VOTING STRENGTH IN THE FINNISH PARLIAMENT 1951—1966

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Explanation of Concepts

The concept of voting strength[1] is derived from studies conducted in the United States on the distribution of power among single members and coalitions of members in committees. If a group of members — or a coalition — in a certain committee has a sufficient number of votes to put its measure through, it is termed a winning coalition. If the members cannot get a certain piece of legislation through, such a coalition is considered a losing coalition. If neither the members of a certain coalition nor the members of an opposing coalition succeed in getting a resolution through, such coalitions are termed blocking coalitions. Grouping C is a winning coalition if it gets its measure through in the voting. Coalition C is a losing coalition if coalition C′ succeeds in the voting. Coalition C is blocking if neither C nor C′ succeed in the voting.[2]

The minimal winning coalition is of special interest. With this type of coalition the shift of even one vote to the opposite side causes a coalition to become a losing or blocking coalition.

If some member of a committee succeeds in forming a winning coalition, he is termed a dictator. If some member exercises veto power, he is able to form a blocking coalition by himself. If a member does not participate in any of the smallest winning coalitions, this member is powerless.[3]

The ratios of the members' own number of votes (if the members have a different amount of votes) or the number of votes of the coalitions are not necessarily the same as the ratio of their voting strengths. If some member possesses three votes and another only one, their relative voting strengths need not be 3 to 1. If there were still a third member with a single vote, the first member would be a dictator and the two others would be powerless.

The basic idea of voting strength becomes apparent after an examination of the behavior of the members during the voting. The relative degrees of support for a certain disputed measure may find the members arrayed in the following order: $X_1, X_2, X_3, \ldots X_n$. For a measure to be pushed through a committee, the supporters of the measure $[X_1, X_2, X_3 \ldots Xi]$ should form a winning coalition, i.e. control more of the votes during the balloting than the coalition opposing the measure $(X_{i+1}, \ldots X_n)$. If $X_1, X_2 \ldots, X_i$ is a winning coalition and

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coalition $X_1, X_2 \ldots X_{i-1}$ is not, then member X_i, who shifts his vote to the opposing side, is said to be pivotal in the voting.[4] All those members whose vote change causes a winning coalition to lose are considered essential in that particular vote.

When estimating the magnitude of the voting power, it is necessary to determine all the possible combinations into which the members may be arranged. These possibilities are represented by n! The next task is to identify those combinations or groupings in which a certain member or group is considered essential. The voting power of a single member or group is the proportion of the number of those coalitions, in which this member or group is essential, to all possible coalitions.[5] In other words, all those combinations of members or groups are calculated in which the member or group in question holds the balance of power in the voting.

In the United States, with two major parties, interest in studies of the distribution of power has centered on the committees, because in a two-party legislative assembly the majority party is always a dictator if it can keep discipline in its ranks. Studies have been conducted on the voting strength in the United Nations, however, where, for instance, the following power indices were computed for the members of the Security Council: each of the five big powers having vetoes received a power index of 0.197, and each of the other Security Council members received 0.002 (a minimal winning coalition consists of 5 big powers and 2 other members).[6]

Of course, in committees where the members all have the same number of votes, the voting strength of all members is 1/n (where n is the number of members). In certain corporations, however, the number of votes of some stockholders differ appreciably from others. This occurs in a company with a total of 1,000 shares. If one shareholder owns 400 shares and the remaining 600 shares are scattered among 600 different stockholders, the power index for the man holding 400 shares is 0.666 and 0.006 for those holding single shares. If on the other hand these same shares were divided among three shareholders in the proportion 450, 450, and 100, the voting strength of each would be $1/3$. We may generally say that the stockholder holding the most shares becomes more potentially influential as the remaining shares are distributed among more and more of the other shareholders.

With the use of a method for evaluating voting strength, the division of power among various representative bodies may also be compared. In the United States the division of power between the President and Congress has been investigated. It takes majorities of the Senate and the House, with the President, or two-thirds majorities without the President, to enact a bill. With the members of the three bodies arranged in every possible order of support for the bill, the President has a voting index of $1/6$ and each of the two houses about $5/12$. The power indices for the three bodies are in the proportion 5:5:2. The indices for a single congressman, a single senator, and the President are in the proportion 2:9:350.

