177**	1619	1231	2850	2864	19
PvdA-I	3021	33	77	404	2507	**2014**	1309	1309	3021	19
II	0585	24	70	491	**2572**	1576	0787	2363	3157	22
III	0563	38	82	443	**2383**	1641	1169	2810	2946	19
VVD-I	2302	14	57	285	1946	**2234**	1723	1723	2302	14
II	2277	07	40	303	1927	**1960**	1194	1194	2277	16
III	2505	17	72	362	2054	**1905**	1243	1243	2505	16
SP-I	2991	81	124	597	2189	**1755**	1388	1388	2991	19
II	0650	46	123	481	**2108**	1590	0993	2583	2758	19
III	2652	37	119	419	2077	**1666**	1214	1214	2652	17
GL-I	2687	51	110	444	2082	**1849**	1502	1502	2687	17
II	2600	34	107	434	2025	**1685**	1062	1062	2600	18
III	2735	45	129	490	2071	**1628**	1190	1190	2735	18
D66-I	2080	11	052	195	1822	**2207**	1517	1517	2080	13
II	2539	16	073	372	2078	**1778**	0873	0873	2539	18
III	0763	35	148	580	**2385**	1520	0817	2337	3148	20
CU-I	2260	40	078	299	1843	**1817**	1789	1789	2260	14
II	1654	23	068	202	1361	**1858**	1716	1716	1654	11
III	1833	34	067	231	1501	**1800**	1821	1821	1833	12
SGP-I	2633	44	040	096	0689	1764	**2666**	0000	0869	05
II	0794	36	045	079	0634	**1688**	2302	2302	0794	05
III	0901	31	034	085	0751	**1733**	2408	2408	0901	06
TON-I	1674	89	111	372	1102	**1185**	2681	2681	1674	10
II	2165	25	020	119	0718	1283	**3030**	0000	0882	06
III	2103	12	015	078	0668	1330	**3312**	0000	0773	05
PVV-I	2238	66	071	220	0841	1040	**2511**	0000	1198	07
II	1983	58	056	165	0692	1012	**3374**	0000	0971	06
III	2213	81	084	269	0867	0912	**3447**	0000	1301	08
PvdD-I	1734	92	091	224	1327	**1528**	2639	2639	1734	11
II	1307	74	050	186	0997	**1385**	2577	2577	1307	09
III	1609	92	074	232	1211	**1436**	2486	2486	1609	10

Table 6. Seat distributions using the Borda Majority Count

Party	*ex*	*go*	*ac*	*po*	*re*	BMC	#Seats
CDA-I	128	1839	2480	1185	1166	12,174	19
II	120	1627	2227	1019	1013	10,834	18
III	137	1605	2159	1084	1366	10,765	17
PvdA-I	110	1508	2639	1303	1238	11,545	18
II	094	1688	2394	0901	0929	11,129	18
III	120	1529	2359	0999	1343	10,784	17
VVD-I	071	1053	2466	1682	1526	10,057	15
II	047	1038	2408	1342	1171	9,460	16
III	089	1205	2379	1271	1405	10,000	16
SP-I	205	1566	2254	1258	1515	11,284	17
II	169	1472	2112	1039	1214	10,355	17
III	156	1312	2226	1091	1564	10,103	16
GL-I	161	1375	2251	1320	1691	10,591	16
II	141	1376	2129	1074	1286	10,024	17
III	174	1451	2082	1115	1527	10,328	17
D66-I	063	0815	2571	1445	1904	9,284	14
II	089	1260	2348	1036	1273	9,868	16
III	183	1775	2185	0857	1349	11,284	18
CU-I	118	1019	2172	1413	2076	9,286	14
II	091	0703	1896	1443	1873	7,708	13
III	101	0783	2004	1353	2108	8,114	13
SGP-I	084	0303	1351	1685	3375	5,632	08
II	081	0271	1298	1590	2766	5,323	09
III	065	0299	1453	1535	2997	5,598	09
TON-I	200	0911	1226	1059	3402	7,044	10
II	045	0414	1159	1162	3226	4,902	08
III	027	0303	1106	1304	3609	4,533	07
PVV-I	137	0589	0991	1091	3990	5,388	08
II	114	0473	0923	1050	3446	4,771	08
III	165	0653	0971	0896	3664	5,457	09
PvdD-I	183	0760	1654	1304	2897	7,624	11
II	124	0564	1442	1193	2683	6,265	10
III	166	0734	1539	1246	2664	7,190	11

