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Predicting Party Sizes

The 2007 Johan Skytte Prize Lecture

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The Skytte Foundation states that I was awarded the Skytte Prize 2008 for 'profound analysis of the function of electoral systems in representative democracy'. What does this mean? As examples, I would highlight three relationships that qualify as laws in the strongest scientific sense. They do so because they offer a logically supported model as well as agreement with data, which gives them broad predictive ability.

Three Laws of Social Nature

The first one is the *cube root law of assembly sizes*. This says that the number of seats in a representative assembly (S) tends to be chosen so as to be close to the cube root of the population (P):

$$S = P^{1/3}.$$

Why is this so? It is so because this size minimizes the number of communication channels and hence leads to maximal efficiency.[1] Sweden's population is about 9 million. Its cube root is 209, while the parliament has 249 members – only 20 percent higher. Suppose a newly independent country has to decide on the size of their national assembly. They could save time by considering the cube root of the population. If instead they choose to haggle it out, they would most likely end up with something close to the cube root anyway.

The second law is the *inverse square law of cabinet duration*. Suppose the number of parties (N) is reduced by one-half. Then the duration of governmental cabinets (C) becomes four times longer, according to this law:

$$C = 42 \text{ years}/N^2.$$

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Why is this so? Potential conflict channels among parties put stress on the cabinet. And the number of such channels increases as the square of the number of parties.[2] If we want to have longer lasting cabinets, what could we do? One cannot dictate the number of parties in a country. Well, one cannot do it directly, but one can do so by manipulating the electoral rules. It can be shown that the number of parties (N) depends on the number of seats in the assembly (S) and in the average electoral district (M)[3]:

$$N = (MS)^{1/6}.$$

This changes the inverse *square* law into the *inverse cube root law of cabinet duration*. It expresses cabinet duration in terms of the number of seats in the assembly and in the average electoral district[4]:

$$C = 42 \text{ years}/(MS)^{1/3}.$$

How can this law be used? I cannot predict how long the present cabinet of Sweden will last. Individual cabinets can fall very quickly or last very long. What I can predict is the mean duration of cabinets over several decades. Hence this law enables us to design electoral rules so as to alter the *average* cabinet duration by a specified amount. Therefore, it is of practical use in institutional design.

The third and last example of my work is the *law of minority attrition*. This says that the fewer the available positions, the smaller the share of a minority. If women are a minority (F) among the many assistant professors ($F + M$), they are an even smaller minority (f) among the fewer full professors ($f + m$). If a party has a small share of votes, it has an even smaller share of the seats (if plurality rule is used with one-seat districts). A quantitative model can be logically deduced[5]:

$$f/m = (F/M)^n, \text{ where } n = \log(F + M)/\log(f + m).$$

By recognizing a natural tendency, this law could be of help in counter-balancing the effect of this tendency (Taagepera 1994). The same law can also express the opposite *minority enhancement*, such as practiced in the European Parliament. The smaller states are overrepresented there, relative to their population. Remarkably, the European Union allocated the seats in its parliament almost exactly according to this law, over forty years, without being aware of it (Taagepera & Hosli 2006).

Last year my book *Predicting Party Sizes* (Taagepera 2007) brought to a conclusion my previous work on electoral and party systems. It includes the three laws I have described. Why did I discover these laws of social nature, rather than someone else? My very approach to social sciences is different from that of most social scientists since I did my doctoral studies in solid state physics. The social sciences have made great progress in statistical analysis of data and deducing empirical regularities, but it is high time to complement empirical analysis with logical models – and this is where my contribution comes in.

The three laws I have described could hardly have been deduced from statistical analysis of empirical data. These methodological issues are discussed in my most recent book *Making Social Sciences More Scientific* (Taagepera 2008a). As this title implies, I presume to have something to offer to all social sciences. We will come to that, but let me first give you a simple example.

A Simple Guessing Game

Suppose a representative assembly has one hundred seats, and they are allocated nationwide. Suppose some proportional representation rule is used. This means that even a party with only 1 percent of the votes is assured a seat. The question is: How many parties would you expect to gain access to the assembly, on the average? Should we guess 2 parties, 5, 10, 20 or 50 parties? One may refuse to guess, protesting that one cannot possibly know how many parties get seats, because one has not been given any relevant information. One might wish to know how many parties run, and how the *votes* are distributed among them. If this is the way you think, you would be in good company. For decades, I was stuck at this point.

Now suppose I told you two hundred parties would get seats. You would protest that this cannot be, if only one hundred seats are available. Fair enough, so what is the *upper limit* that is still logically possible? It is one hundred. It is not likely, but in principle, 100 parties could win one seat each. What is the *lower limit*? It is 1. This is not likely either, but in principle, one party could win all 100 seats. So you did have some information, after all – you knew the lower and upper limits, beyond which the answer cannot be on logical grounds.

