This is slightly re-edited version of the letter I sent by email May 19, 2007, to Jesús Mario Bilbao (University of Seville) and Karol Życzkowski (Jagiellonian University) before the conference "Rules for decision-making in the Council. Which way forward?" that was to be held May 23, 2007 in Brussels at European Policy Center (www.epc.edu). Professors Bilbao and Życzkowski were invited to present at that conference Penrose's approach to designing voting games. The letter provides a new analysis of voting systems for the EU Council and offers further arguments for the square root system. It can be passed to anyone interested in the theory of voting games and applications. The *Appendix*, which I added in August 2007, corrects an error I made in analyzing the blocking structure of the Constitution game. You will also find there the table which shows the correct distribution of blocking fours in this game and in two games with square root weights.

Dear Colleagues:

I have learnt that you have been given an opportunity to defend the *square root voting system* before a political forum. I'm glad that the men of power will give a hearing to the men of science. Good luck!

To reassure those apprehensive of the new "technology" for constructing voting systems, I suggest to raise the argument that the "square root law" was already used in determining weights for the voting system invented for EU-15. Look at the following table.

State	Population	Square root	Weight
France	59.3	7.70	10
Spain	39.3	6.27	8
Nthrlnds	15.4	3.92	5
Sweden	8.8	2.97	5
Denmark	5.2	2.28	3

Each of 5 states listed above had in 1995 the largest population in each of 5 groups: {France, UK, Italy}, {Spain}, {Netherlands, Greece, Portugal, Belgium}, {Sweden, Austria}, {Denmark, Finland, Ireland}. For any 2 out of 5 countries, compute the ratio of the square roots of their populations (divide the smallest of two numbers by the largest one). Next, compute the ratio of the weights (numbers of nominal votes) assigned to the two countries. You will notice that the two fractions are remarkably close to each other. Their difference never exceeds .04, being much smaller in most of 10 pairs. For Spain and France, the ratio of square roots 6.27/7.70 equals .81. Since the population ratio 39.3/59.3 equals .66, Spain would receive 7 votes if the voting system for EU-15 were designed according to the principle that is now so strongly backed by the supporters of the Constitution treaty.

In constructing the voting system for the Fifteen, Penrose's theory was combined with the *parity principle*, namely, Germany's population advantage over France, UK and Italy was ignored so that Germany received as many nominal votes as the Big Three. The constructor of the voting system for EU-15 also ignored the difference between the Netherlands and Belgium (consequently, 2 other 10-million countries, Greece and Portugal, were also given 5 votes each).

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I signed the scholars' open letter in defense of the "Jagiellonian compromise" because the square root mapping of the population data into weights rests on a robust mathematical theory which allows us to design decision rules so as to formalize some natural insights concerning *democracy*. An even more important reason for advocating this solution was its compromise nature. What I mean by *compromise* is that the values of the "classical" voting power coefficients (by "classical" I mean the Banzhaf and Shapley-Shubik indices), calculated under the square root voting system with the 61.6% relative quota, do not depart too much from the median values of these parameters computed for any game from a collection of double majority games, obtained by varying quotas for the 1 *state* – 1 *vote game* and the one with population weights.

Unfortunately, Penrose's theory has turned out be too difficult for those who know no more than what the *square root* is. It will be hard to convince the listeners that an *indirect* democratic representation of some 500 million EU-27 citizens requires that a 16-million member state be given only twice as many votes as a 4-million state. The politicians, journalists, and ordinary readers of daily newspapers still say: according to our understanding of democracy the Netherlands should have 4 times more votes than Ireland.

The compromise prompted by the scientists to the governments would have been accepted, had the EU politicians actually estimated voting power by means of the indices used by the academics, or the indices that are based on the notion of a *critical* member of a winning coalition.