II. The Distribution of Power in Multiparty Systems, with Special Reference to Finland

Certain major difficulties arise when investigating the distribution of power in multiparty system legislative bodies. Each group must be considered as a unit, even though in actuality the members do not always vote for the same party at all. But because the concept of voting strength has to be completely examined only *a priori*, some assumptions which correspond to reality have to be made. With the power index formula devised by Irwin Mann and L. S. Shapley the probability of a certain arrangement of all the different groups is equally great. This is simply not the case in multiparty systems, as the very different positions of the parties of the extreme left and right in the voting demonstrate.

Before proceeding to a closer examination of voting strength in a multiparty system, a short example may help at this point to clairfy the concepts. Let us suppose that there are a total of 100 members in a nation's legislative body and that a two-thirds majority is needed for a piece of legislation to become law. The seats of the parties are distributed as follows: party A has 45 seats, B has 25, and C has 30. The ratio of support for a certain measure may be reflected in any of the following arrangements: 1. A,B,C; 2. A,C,B; 3. B,A,C; 4. B,C,A; 5. C,A,B; 6. C,B,A. In combination 1, party B is decisive, because by withholding its 25 votes the total of at least 67 votes needed for passage cannot be reached. Pary C is decisive in combination 2, in combination 3 party A, in 4 party A, in 5 party A, and in 6 party A. In these 6 cases, party A has been essential a total of four times, while parties B and C have each been necessary for success only once. The power indices of the parties turn out to be: A 4/6, B 1/6, C 1/6. But if only a majority would be needed to enact a law, the voting strength of each party would be 2/6.

The Mann-Shapley formula was devised to study the Electoral College of the United States. The 50 states in the College have differing numbers of votes, depending on population size. The power indices of the various states were obtained with the following formula:[7]

$$\varnothing = \sum \frac{(s-1)!\ (n-s)!}{n!}$$

$\varnothing$ is the power index for the ith state, n is the number of states, and s is the number of states in a coalition in which the ith state is essential. Parties may of course be used instead of states. Expression (s—1)! indicates the number of arrangements into which parties of a winning coalition can be placed so that a party would be decisive in it. All the arrangements within this coalition would be s!, but then party i would not always hold the balance of power. Expression (n—s)! indicates the number of arrangements into which the parties of the opposition can be placed. n! represents all the possible combinations into which these parties can be placed. From this it can be observed that the ratio of all these combinations in which party i is essential to all possible arrangements may be estimated from the formula.

Irwin Mann and L. S. Shapley produced results showing that the big states had greater voting strength in relation to their number of votes than did the small states.[8]

Before applying the formula in a Finnish setting, it is necessary to digress a bit and identify the parties which made up the parliaments from 1951 to 1966. The most leftist party in Finland is the Finnish People's Democratic Union (FPDU), founded in the year 1944. Its dominating nucleus, the Finnish Communist party, was founded in Moscow in 1918. The Social Democratic League of Workers and Small Farmers (SDWS) was founded in 1959 after is separated from the Social Democratic party in 1957 under the name "Independent Social Democrats". This group received the name "Social Democratic Opposition" in 1958. The Social Democratic party (SDP) was founded in 1899, and like other leftist parties derives its support mainly from workers, small farmers and the lower middle class.

In 1958, Veikko Vennamo separated from the Agrarian Union and founded a new party called the Smallholders party of Finland. The name was changed to the Finnish Rural party (FRP) in 1966. The Agrarian Union was founded in 1906 and like its Scandinavian counterparts changed its name to Center party (CP) in 1965. The Finnish Rural party and the Center party represent the agrarian population.

The Liberal People's party (LPP) was founded in 1965 when the Finnish People's party and the Liberal Union united. These two parties had separated in 1951 when the National Progressive party terminated its activity. This is the party of the middle class in the urban areas. The Swedish People's party (SPP)

