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OPINION CONTAGION: WHAT IS TO BE LEARNT FROM A SIMULATION MODEL?

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Abstract: The paper introduces a simulation, which was developed by Michael Krassa to model the opinion contagion. Krassa developed his model by using the theory of the spiral of silence that says that the perception of the public opinion influences the opinion assertion of the people and the threshold models that show how much support one person needs for the public assertion of his opinion. With the help of these relationships Krassa integrated the social networks in his model. We applied Krassa's mathematical model to two cases, the parliamentary elections of 2002 and the EU-parliamentary elections of 2004 in Hungary. We used hypothetical thresholds to examine the data because the actual threshold values are not known. The results of the simulation show that it can happen that we measure the minority opinion to be higher than the real distribution of the opinions as a consequence of the different distribution of the threshold values of the opinion assertion. This can be one explanation of the wrong electoral forecast. The problem is that the model helps little to give a better forecast because we have no data about the threshold values and we do not know the point where the dynamics of the opinion contagion stands at the time of the survey.

Keywords: simulation model, opinion contagion, opinion assertion

INTRODUCTION

The research of social networks is not entirely unknown even to the lay readers in Hungary because a diverse selection was published in 1991 (Angelusz and Tardos 1991) that introduced a wide range of the applications of network analysis. To mention a few examples, Pappi's research of social strata, Breiger's analysis of occupational mobility, Nan Lin's theory of social resources and status attainment and Granovetter's study of the strength of weak ties. The rapid development of computer programs and the spread of the simulation models offered new opportunities for network analysis. The new social theories also increased the popularity of the term "network": in his trilogy of the information age Castells (1996; 1997; 1998) argues that the network is the basic unit and organizational principle of modern society while Van Dijk (1999) calls our century the age of networks.

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It is not possible to review the impressive empirical literature within the framework of an introduction. Criticism will be therefore limited to a general argument. The spread of network analysis was facilitated not only by the increased visibility of networks but also by its flexible methodological perspective. Its important advantage is that it gives an opportunity for a multi-level analysis and the simultaneous consideration of the individual and macro-environmental characteristics. In the globalized world we can meet an increasing number of phenomena that the macro-structural analyses cannot adequately explain. Network analysis can help to bridge the gap between the micro- and macro-sociological approaches. It provides for a continuous "passage" between the micro-and macro-levels by transferring the systems of reference.[1]

From the perspective of practical application it is, of course, a crucial question of how social networks can be integrated in the already existing models or whether they can be integrated at all. The topic of the present paper is the introduction and critical evaluation of a simulation, which was developed by Michael Krassa (1988) to model opinion contagion. The paper is divided into three parts. The first part introduces the phenomenon that is simulated and the mathematical model. The second part examines the question of how far the model can explain the frequent differences between the electoral prognoses and the actual results. The mathematical model of Krassa is applied to two concrete cases, the parliamentary elections of 2002 and the EU-parliamentary elections of 2004 in Hungary. Since the actual threshold values are not known, we examine the data with reference to various *hypothetical* thresholds. We show that it is possible for a public opinion poll to measure the minority opinion to be higher than the real distribution of opinions just because of the different distributions of the thresholds of opinion assertion. We stress that all of the introduced models are hypothetical because the relevant threshold values are not available.

The third part examines the question of how it is possible to use the model of Krassa in the public opinion poll. Even though the models that we received with the help of the different threshold values can illustrate one possible reason of the wrong electoral prognoses, they give no answer to the question of how it is possible to improve them. On rethinking the model, we face serious difficulties both with respect to the theoretical preconditions and empirical applicability. The last part of the paper discusses the problematic aspects and gives a critical evaluation of the simulation model.

THE SIMULATION OF OPINION CONTAGION

The idea to model public opinion comes from Paul Lazarsfeld, who first attempted to interpret and explain the results of the public opinion polls from a theoretical perspective (Lazarsfeld et al. 1968). Together with his colleagues he recognized several important relationships such as the "bandwagon effect" (also referred to as the "join the winner" effect) or the "pluralistic ignorance". The bandwagon effect is based on the assumption that people would like to belong to the winners rather than the losers, which in the last moment could benefit the "expected winner". The relationship is, however, not so

1 See the preface of Angelusz and Tardos (Angelusz and Tardos 1991).

simple because in many cases a contradictory effect can be observed, the so-called "underdog effect", when people show sympathy towards the predictable loser. Allport (1924) identified the most characteristic cases of pluralistic ignorance and the expression also comes from him. The assumed situation is the condition of total ignorance when everybody has a wrong perception of the reality. Newcomb described a situation where everybody believes that he or she has nonconformist attitudes while all the others uncritically accept the norms. This is an example of what Allport would have called pluralistic ignorance (Newcomb 1950: 608). Perhaps the most well known case of this type of ignorance is the deceived emperor in the fairy tale of Andersen to whom nobody dared to say that he was naked because everybody believed that the others saw the gown. This is a "classical" case of the underestimation of majority opinions. The extreme opposite of this situation is when somebody alone represents a certain opinion and still believes that everybody shares this view. Even though such extremes are very rare, the more moderate forms of the overestimation of minority opinion belong to the everyday facts of the perceptions of opinions.[2]