When the Convention proposed the new voting rules for the EU Council, Poland replied with *Niza o muerte*. Why? One could easily notice that Poland's relative *political* weight 27/345=7.8% roughly coincided with its share of the total EU-27 population. If voting power were assessed by relative weight only, the two voting systems would have to be recognized as equally good for this country. When the scientists computed classical coefficients and showed the barcharts to the public, everybody could see that Poland and Spain lost a lot of their voting power. As regards myself, I was more surprised at another result: the bar for Germany stood out high above the bars for the France, UK and Italy. I thought to myself: either the Big Three have accepted the leadership of Germany in the EU or they do not measure voting power in the way which implies such a conclusion. At that time I believed that classical indices are also used by politicians, so that the first explanation seemed to me more likely. However, I did not rule out the second one.

As a matter of fact, one doesn't need a special mathematical training to grasp the meaning of the Banzhaf index. Banzhaf himself was a lawyer, not a mathematician. Are political decision-makers now more ready to get acquainted with *scientific* methods for measuring voting power? Is it possible to encourage them to examine how advantageous are particular voting systems for particular countries with the use of classical indices? Now I doubt about this much more than three years ago. Actually, my position has radically changed since the time when I published (in a Kraków daily *Dziennik Polski*) my articles based on the assumption that there is no alternative to understanding voting power as *critical* membership in *many* winning coalitions. When I realized that the politicians had developed their own approach to the issue, I had to reconsider the reasons for poor cooperation between the constructors of voting systems and the scholars who deal with the theory of voting games. But first, I must repeat that the main obstacle on the side of the world of power is the fact that politicians and their advisors (who are mainly lawyers by education) still rely on weights in estimating voting power. Hence, the chance that the “Jagiellonian compromise” will be appreciated as a true compromise is not very high. If the pool of 345 votes is distributed among 27 states according to the square root rule, Germany will get 33 votes, just a bit more than 29 Nice votes and much less than 58 votes corresponding to its share of the total EU population. Thus, in terms of weights, the square root system is certainly not in the middle between the two systems.

Not only the Germans reject the replacement of linear weights with square root weights. Let me quote Alain Lamassoure, a Member of the EP and advisor of President Sarkozy. Yesterday (May 17, 2007), in his interview for *Dziennik* (a new Polish nationwide daily competing with *Gazeta Wyborcza* and *Rzeczpospolita*) he said “I don't think that any EU member state would agree to change the compromise which was so hard to work out. The double majority system included in the Constitution treaty is a very democratic method, for it is based on the principle: one citizen – one vote”. However, in the same issue of *Dziennik*, I read a statement of Paweł Zalewski, the Chairman of the Foreign Affairs Committee in the Polish parliament. He expects that France will be ready to discuss the issue. Thus, there is still hope that your presentation on May 23 may help gain more supporters for the square root system.

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Let me explain now why the mathematical theory of voting games has so far had too limited impact on the practice of constructing voting systems. The analysis that follows is based on my article which I wrote in Polish in May 2007 for *Międzynarodowy Przegląd Polityczny* (“International Political Review” – a Polish bimonthly publishing political analyses and documents). My main point is that the politicians do care about *blocking power*. It is a different kind of power than *winning power* identified within the mainstream mathematical theory with *voting power* tout court.

It is often believed that blocking power is measured by Coleman's index of "preventive" power which is defined as the ratio of the number $ws(i)$ of all winning coalitions containing a given voter as a critical member to the number w of all winning coalitions. Indeed, it is not difficult to prove that this coefficient assumes the maximum value of 1 if and only if $\{i\}$ is a blocking coalition (then voter i has the right to *veto* any decision) or $\{i\}$ is a winning coalition (voter i is then said to be a *dictator*). What is the meaning of "blocking coalition" in this theorem? Lloyd Shapley (by the way, the scholar whose turn has come now if a game theorist is considered again for the Nobel prize in economics) in an old paper (1962) defined a *blocking coalition* as any coalition C such that neither C nor its *complement* $N-C$ (N is the set of all voters) is winning. "That sense – say Felsenthal and Machover (*The Measurement of Voting Power*, 1998, p. 23) – agrees with common political parlance, in which the term is used to refer to a coalition that is able to stop a bill being passed but cannot force one through. However, subsequent usage in the voting-power literature has shifted to the broader sense of blocking, which we adopt here". This "broader sense" actually prevailing in the literature is obtained by defining a blocking coalition as any subset C of N such that $N-C$ is not winning.