When such limits are given, our best guess would be the mean of the limits. In the absence of any further information, nothing else would be justified. There are many kinds of means. The good old arithmetic mean of 1 and 100 is roughly 50. This will not do. Having 50 parties getting an average of only two seats each would be highly unusual. Indeed, when only positive values are logically possible, the *geometric mean* should be used. This is explained in my book on methodology (Taagepera 2008a). The geometric mean of 1 and 100 is 10, given that 1 times 100 equal 10 times 10. Hence, I would guess at ten parties to win an average of 10 seats each.

This is what I call an '*ignorance-based logical model*'. It is based on nearly complete ignorance. All we know is the conceptual limits, 1 and 100. Do we have data to test the model? Yes, The Netherlands had a first chamber of 100 seats, from 1918 to 1952, and the seats were allocated on the basis of nationwide vote shares, with few restrictions. Over these nine elections, the number of seat-winning parties ranged widely, from 8 up to as many as 17. Yet the geometric mean was 10.3 parties, with an average of 9.7 seats per party. This is pretty close to 10 parties with an average of 10 seats each. You see, we could make a prediction with much less information than you may have thought necessary. And this ignorance-based approach actually worked!

Why have I dwelled so long on this simple guessing game? It could be said that solving this puzzle opened the way to my receiving the Skytte Prize. Indeed, the breakthrough moment came about 18 years ago when I told myself: simply consider the mean of the extremes.[6] Using this approach repeatedly, I could calculate the number of parties in the assemblies of all those countries that allocate assembly seats in a simple way. All I needed was assembly size and the number of seats allocated in the average electoral district. This is how the previous model for the number of parties, $N = (MS)^{1/6}$, came about. The overall result was that the average cabinet duration could be deduced from the electoral system.

Some of the greatest truths in life and science are very simple. Indeed, they are so simple that we may overlook them. And even when pointed out to us, we may still refuse to accept them, because we say ‘it cannot be that simple’. This does not mean that it is simple to find simple truths. All simple statements are not true. Moreover, combining simple building blocks can quickly lead to quite complex constructions. When we think we have a logical model, we should verify whether it really holds. In science, this is called ‘testing a model’. This brings us back to my most recent book, *Making Social Sciences More Scientific* (Taagepera 2008a), complemented by a draft book, *Beginners’ Logical Models in Social Sciences* (Taagepera 2008b).

The Two Legs on which Science Stands

Science stands on two legs. One leg refers to the question of how things *are*. It leads to careful observation, measurement and statistical analysis. The other leg refers to the question of how things *should be* on logical grounds. This is the question we asked about the number of seat-winning parties. That question guides the first one. The question of how things are assumes that we know which aspects of things are worth paying attention to, but we largely see only what we look for. And it is the question of how things *should be* that tells us what to look for.

Putting it as simply as possible, science consists of logical models that are tested with data, using means that include statistics. Social sciences, however, have all too often missed out on the question of how things should be.

Rather than testing logically based models by statistical means, social sciences often have fallen into the trap of calling mere statistical data fits 'empirical models'. Testing statistics by using statistics weakens the very idea of model testing. Success is guaranteed, but the predictive ability is nil.

The excuse often made for these so-called 'empirical models' is that one actually does test a logical model: a directional one. This is not good enough. It does not suffice to predict that electoral districts with more seats will enable *more* parties to win seats. One must specify *how many* parties are expected to win seats. Models must predict not merely the direction of processes, but also their quantitative extent. Every child in Galileo's time knew the direction in which things fall – but Galileo felt the need to predict more than direction.

In science the proper task of statistics is to *test* logically based quantitative models. Using statistics to *construct* models is a corruption of the scientific method. Why have social sciences often taken this path? Roughly a half-century ago, many social sciences quite self-consciously decided to become 'real' sciences. This goal required quantitative approaches, and statistics came in handy. Then canned computer programs were developed. They seemed to offer an easy way out – the computers would do the mathematics. It worked well indeed for model testing, but it often made for poor formulation of models.

One does not hop very far on one leg. Sooner or later, social sciences will have to reinforce the second leg on which science stands. They have to strive to replace the so-called 'empirical models' with genuine logical models that can then be tested by statistical and other means. Quantitatively predictive logical models need not involve heavy mathematics, but they certainly need active thinking that cannot be abdicated to computers.

Such a model-based approach is so rare in social sciences that it took me a separate book to explain the various methods used in my electoral studies – and my other studies of society. This is what the book on *Making Social Sciences More Scientific* is about. It tries to change the methodological emphasis in social sciences in a major way. I am not megalomaniac enough to expect full success, but I will keep trying.

NOTES

1. The cube root law of assembly sizes was first reported by Taagepera (1972), where a more detailed expression also takes into account literacy and age structure. Most actual values for first or only chambers of sovereign countries fit within a factor of two (Taagepera & Shugart 1989, 175–8). Assemblies of subunits and cities tend to fall below the cube root of population (Taagepera 2007, 190). So do national second chambers, in a somewhat systematic way (Taagepera & Recchia 2002). See overview by Taagepera (2007, 189–91, 198–200).
2. Here N is the *effective* number of assembly parties (Laakso & Taagepera 1979), and C is the *average* duration of cabinets over a long period, measured using the Dodd (1976)

method. The inverse square law of cabinet duration was first reported at a conference (Taagepera 1987) and in print by Taagepera and Shugart (1989, 99–103). It was inspired by data and discussion in Lijphart (1984, 124–6) that showed that *C* increases with increasing *N*. See Taagepera (2007, 167–70) and Taagepera and Sikk (forthcoming) for recent adjustment, and Taagepera (2008a, 176–80) for choice of indices.