seat distributions are shown in Table 6. The divisor for wave I is 640.70, for wave II 589 and for wave III it is 600.

The more voters there are, the smaller is the chance of a tie under the Borda Majority Count. Typically, the differences in the seat distribution under Range Voting (Smith 2015), Approval Voting (Brams 1976; Brams and Fishburn 1978, 1983), Majority Judgment (Balinski and Laraki 2007a,b, 2011) and the Borda Majority Count (Zahid and de Swart 2015) highest BMC than others parties. All other parties are almost consistent in their ranks. The main party PvdA has slightly improved his position over CDA. The BMC ranking position, in all waves are as under:

5. About the number of grades

In the LISS panel the voters could give an evaluation of the different parties on a scale from 10 (excellent) to 0 (reject), in other words, the common language was the set of grades $\{10, 9, 8, \ldots, 2, 1, 0\}$ familiar to every voter from the Dutch education system. One may wonder what language is appropriate and whether the outcome of an election depends on the language used. For that reason we have counted the number of voters who used k different grades, for $k = 1, \ldots, 10$. The results are in Table 7.

Table 7. Number of grades used by voters

Voters (%)	Grades
0.62	1
2.44	2
5.83	3
15.25	4
25.31	5
28.41	6
16.23	7
5.12	8
0.78	9
0.01	10

Only 0.01% of the voters used ten different grades to evaluate the parties and most voters (28.41%) used six different grades to evaluate all parties. As is clear from the table, almost half of the voters used 5 or less grades, 77.86% of the voters used six or less different grades and almost 85.2% of the voters used four to seven different grades. This is in line with the experimental results of Balinski and Laraki (2007b), who observed that the six grades (excellent, very good, good, acceptable, poor, reject) in their experiment were sufficient and no more grades were needed. For reasons of symmetry we slightly prefer the language {excellent, good, acceptable, poor, reject}, leaving out the term 'very good', because the term 'acceptable' is then precisely in the middle. In addition, it reduces the possibilities for manipulation, because one may only

Table 8. Frequency of grades

Grade	Percentage of use
0	17.99
1	5.18
2	7.13
3	9.27
4	11.29
5	15.52
6	15.25
7	11.15
8	5.20
9	1.24
10	0.8

reduce the evaluation of a candidate dishonestly by four points, instead of five when Balinski's language is used.

We have also counted how many times each grade has been used. The results are in Table 8. Notice that grades 5 and 6 were used most frequently.

6. Pairwise comparison

The results of pairwise comparisons of parties in percentages have been calculated from the original data in Table 2 obtained in the LISS panel taking the three waves together, and are shown in Table 9.

So, the first number 52 in the first row indicates that 52% of the voters prefer CDA to PvdA. As one can see in this table, in a pairwise comparison the party CDA defeated every other party except D66 and D66 defeated all other parties. Notice that

Table 9. Pairwise comparisons

	CDA	PvdA	VVD	SP	GL	D66	CU	SGP	TON	PVV	PvdD
CDA		52	63	50	51	49	68	73	73	77	67
PvdA	48		60	51	53	49	62	68	69	74	70
VVD	37	40		43	44	41	55	66	73	78	63
SP	50	49	57		53	49	61	67	70	76	73
GL	49	47	56	47		47	62	68	69	74	74
D66	51	51	59	51	53		67	73	72	77	73
CU	32	38	45	39	38	33		74	67	73	61
SGP	27	32	34	33	32	27	26		63	70	53
TON	27	31	27	30	31	28	33	37		70	44
PVV	23	26	22	24	26	23	27	30	30		34
PvdD	33	30	37	27	26	27	39	47	56	66	