Table 1. *Party Voting Indices in Parliament, 1951—1966*

		FPDU	SDWS	SDP	CP	Others[1]	LPP	NCP	SPP
	Ø	.200	.	.302	.302	.	.066	.066	0.66
1951	Seats	43		53	51		10	28	15
	%	21.6		26.5	32.2		5.7	14.6	7.6
	Ø	.200		.302	.302		.066	.066	.066
1954	Seats	43		54	53		13	24	13
	%	21.6		26.2	24.1		7.9	12.8	7.0
	Ø	.273	.038	.238	.238		.071	.071	.071
1958	Seats	50	3	48	48		8	29	14
	%	23.2	1.7	23.2	23.1		5.9	15.3	6.7
	Ø	.276	.074	.177	.238	— —	.048	.107	.074
1959	Seats	50	13	38	47	1	8	29	14
	%	23.2	.	.	.	.	5.9	15.3	6.7
	Ø	.249	.016	.179	.323	— —	.055	.106	.072
1962	Seats	47	2	38	53	1	13	32	14
	%	22.0	4.4	19.5	23.0	0.5	6.3	15.0	6.4
	Ø	.209	.020	.325	.287	.000	.031	.066	.066
1966	Seats	41	7	55	49	1	9	26	12
	%	21.2	2.6	27.2	21.2	1.0	6.5	13.7	6.0

[1] The Finnish Rural party in 1959 and 1966 and the Liberal Union in 1962.

was founded in 1906 and is the party of the Swedish-speaking population. The National Coalition party (NCP) was founded in 1918 to continue the work of the Old Finnish party. It is the most conservative party in the country and derives its support from upper and middle class groups.

The values of the power indices computed using the formula are shown in Table 1. The table also shows the number of seats held by each party and its share of the vote in each election.

To facilitate comparison of the different sized parties, the power indices corresponding to the number of seats of the parties have been plotted in Figure 1 along with the trend of the sliding average estimated for five values. From the diagonal we can see what values exceed the voting strength expected for the party, if voting strength were directly proportional to the distribution of seats.

It may be noted from the figure that both the big and small parties attain voting strengths which exceed their number of seats. The middle-sized parties (20—40 seats), however, are underrepresented when voting strength is compared to the amount of seats held. The trend of the sliding average begins above the