I suspect that the "shift to the broader sense" accounts for the gap between political practice and the current state of voting games theory. I can't believe that I was first to propose (I did it in a paper I presented last year in Kraków in a conference organized by the *sociophysics* section of the Polish Physical Association) that blocking power should be distinguished from winning power and measured – just like at least some politicians try to measure it! – by counting small size minimal blocking coalitions containing a given voter. To put it more exactly (though not yet quite precisely), the blocking power of a voter depends on what is the minimum size of a minimal blocking coalition he can form with other voters and on the number of different *small* blocking coalitions available to him.

Clearly, the blocking power is largest if a voter can do without the cooperation of any other voter to prevent the assembly to pass an issue. That's why the Coleman index has something to do with blocking power even if it is based on counting winning coalitions. Since 1986 (EU-12) the games for the EU Council have always been designed so as to set the minimum size of a blocking coalition to at least 3 voters. In the Nice triple majority voting system, there are 4 blocking threes. All of them contain Germany, 3 contain France, 2 – UK or Italy, and 1 – Spain (Spain did not have this privilege when the Nice treaty was signed, but its population has increased enormously since that time). France, UK and Italy still are not in a position to form a blocking coalition, for their total population is now some 36.9% of the EU total. The Convention was afraid of that the Big Three could gain in future the power to block Germany's initiatives, so the blocking threshold was raised from 38% to 40% by setting the quota to 60%. June 18, 2004, the EU summit moved in the opposite direction: the quota was set to 65%, which could satisfy the Big Three, but the distribution of the smallest size blocking coalitions now took the form

Germany	9
France, UK, Italy	5
Spain, Poland	3

Maybe the historians will find out some day who noticed at the negotiation table that Germany is a member of 9 out 10 blocking threes, by far surpassing other largest countries in this respect. As a consequence, the Inter-Governmental Conference ruled in the last minute that the following clause will be appended to article I-25 of the Constitution treaty: *A blocking minority must include at least four Council members, failing which the qualified majority shall be deemed attained.*

What may be the possible sequel to this story? If Poland and other supporters of the square root system lose the battle, article I-25 will be rewritten to the draft of the new treaty. But any draft can be improved. What is the most likely improvement? I can imagine that Jesús Mario Bilbao or Moshé Machover, or another European specialist in voting games is interviewed by the media. "Do you think that the distribution of voting power in EU-27 would change significantly, if the condition specifying the minimum size of blocking minority is removed?" An expert would reply – "Certainly not" – and of course his answer would be true, for classical power indices are not sensitive to such minor modifications of voting rules. The next day newspapers would tell to the world: "Scientists suggest to simplify the voting system for the EU Council and make it even more democratic".

I'm sure that some EU experts count or try to count small size *blocking minorities* (the term used in EU documents to denote blocking coalitions). However, most of them and the politicians themselves resort to a simpler method of assessing blocking power, the method which well agrees with the ineradicable custom of identifying power with weight. I learnt from Axel Moberg about widespread use of the *share of blocking minority*. It is the ratio of a voter's *weight* to the *blocking threshold*. For example, consider again the single majority voting system which was used in EU-15. The quota in that system was set to 62. Since the sum of weights assigned to 15 countries equals 87, any “losing minority” must have in total at most 87−62=25 votes, so that the blocking threshold equals 26. Thus, the share of blocking minority equals 10/26=.38 for the members of the Big Four having each 10 nominal votes.