Table 10. Percentage of voters giving the same evaluation

	PvdA	VVD	SP	GL	D66	CU	SGP	TON	PVV	PvdD
CDA	31	31	22	16	27	29	21	18	15	19
PvdA		28	29	31	30	26	20	16	14	20
VVD			25	24	29	27	25	21	17	20
SP				42	31	26	25	20	17	23
GL					40	27	25	20	17	25
D66						30	27	21	17	23
CU							43	23	19	24
SGP								30	24	26
TON									48	27
PVV										28

although D66 is the Condorcet winner, the parties CDA and PvdA get more seats when the Plurality Rule is applied (except in wave III). Van Deemen (1993) calls this the *More-Preferred, Less-Seats paradox.*

For each pair of parties we have also calculated from the original data in Table 2, taking the three waves together, what percentage of voters is indifferent between the two parties in question. The results are shown in Table 10.

Notice that almost half of the voters (48%) is indifferent between TON and PVV, which is not surprising if one knows the political landscape in the Netherlands. A similar remark can be made for CU and SGP, but now with 43%. Among CDA, PvdA, VVD and SP, roughly speaking at most 30% of the voters is indifferent between any pair of them.

7. Summary

Balinski and Laraki's Majority Judgment (Balinski and Laraki 2011) asks the voter to give *evaluations* of the alternatives instead of giving a first preference or a ranking of the candidates. In this way, the voter is able to provide much more information than in the traditional framework of social choice theory, which was inspired by Arrow (1963, 1983): in Balinski and Laraki's framework the voter may give the same evaluation to two or more candidates and also is able to express to which degree he prefers one candidate to another one. From an evaluation of the candidates one may deduce a weak ordering or ranking of them, but conversely, one cannot deduce an evaluation of the candidates from a given ranking. In his Majority Judgment this extra information is also used in the aggregation of the individual evaluations to an evaluation by the society. In order to reduce the possibilities for manipulation, Balinski and Laraki take the median value of the evaluations by the voters as the final social evaluation. In experiments they have shown that, contrary to what is frequently thought, voters are quite able to give evaluations of relatively many (about 10) candidates. Their idea of asking the voters for evaluations instead of rankings is inspired by the practice of many contests, for instance of ice-skating. However, in elections for parliament or for

choosing a president, to the best of our knowledge, voters are nowhere asked to give their *evaluations* of the different candidates or parties; instead, in most cases they just have to mention one candidate or, at best, a ranking of the candidates.

By taking the median value of the evaluations by the voters as the social outcome, it frequently is the case that several candidates have the same median value and consequently there usually are many ties. Balinski and Laraki propose two tie breaking rules and show that if a candidate A is socially preferred to candidate B according to the majority-gauge, then A is also socially preferred to B according to the majority ranking.

There is a number of examples where application of Majority Judgment yields controversial results. That is, the social outcomes look at first sight counter-intuitive. However, Balinski and Laraki argue in Chapter 16 of their book (Balinski and Laraki 2011) that these surprising results are very reasonable outcomes and after all are not counter-intuitive at all. They only look counter-intuitive at first sight, because we are used to think in the traditional framework of Arrow.

An item not touched by Balinski and Laraki is how their Majority Judgment may be used to give a seat distribution for parties in parliament and it is not immediately clear how this may be done. We present two ways to do so: the first one is described in Subsection 4.3 and the second way is—once the votes have been casted in linguistic terms—by replacing the linguistic grades by appropriate numbers, resulting in what we have called the Borda Majority Count.