Figure 1. *Party Voting Index compared to Number of Seats*

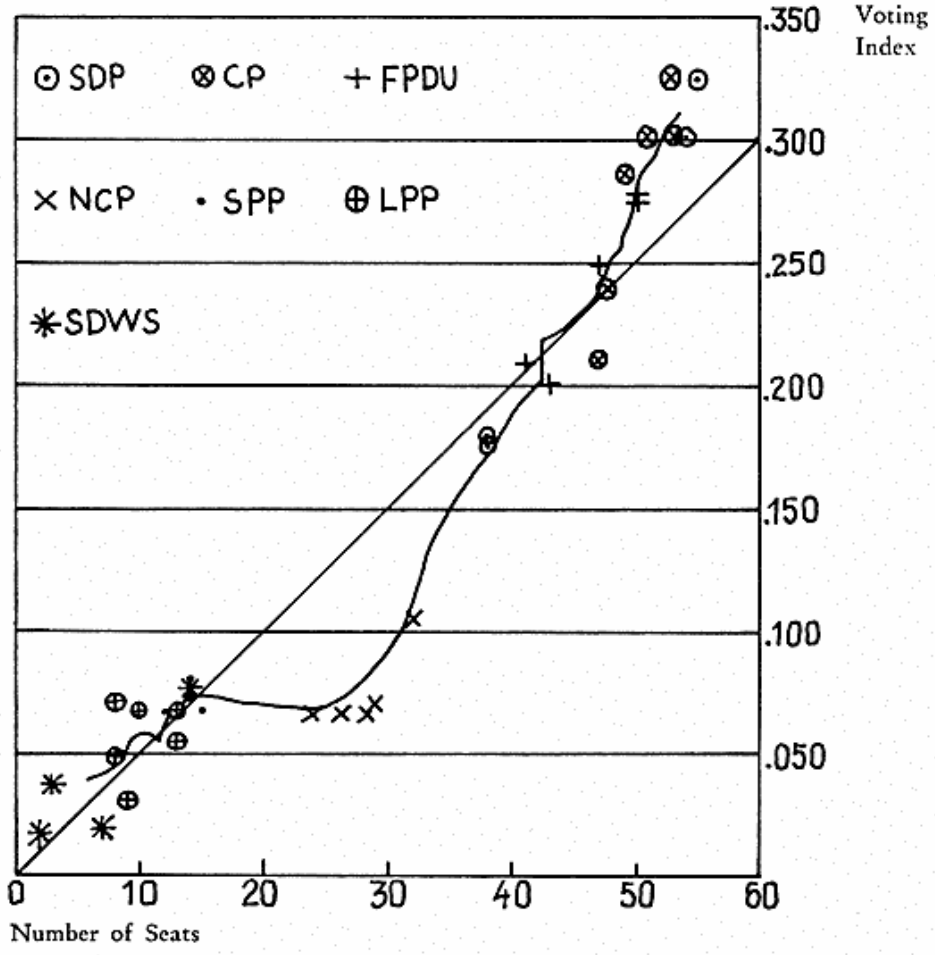
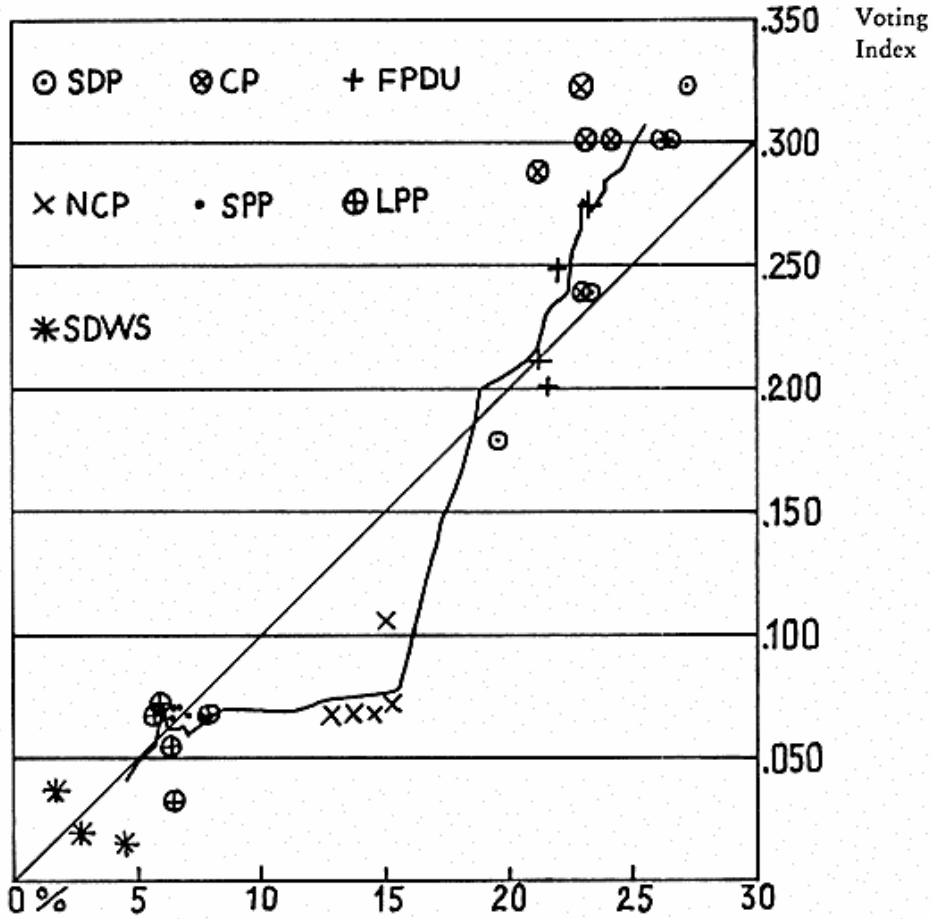


Figure 2. *Party Voting Index compared to Per cent Share of Valid Ballots*



diagonal up to 14 seats, dips below it from seat interval 15, and again clearly moves above the diagonal after 42 seats are reached.

From Figure 1, one gets the impression that the National Coalition party would command considerably less voting strength than its representation would indicate, while the Center party, on the other hand, generally has greater voting strength than might be supposed from only an enumeration of their seats. The location of the National Coalition values is a special feature of the trend, because within the range where it has its seats, the curve falls with an increase in seats. This decrease in voting strength with increase in the number of seats may be explained by the values for 1958 and 1959 when the voting indices of the small parties greatly exceeded their number of seats. Because there are more parties with about 10 seats than parties with around 30, these small parties have more effect on the trend, causing it to fall between 15 and 25 seats.