But why the quota was set to 62 and not to, say, 61? Let us look at the following table which shows the *blocking structures* in 4 weighted voting games. These games were probably considered in designing a voting system for the Fifteen. The lowest quota (59) was derived from the natural requirement that any winning coalition must have at least 8 voters, that is, it should be at the same time a winning coalition in the 1 *voter* – 1 *vote simple majority game*. If you add the weights of 7 largest countries, you will get 58. Therefore, if you want to avoid constructing a double majority voting system, you should try quotas from 59 upwards.

State	Wght	G_1: q=59		G_2:q=60		G_3: q=61		G_4: q=62	
1. Germany	10	3	72	6	87	6	125	6	153
2. France	10	3	72	6	87	6	125	6	153
3. UK	10	3	72	6	87	6	125	6	153
4. Italy	10	3	72	6	87	6	125	6	153
5. Spain	8	0	60	6	24	6	56	6	108
6. Nthrlnds	5	0	36	0	60	0	74	0	86
7. Greece	5	0	36	0	60	0	74	0	86
8. Portugal	5	0	36	0	60	0	74	0	86
9. Belgium	5	0	36	0	60	0	74	0	86
10. Sweden	4	0	30	0	30	0	64	0	74
11. Austria	4	0	30	0	30	0	64	0	74
12. Denmark	3	0	6	0	24	0	36	0	64
13. Finland	3	0	6	0	24	0	36	0	64
14. Ireland	3	0	6	0	24	0	36	0	64
15. Lxmbrg	2	0	6	0	0	0	24	0	36

Why then the smallest relevant quota was not used? The two columns below G_1 contain the numbers of minimal blocking coalitions of size 3 and 4. Notice that only the Big Four is granted the right to block in threes. Games G_2, G_3, and G_4 extend this right to Spain. What a mathematical-political scientist cannot tell without consulting the politicians involved is only whether the Big Four deliberately admitted Spain to the club of the most powerful states or failed to control a too smart expert who knew how to design the game so as to meet the expectations of Spain.

It remains to be explained why games G_2 and G_3 were rejected and G_4 was accepted. All three games have the same set of blocking threes. The differences appear on the second of two levels of the blocking structure, the level of blocking fours. Notice that in G_2 and G_3 the condition of *regularity* is not met. The condition means that, for any small coalition size, the ordering of the voters with respect to increasing weight should agree with their ordering with respect to increasing number of blocking coalitions of a given size. In G_2, Spain with 8 nominal votes takes part in 24 blocking fours, while the Netherlands with 5 votes is a member of 60 blocking fours. 62 is the smallest quota for which the game has a regular blocking structure and the “first division” has 5 “teams”.

Since my letter has grown too much, let me refer you to my paper in Polish (the file *tsmpp18.pdf* on my personal website http://www.cyf-kr.edu.pl/~ussozans/voting.htm). You will find there an analysis of blocking structures in the Nice treaty voting system and the Constitution treaty system [without the ban on blocking in threes – added as a correction]. You don't need to know Polish to understand the content of Table 2 in which the blocking structures of the two games are displayed. Both games are badly constructed. I would not die for Nice because the Nice game is by no means nice. Should I be happy that Poland has 136 blocking fours while Germany has only 90? But Germany has 4 blocking threes, while Poland has none. Clearly, a synthetic measure of blocking power must be based on evaluating relative importance of the coalition size (maybe the method used to construct the Deegan-Packel index would solve the problem). If a blocking structure is regular (that is, *monotonic* on its every level), the user doesn't need at least to ask himself the question: “If I am stronger than my colleague on the level of blocking threes, but he is stronger than me on the level of blocking fours, then who of us is more powerful?”

The Constitution game [without the added clause] has an even more irregular blocking structure. Poland has dropped to 7th place (past Romania) with respect to the number of blocking fours, but moved ahead of Spain to the 5th place with respect to blocking fives. Thus, the overall evaluation of blocking power is difficult again.