In order to avoid the controversial examples, to make the computations for determining the social outcome more simple and in order to be able to compute a seat distribution for parties in parliament, we have made a number of changes in the procedure of Balinski and Laraki:

(i) We use the same set of grades as they do, say {*ex*(cellent), *go*(od), *ac*(ceptable, *po*(or), *re*(ject)}, for reasons of symmetry leaving out the grade *vg* (very good). Voters are asked to evaluate the candidates using these linguistic grades.

(ii) After the voters have casted their votes, *ex* is identified with the number 4, *go* with 3, *ac* with 2, *po* with 1 and *re* with 0.

(iii) Next for each alternative we simply add up the number grades obtained by that alternative, which we call the Borda Majority Count of that alternative.

In this way one obtains one or more winners and a social ranking of the alternatives. The chance that two candidates have the same Borda Majority Count is relatively low, in particular when there are many voters.

We call this procedure the Borda Majority Count (Zahid and de Swart 2015), because on the one hand it reminds us of the Borda Count (Saari 2001, 2008) and on the other hand it reminds us of Majority Judgment. The controversial examples disappear when applying the Borda Majority Count and it becomes easy to apply the Borda Majority Count if one wants to compute a seat distribution for parliament. Although the Borda Majority Count has a number of nice properties, compared with Majority Judgment we also pay a price: it is easy to manipulate. When I know that two candidates

A and *B* are close competitors, and *A* is my favorite one, then I may dishonestly give *B* a very low evaluation. However, the difference for the Borda Majority Count of *B* will be at most 4, frequently less than 4. In this respect the Borda Majority Count, although a special case of Range Voting (Smith 2015), is less manipulable than Range Voting, where the range of possible numbers usually is (much) larger.

The Borda Majority Count has with the Borda Count in common that they both compute scores of the alternatives, but it differs from the Borda Count because it uses as input evaluations of the candidates instead of rankings, which are much less informative than evaluations. The Borda Majority Count may be conceived as a special case of Range Voting, but it differs from Range Voting by using evaluations in terms of a small set of linguistic expressions, well understood by everyone involved, instead of evaluations in terms of a fairly large set of natural numbers. The Borda Majority Count is similar to Majority Judgment in that both use a common language consisting of a relatively small set of linguistic grades, but it differs from Majority Judgment by not taking the median value of the evaluations given to a candidate by the voters, but by summing up or averaging the numbers associated with the linguistic grades given to the candidate in question.

Anyway, while it is not clear at all how Majority Judgment may be used to give a seat distribution for parties in parliament, the Borda Majority Count seems an appropriate way to do so.

8. Conclusion

We have applied five different election mechanisms to the data of the LISS panel, showing the evaluations by its members of the most well-known Dutch parties on an eleven point scale, ranging from 0 (reject) till 10 (excellent), as familiar from the Dutch education system. In the case of Approval Voting (AV), Majority Judgment (MJ) and the Borda Majority Count (BMC) we had to transform these data to the language of the election mechanism in question, i.e., $\{0, 1\}$ for Approval Voting, $\{0, 1, 2, 3, 4, 5\}$ for Majority Judgement and $\{0, 1, 2, 3, 4\}$ for the Borda Majority Count. Generally speaking, the seat distributions under Range Voting, Approval Voting, Majority Judgement and the Borda Majority Count are more or less similar, except for SGP and TON, which get clearly less seats under AV and MJ than under RV and BMC. Plurality Rule (PR) is clearly beneficial for some parties, like CDA (in all three waves), and to a lesser degree for PvdA, D66 and PVV, while Range Voting and the Borda Majority Count are beneficial to CU, SGP and TON. The last observation may be explained by the fact that these parties may not be approved of by many of the voters, but still obtain a lot of respect by these voters.

More than 50% of the participants used five or six grades. It is striking that the members of the panel clearly were able to give evaluations of the eleven parties involved and many gave different parties the same evaluation. This shows that one should not ask the voters to give a ranking of the parties and that it is not reasonable to ask the voter to select just one party from the list, as is done under the Plurality Rule.

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Appendix

Figure A1. Overview of the resulting seat distributions in wave I, II and III