From Figure 2, a comparison can be made between the per cent of the vote received by the parties in the elections and their voting strength. The figure clearly shows that in comparison with their vote totals, the small parties do not have nearly as much voting strength as they do when seats are related. The big

parties, however, generally receive index values located only above the diagonal. On the bases of the number of seats and vote totals, marked differences appear in the computed trends. Except for the index values clustered around 6 %, the trend based on vote totals is above the diagonal only when a party's per cent share of the total vote exceeds 18 %. In addition, the trend in the vote per cent figure is much steeper than the line computed from the distribution of seats.

The differences between the power indices of the parties and their proportion of seats and share of the total vote have been computed in Table 2. The three biggest parties all have positive sums when power index values are related to their proportion of seats and share of the vote. The single middle-sized National Coalition party always has negative values. The values of the small parties vary considerably; however, of these, only the Swedish People's party has positive sums computed from both the seats and votes it received.

Table 2. *Differences between the Power Indices of the Parties and their Proportion of the Seats and Total Vote*

		FPDU	SDWS	SDP	CP	Others	LPP	NCP	SPP
	Ø	.200	.	.302	.302	.	.066	.066	.066
1951	A	—.015	.	+.037	+.047	.	+.016	—.074	+.009
	B	—.016	.	+.037	+.070	.	+.009	—.080	+.010
	Ø	.200	.	.302	.302	.	.066	.066	.066
1954	A	—.015	.	+.032	+.037	.	+.001	—.054	+.001
	B	—.016	.	+.040	+.061	.	—.013	—.062	—.004
	Ø	.273	.038	.238	.238	.	.071	.071	.071
1958	A	+.023	+.023	—.002	—.002	.	+.031	—.074	+.001
	B	+.041	+.021	+.006	+.007	.	+.012	—.082	+.004
	Ø	.249	.016	.179	.323	.—	.055	.106	.072
1962	A	+.014	.006	—.011	+.058	—.005	—.010	—.054	+.002
	B	+.029	—.028	—.016	+.093	—.005	—.008	—.044	+.008
	Ø	.209	.020	.325	.287	.—	.031	.066	.066
1966	A	+.004	—.015	+.050	+.042	—.005	—.014	—.064	+.006
	B	—.003	—.006	+.053	+.075	—.010	—.034	—.071	+.006
Σ	Ø	1.131	.074	1.344	1.452	.—	.289	.375	.341
Σ	A	+.011	+.014	+.106	+.182	—.010	+.024	—.320	+.019
Σ	B	+.035	—.013	+.120	+.306	—.015	—.034	—.339	+.024

A is the difference between seat proportion and index.
B is the difference between total vote per cent and index.

The most clearly overrepresented party according to the power index is the Center party, whose absolute values for the positive sums exceed the absolute values of the negative sums received by the National Coalition party. Even though the Coalition party is a middle-sized party on the basis of seat and share of the vote, it is clearly in the same group as the small parties when voting strength is considered.

When examining Tables 1 and 2, it can be seen that the small parties in particular have had relatively high voting indices when the amount of seats of the big parties was split up into certain smaller groupings (SDWS and FRP). On the

other hand, if two major parties together hold over 100 seats in Parliament, they are in a truly dominant position. This was clearly reflected in the values for 1966, when the Social Democrats and the Center party held 52 % of the seats, but attained fully 61.2 % of the voting power. A big party loses a relatively large amount of its voting strength if its proportion of seats drops below 40, which is what happened to the Social Democrats after 1958.

When the power index is related to voter support, it may be pointedly maintained that the Center party voter has the greatest amount of influence on the management of affairs in Parliament, while the National Coalition voter has the least influence over the voting outcomes.

The fact mentioned several times earlier becomes apparent from Table 2: small parties suffer from our system of proportional representation while big parties (most particularly the Center party) benefit from it. Because the Swedish People's party is concentrated in only a few constituencies, its voting strength is positive relative to its share of the vote. In these electoral districts, the SPP is not a small party at all, although it is when included in the national aggregate totals.