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The main virtue of the square root weights is the possibility to construct a voting system generating a regular blocking structure. However, the choice of a proper quota is essential. In addition, the quota should not be set in terms of a percentage. If *N* is extended by one or more voters, both the weights and the quota should be defined anew following a thorough examination of many tentative values. I have shown here how to do this using the game for the Fifteen as an example. In my paper for MPP, I showed how to construct a voting system based on square root weights so as to obtain a regular two-level (fours-fives) blocking structure that is most similar to the irregular blocking structure obtained under the Constitution game [without the added clause].

I have also analyzed the blocking structure generated by the voting system with square root weights and the quota proposed by Słomczyński and Życzkowski. They have recently offered a formula for determining an “optimal” quota dependent on the population distribution. Their quota is given as the percentage of the sum of weights; for the case of EU-27 it equals 61.6% . The study of blocking structures in voting games makes sense insofar as all quantities are integer and any calculation is done in integer arithmetic. Even a small change in the data may result in a big change in the number of small blocking coalitions. For example, in the game for the Fifteen, if the quota is changed from 61 to 62, the number of blocking fours containing Spain jumps from 56 to 108.

If square root weights in the EU-27 are expressed as integers which sum up to 345, the 61.6% quota equals 213. With this quota we get a regular blocking structure with 7 minimal blocking coalitions on the lowest level (see Table 3 in my paper for MPP). Since their size is 5, the largest EU member states which got used to the right to block in threes and fours may object to this solution. If so, I would reply that the minimum size of a “blocking minority” should rise after the enlargement in order to hinder the blocking of common initiatives by small interest groups and thus support the integration process.

All 7 smallest minimal blocking coalitions are made up each of 5 states taken from the set of 8 largest countries (from Germany through the Netherlands). The distribution of blocking power measured by the number of blocking fives containing a given state is as follows.

Germany	7
UK, France, Italy	6
Spain, Poland	4
Romania, Nthrlnds	1

Germany is a member of all 7 fives, so those who would welcome the return to the parity principle will be disappointed. Myself, I would like to restore equality on the top of the EU. If you asked me which of power structures I like more: (1) Hierarchical order with one state much stronger than the rest, with Poland being granted relatively high position in the hierarchy; (2) 4 or even 5 states equally powerful on the top, with Poland placed with Romania and the Netherlands in the weaker group, I would prefer the second power structure because I'm afraid that the Union dominated by one state is more likely to share the fate of the Soviet Union. Needless to say, it's my own view. I don't know what is the position of my government. I do not work for any government. If I could show to Chancellor Merkel the numbers given above as well as those given below, I would ask her: "Do you really like more the Constitution voting system than the one proposed by my colleagues from the Jagiellonian University?"

Germany	30	Spain	37	Greece	8	Hungary	5
France	36	Poland	17	Portugal	7	Sweden	5
UK	29	Romania	28	Belgium	7	Austria	3
Italy	27	Nthrlnds	11	Czech R.	7	Bulgaria	3

If she answered "Yes, linear demographic weights are good and article I-25 must be included in the new treaty", I would never believe that she had studied physics. Neither would I believe that the Germans love order so much if they liked such a distribution of blocking fours across 16 "teams" which make up the "first division" established by the Constitution treaty [without the added clause]. I am not surprised at all that such a result was obtained once voting rules have been and still are "designed and redesigned in the proverbial smoke-filled room, away from public gaze, by a process of political horse-trading between politicians and officials who (as far as we can tell) had do expert advice on the theory of voting power" (Felsenthal and Machover, 1998, p. 168).

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Lastly, let me show how I would answer the question "Which way forward?" if I were to participate in the debate scheduled for May 23, 2007. My tips on what the political decision-makers should do now (with the help of an international team of experts) are the following.

1. Compute the square root weights which sum up to an integer value. The number 345 can be retained or modified (Wojciech Słomczyński has some suggestions).

2. Simplify the collection of weights and adjust the values to create groups with the same weight. Here political reasons could and should be taken into account. If the parity principle concerning the Big Four is rejected, tell it overtly to the world, justifying the rejection more convincingly than by resorting to allegedly democratic representation. Actually, fair democratic representation is guaranteed by the use of square root weights.