3. Here *N* is again the *effective* number of assembly parties, and *S* stands for assembly size. District 'magnitude' (*M*) is the number of seats allocated in an average electoral district. The relationship applies directly only to simple electoral systems, but it leaves openings to extend predictive ability to more complex electoral systems. See Taagepera (2007, 115–54) for derivation and testing of this model.
4. The inverse cube root law of cabinet duration was first reported in Taagepera (2007, 170–2) on the basis of evidence to appear in Taagepera and Sikk (forthcoming).
5. Here *f* and *m* could stand for the numbers of females and males in a selective category with $f + m$ positions, while *F* and *M* stand for the numbers of females and males in a broader category with a larger number positions, $F + M$. They could also stand for the numbers of seats (*f* and *m*) and votes (*F* and *M)* of two parties in an electoral system with one-seat plurality rule. The law of minority attrition was first presented more modestly as 'seat–vote equation' in an MA thesis (Taagepera 1969) and a published article (Taagepera 1973). It was extended from one-seat plurality to multi-seat districts in Taagepera (1986). The term 'law of minority attrition' first appeared in Taagepera and Shugart (1989, 84–5) and Taagepera (1994). Robert Putnam, another Skytte Prize recipient, called this tendency 'the law of increasing disproportionality' (Putnam 1976, 33) as one moves up the ladder of authority; he did not offer a quantitative model. The model was extended to minority enhancement in federal bodies by Taagepera and Hosli (2006). This reversal of the law of minority attrition could save the European Union quite a lot of haggling about seat distribution among Member States. See overview by Taagepera (2007, 201–23).
6. This breakthrough was first reported by Taagepera and Shugart (1993).

REFERENCES

Dodd, L. C. 1976. *Coalitions in Parliamentary Government*. Princeton, NJ: Princeton University Press.

Laakso, M. & Taagepera, R. 1979. '"Effective" Number of Parties: A Measure with Application to West Europe', *Comparative Political Studies* 23, 3–27.

Lijphart, A. 1984. *Democracies: Patterns of Majoritarian and Consensus Government in Twenty-one Countries*. New Haven, CT: Yale University Press.

Putnam, R. D. 1976. *The Comparative Study of Political Elites*. Englewood Cliffs, NJ: Prentice-Hall.

Taagepera, R. 1969. *The Seat–Vote Equation*, MA thesis, University of Delaware.

Taagepera, R. 1972. 'The Size of National Assemblies', *Social Science Research* 1, 385–401.

Taagepera, R. 1973. 'Seats and Votes: A Generalization of the Cube Law of Elections', *Social Science Research* 2, 257–75.

Taagepera, R. 1986. 'Reformulating the Cube Law of Elections for Proportional Representation Elections', *American Political Science Review* 80, 489–504.

Taagepera, R. 1987. 'The Inverse Square Law of Coalition Durability'. Paper presented at the international conference on Coalition Theory and Public Choice, Fiesole, Italy, 25–29 May.

Taagepera, R. 1994. 'Beating the Law of Minority Attrition', in Rule, W. & Zimmermann, J., eds, *Electoral Systems, Minorities and Women in Comparative Perspective*. Westport, CT/London: Greenwood.

Taagepera, R. 2007. *Predicting Party Sizes: The Logic of Simple Electoral Systems*. Oxford: Oxford University Press.

Taagepera, R. 2008a. *Making Social Sciences More Scientific: The Need for Logical Models*. Oxford: Oxford University Press.

Taagepera, R. 2008b. *Beginners' Logical Models in Social Sciences*. Manuscript, available online at: http://www.psych.ut.ee/stk/Beginners_Logical_Models.pdf

Taagepera, R. & Hosli, M. O. 2006. 'National Representation in International Organizations: The Seat Allocation Model Implicit in the EU Council and Parliament', *Political Studies* 54, 370–98.

Taagepera, R. & Recchia, S. 2002. 'The Size of Second Chambers and European Assemblies', *European Journal of Political Research* 41, 185–205.

Taagepera, R. & Shugart, M. S. 1989. *Seats and Votes: The Effects and Determinants of Electoral Systems*. New Haven, CT: Yale University Press.

Taagepera, R. & Shugart, M. S. 1993. Predicting the Number of Parties: A Quantitative Model of Duverger's Mechanical Effect, *American Political Science Review* 87, 455–64.

Taagepera, R. & Sikk, A. Forthcoming. 'Parsimonious Model for Predicting Mean Cabinet Duration on the Basis of Electoral System', *Party Politics*.