III. Some New Research Possibilities

Because of the many special features of their legislative bodies, more research needs to be done on the estimation of voting strength in nations with multiparty systems. Both *a priori* and *a posteriori* methods need to be selected in this regard. I have constructed a Mann-Shapley model by considering primarily the dispersion of the different party representatives in the voting and the ideological distance between the parties which clearly distinguishes them in the balloting. Weights, denoted by w, have been added to the formula.

$$\varnothing = \sum w \frac{(s-1)!\ (n-s)!}{n!}$$

with

$$w = \frac{D_s}{s \cdot \overline{X}_d}$$

and

$$\overline{X}_d = \frac{\sum d}{n_d}$$

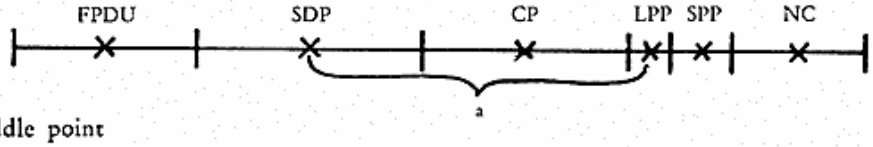
D_s is the total number of seats for the winning coalition and d is the ideological distance of the two parties, obtained by placing the parties with their number of seats in ideological order from left to right and determining the distance between the middle points of segments obtained in this manner. This can be seen more clearly in Table 3 where n_d is the amount of the distances inside a winning coalition.

By using weights, we have mainly attempted to improve the drawbacks caused by each coalition having the same probability in the Mann-Shapley model. The weights may be considered as some form of measure of the probability of a winning coalition, since the weighted value decreases as the ideological distance

of the parties forming the winning coalition increases. The number of parties in a winning coalition is inversely proportional to the magnitude of the weights, for it is obvious that it is easier for a few parties to reach agreement than for many.

The total number of seats commanded by a winning coalition is directly proportional to the weight, since the larger this figure is, the more probable it is that this coalition will be successful in the voting outcome. This is because the dispersion of the party representatives in the vote must be considered. If the winning coalition's total number of votes is close to 100, it is possible that because of the dispersion of the members, this coalition may not be successful.

Figure 3. *The Ideological Distances of the Parties Located along a Continuum from Left to Right (1951 Parliament)*



x = Middle point
a = Ideological distance between SDP and LPP = 82.5 seats

Table 3. *Weighted and Unweighted Party Voting Strengths for the 1951 Session of Parliament*

	FPDU	SDP	CP	LPP	SPP	NCP
Without weighted per cent	.200	.302	.302	.066	.066	.066
With weights added	.147	.325	.339	.064	.064	.061

By using this formula with the weights added, the power indices for the 1951 session of Parliament were calculated. As may be observed from Table 3, the Center party obtains, at the expense of the parties of the extreme left and right, higher power indices with weights included in the formula than without. The weighted formula has a certain drawback, because the sum of each party index does not add up to one but only represents a magnitude relative to the other party index magnitudes.

We may also construct a model based on observation or by simply counting the number of times some party has been on the winning side in the vote and comparing the values obtained by this method with theoretically estimated indices. Voting strength indices may also serve as a basis for studying political activity. When studying the number of party ministers in different governments, for instance, one might examine in which cabinets the ministers have been selected on the basis of the distribution of seats of a certain group, or when the composition of the cabinet reflects the real power distribution. In this manner, the allocation of portfolios by number of seats could be considered an antiquated system and allocation according to numerical estimates of power indices as a rational system.

By way of summarizing, it can be said that studies conducted in the area of voting strength demonstrate how the use of mathematical models effectively

simplifies theoretical constructs and makes frames of reference more concise. In addition, the use of mathematical models facilitates the articulation of research findings so they may better serve normative ends, e.g., by using the current "rationalized" method of allocating cabinet protfolios — as well as other research objectives, e.g. through an analysis of party ideological ordering and the ratios within them.

NOTES

[1] This is also called voting power. The numerical estimates of the distribution of power to be discussed later in the article will be termed "power indices".

[2] John G. Kemeny, J. Laurie Snell and Gerald L. Thompson. *Introduction to Finite Mathematics*, Englewood Cliffs, N.J., 1964, p. 75.

[3] *Ibid.*, p. 76.

[4] L. S. Shapley and Martin Shubik. "A Method for Evaluating the Distribution of Power in a Committee System", in Martin Shubik (ed.). *Game Theory and Related Approaches to Social Behavior*, New York 1964, p. 109.

[5] *Ibid.*, p. 109.

[6] *Ibid.*, p. 109.

[7] *Ibid.*, p. 110.

[8] Irwin Mann and L. S. Shapley. "The A Priori Voting Strength of the Electoral College", in Martin Shubik, *op.cit.*, p. 159.

[9] *Ibid.*, p. 160.