3. Try various quotas until you get a blocking structure that will be both regular and politically acceptable for all EU member states. You need a computer program to do this. The one I wrote for myself (POWERIND) is pretty slow (that's why I processed just a couple of voting games with 27 players). You should order a more efficient program from a professional programmer.

4. If you fail to find a better solution than the "Jagiellonian compromise" (interpreted as I did here, that is, integer square root weights should sum up to 345 and the quota be set to 213), implement it. It is well constructed and "politically correct," too.

5. You can add the 1 state – 1 vote game with a proper quota (say, 15 countries as in the Constitution treaty) if the quota for the game with square root weights does not entail simple majority.

6. Last, but not least, stop the practice described in the above citation from Felsenthal and Machover 1998.

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I hope that my comments (to be developed into a regular paper I'm going to submit to a refereed journal) will help you defend the square root system at the conference.

With best wishes

Tadeusz Sozański

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Institute of Philosophy and Sociology

PS. I'm sending the copy of this letter to few people, including one politician, Dr. Jacek Saryusz-Wolski, Chairman of the EP Foreign Affairs Committee. It was his article published in March 2007 in *Dziennik* that spurred me to resume research on blocking power in voting games. You may forward this letter to anyone (a scholar, student or politician) who is interested in mathematical theory of voting games and/or its political applications. Tad.

May 18-20, 2007

Appendix

(written after the June 2007 EU summit)

When the paper for "International Political Review" (MPP) appeared in print (at the beginning of June 2007) Professor Słomczyński noticed a flaw in my analysis of the blocking structure of the Constitution game. To examine this game, I represented it in the form $H=(H_1(15)\cap H_2(650))\cup H_3(24)$ where $H_1(15)$ is the 1 voter – 1 vote game with quota 15, $H_2(650)$ is the weighted voting game with quota 650 and integer population weights which sum up to 1000, and $H_3(24)$ is a 1 voter – 1 vote game with quota 24. I assumed, wrongly, that H and $H_1(15)\cap H_2(650)$ have the same minimal blocking coalitions of size 4. Actually, the set of minimal blocking fours in the second game, or the Consitution game *without* the additional clause, is smaller. I had made this error already in my paper for the sociophysics conference. As my colleague observed, the ban on blocking in threes added to article I-25 implies that *every* (not only minimal) blocking four in $H_1(15)\cap H_2(650)$ becomes minimal in H. Having realized this, I was able to correctly determine the set of minimal blocking fours in H. The computations are shown in the Appendix that I added to my old conference paper (see pp. 39–43 in winblock.pdf file). Here I will show only the result: the distribution of blocking fours in the Constitution game H.

In Table 1 given at the end, you will also find the distribution of minimal blocking fours for the game with quota 255 and integer square root weights which sum up to 345. It's the game I would recommend to President Sarkozy. The distribution of minimal blocking fours for the "French game" does not depart too far from that determined for the Constitution game, yet Germany's power advantage over France is much smaller. For Poland, the difference between the two games is negligible.

The last two columns of Table 1 show the two-level blocking structure of the square root game with quota 213. The "Polish game" is in fact much more beneficial to Germany than to Poland. If the Germans did not reject the square root weights, they could satisfy their appetite for power even better than by forcing the population weights with the 65% quota. Indeed, if they accepted the square root weights and demanded in turn an appropriate quota, the Poles could not defend their own best quota (but which one? Polish media were tacit about this) since the logic of negotiations requires that the partner's concession be followed by one's own concession. At that stage, the French could propose the "French game" as a compromise solution...

Why did Poland come up with the square root? Was the Polish government more enlightened than other governments by declaring support for scientific methods for designing voting systems? I don't think so. I suppose that Polish President and Prime Minister simply played for their advantage the German prejudice against the square root weights and possibly scientific approach at all. By evoking the fear of the unknown, the Polish government managed to induce other governments to stay for a decade with the system Europe had already got used to. Now Polish leaders seem to be happy with the result of the last EU summit. As it were, the Nice system, which is still considered in Poland the best for this country, has been defended. Who knows today how the EU's population will be distributed across 2? member states in 10 years when the voting system based on crude population weights is to be implemented?

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The idea of making power allocation dependent on current population distribution is not new. The voting system defined in the Nice treaty includes the requirement that every winning coalition should comprise at least 62% of the total EU population. This component of the Nice game has so far been given little attention by Polish politicians. Their insistence on keeping the Nice system in effect as long as possible stems from the belief that non-square-root proportion 29:27 of nominal votes makes Poland nearly as powerful as the Big Four. The mainstream voting game theorists have underpinned this view by pointing to the fact that the values of classical voting power coefficients for the Nice game depend to a greater extent on the game with political weights and quota 255 than on the game with population weights and relative quota 62%.

I analyzed the Nice "triple majority voting system" as the voting game of the form $G=G_1(14)\cap G_2(255)\cap G_3(620)$ where $G_1(14)$ is the 1 voter – 1 vote game with quota 14, $G_2(255)$ is the game with political weights (nominal votes) and quota 255, and $G_3(620)$ is the game with population weights which sum up to 1000. The Big Six (made up of the Big Four and Semi-Big Two), which dominates over the medium and small size states – if power is estimated solely according to the allocation of political weights – finds expression only in the distribution of blocking fours in $G_2(255)$.

The Nice game G could have been "regularized" by adding the requirement that a "blocking minority must include at least four Council members" to obtain game G', which, like the Constitution game and the square root French game, gives to every player an opportunity to form a minimal blocking four with 3 other players. The frequencies of blocking fours in G' are shown in Table 2. It is seen that the ban on blocking in threes implies that the effect of the population component on the distribution of blocking power nearly disappears.

The blocking structure of the original Nice game G has three levels. The level of minimal blocking threes in G comes from the population component $G_3(620)$. The level of minimal blocking fours in G much differs from the same level in $G_2(255)$, yet it remains determined almost completely by G's political component, since an examination of the set of 235 minimal blocking fours in G shows that only 3 minimal blocking fours (those obtained from {Germany, UK, Spain} by appending one of 3 small states, Latvia, Slovenia or Estonia) owe their blocking power solely to the population criterion. Unlike the remaining 232 fours which have each at least 91 nominal votes, the future of those 3 fours having each only 89 votes is uncertain since the excess of the total population weight over 380 is very small. The same can be said about the axis Berlin-Paris-Madrid whose present total population weight equals 384. If Croatia with its population, equal in thousands to 4443, becomes an EU member as of today, then the share of the axis' population in the total population of EU-28 will be only 38.02%.Thus, the system based, even if partially, on population weights, prompts Spain to oppose further EU enlargements, for it is the only way save the privilege of blocking in threes. This example shows how irrational was the Conventions' idea to build a voting system on the demographic principle. The latter remark pertains as well to the square root mapping of the population distribution into weights. Square root weights, once they have been calculated and "adjusted", should be "frozen", say, for a decade, to play the role of political weights (like the politically corrected square root weights in EU-15) until they shall be updated according to an appropriate article included in the Constitution treaty. The decision made by the last EU summit to preserve the Nice voting system, which certainly was not optimal because of rejecting the square root weights, should be praised, as it were, for the concern about the Union's institutional stability.

Table 1. The statistics of small minimal blocking coalitions
in the Constitution game and two square root games

EU-27 member states	Population		Sq. root wght	Constit. game		Sq.rt. game (255)		Sq.rt. game (213)	
	1000s	wght		b4	%	b4	%	b5	b6
1. Germany	82438	167	33	229	79.8	174	72.8	7	588
2. France	62886	128	29	149	51.9	137	57.3	6	495
3. UK	60393	122	28	142	49.5	123	51.5	6	466
4. Italy	58752	119	28	140	48.8	123	51.5	6	466
5. Spain	43758	89	24	107	37.3	94	39.3	4	355
6. Poland	38157	77	22	87	30.3	74	31.0	4	255
7. Romania	21610	44	17	38	13.2	27	11.3	1	181
8. Nthrlnds	16334	33	15	21	7.3	20	8.4	1	151
9. Greece	11125	23	12	18	6.3	17	7.1	0	100
10. Portugal	10570	21	12	17	5.9	17	7.1	0	100
11. Belgium	10511	21	12	17	5.9	17	7.1	0	100
12. Czech R.	10251	21	12	17	5.9	17	7.1	0	100
13. Hungary	10077	20	11	15	5.2	13	5.4	0	86
14. Sweden	9048	18	11	15	5.2	13	5.4	0	86
15. Austria	8266	17	10	13	4.5	12	5.0	0	71
16. Bulgaria	7719	16	10	13	4.5	12	5.0	0	71
17. Denmark	5427	11	8	10	3.5	10	4.2	0	43
18. Slovakia	5389	11	8	10	3.5	10	4.2	0	43
19. Finland	5256	11	8	10	3.5	10	4.2	0	43
20. Ireland	4209	8	7	10	3.5	8	3.3	0	33
21. Lithuania	3403	7	7	10	3.5	8	3.3	0	33
22. Latvia	2295	5	5	10	3.5	4	1.7	0	18
23. Slovenia	2003	4	5	10	3.5	4	1.7	0	18
24. Estonia	1345	3	4	10	3.5	3	1.3	0	14
25. Cyprus	766	2	3	10	3.5	3	1.3	0	8
26. Lxmbrg	460	1	2	10	3.5	3	1.3	0	3
27. Malta	404	1	2	10	3.5	3	1.3	0	3
	492852	1000	345	287		239		7	655

Table 2. The statistics of small minimal blocking coalitions in the Nice game and its political and population component

EU-27 member states	Nice wght	Nice game *G*			Nice weights (255)		Population weights (620)			*G*'
		b3	b4	b5	b4	b5	b3	b4	b5	b4
1. Germany	29	4	90	651	170	678	4	66	123	182
2. France	29	3	109	663	170	678	3	28	132	178
3. UK	29	2	128	666	170	678	2	44	117	175
4. Italy	29	2	125	678	170	678	2	38	137	172
5. Spain	27	1	124	563	140	590	1	40	99	149
6. Poland	27	0	136	590	140	590	0	37	113	140
7. Romania	14	0	16	678	20	678	0	7	109	20
8. Nthrlnds	13	0	16	528	20	528	0	6	68	20
9. Greece	12	0	16	405	20	405	0	6	22	20
10. Portugal	12	0	16	405	20	405	0	6	20	20
11. Belgium	12	0	16	405	20	405	0	6	20	20
12. Czech R.	12	0	16	405	20	405	0	6	20	20
13. Hungary	12	0	16	405	20	405	0	6	15	20
14. Sweden	10	0	16	239	20	239	0	6	12	20
15. Austria	10	0	16	239	20	239	0	5	22	20
16. Bulgaria	10	0	16	239	20	239	0	5	20	20
17. Denmark	7	0	12	76	16	76	0	3	28	16
18. Slovakia	7	0	12	76	16	76	0	3	28	16
19. Finland	7	0	12	76	16	76	0	3	28	16
20. Ireland	7	0	12	76	16	76	0	2	25	16
21. Lithuania	7	0	12	76	16	76	0	2	22	16
22. Latvia	4	0	2	86	4	96	0	1	20	6
23. Slovenia	4	0	2	86	4	96	0	1	17	6
24. Estonia	4	0	2	86	4	96	0	1	10	6
25. Cyprus	4	0	1	88	4	96	0	0	12	5
26. Lxmbrg	4	0	1	88	4	96	0	0	8	5
27. Malta	3	0	0	72	0	80	0	0	8	4
	345	4	235	1729	315	1756	4	82	251	327

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