These social psychological terms are necessary for the introduction of the theory of the spiral of silence, which is a key element of Krassa's paper. The expression comes from Elisabeth Noelle-Neumann, who first described this phenomenon (1974, 1984). The present introduction is based on the excellent analysis of Róbert Angelusz, who argued that the strength of the theory was the conceptual integration of very different observations (Angelusz 2000b: 131–160). According to the analysis of Angelusz, the spiral of silence is based on the following three assumptions: "1) The majority of the people has a quasi statistical perception of the formation of public opinion. 2) The perception of public opinion influences the opinion assertion and through this the communication processes. The camp that feels the support of the majority will be more courageous, self-confident and therefore more assertive and visible. The other camp, where people think that they are in a minority, will, on the contrary, feel insecure and withdraw. Part of them will be sooner or later effectively silenced. 3) The change of the communication behavior will modify the conditions of perception. The withdrawing camp will seem to be smaller, while the more confidential camp will appear to be greater than the actual size. This wrong optics of the perception of public opinion will further increase the differences in opinion assertion between the members of the two camps and the wrong perception of the expected formation of public opinion: on the one side we can observe the spiral of silence, on the other side the increasing spiral of opinion assertion." (Angelusz 2000b: 135–136) To put it simply: People do not express their opinion if they do not perceive a minimal support from the relevant population groups.

The other important element of Krassa's model is the threshold model of behaviors. Using the example of the riots, Granovetter (1978) developed the most comprehensive threshold models. The threshold models are based on the assumption that the individual behavior depends on the number of individuals, who already show this behavior. An analogous case is the contagion of the public assertion of opinions. The level of public support from the population that the individual needs for the public assertion of his or her support is precisely the threshold value that Granovetter uses in

2 On the paradoxes of pluralism see Angelusz 2000a: 185–209.

the analysis of riots. The level of opinion assertion thus largely depends on the distribution of the thresholds in a given population (Krassa 1991: 265).

Even though the synthesis of the theory of Noelle-Neumann and the threshold models seem to be an attractive theoretical solution, Krassa rightfully calls attention to the weak point of the model. People do not perceive public opinion in a "uniform" way; some attribute greater significance to certain social groups than the others and certain groups can even have a contradictory, negative effect: it can happen that some people choose to be silent precisely because certain social groups assert an *X* opinion.

Krassa attempts to solve this problem with the help of ties between the people. Every person can be described as being embedded in a particular network, where every person is connected to every other person with the help of ties. The strength of these ties depends on the relationship between the two people. The strength of every tie between A and B individuals depends on (1) how important B is from the perspective of the decision-making of A, and (2) in this case to what extent A is conscious of the actions of B independently of the assertion of B's preferences. A possible representation of the ties is the consideration of two multipliers: (1) the level of consciousness that ranges between 0 and 1, and (2) what significance one attributes to the other in case of an unlimited interval of hesitation. The tie can be then seen as the product of these two factors and the significance shows how much B's actions count in relation to the threshold of A.

By using the above relationships Krassa builds the concepts of "weighting" and "network" (that themselves substitute for the more general concepts of selective perception and social groups) into a simulation model. For simulations we need to assign threshold values to every individual within the population. Further, we need a population-matrix that indicates the strength of the ties between each (direction-oriented) pairs within the population. These mutual relationships take into account both the network and the weighting and in case of each *ij* pair they indicate to what extent *i* is informed of the actions of *j* under the condition of a weighting scale that shows the significance of the actions of *j* from the perspective of the decision-making of *i.* We assign the assertion value of 1 to every person, who expresses his or her preference while those who remain silent are given the value of 0. In this case the following formula, which can be calculated with the help of a computer, gives the estimation of the social support for certain X cause:

$$P./i,x = \sum_{j=1}^{n} (Aj/x) \times (Ej/i,x) \times (Nj/i,x)$$

where

P./i,x = the proportion of the population, which would assert a preference for the X cause according to the calculation of the *i* individual;

Aj/x = the opinion assertion of the *j* individual with respect to the X cause, where *Aj/x* is a dichotomous variable that can take either the 1 or the 0 value;

Ej/i,x = the significance or the evaluation of the *j* individual from the perspective of the *i* individual;

Nj/i,x = the social group of the *j* individuals, who are important references to the *i* individual particularly with respect to the X cause.

This means that within a given population every individual makes a subjective calculation, what proportion of the population shares a given opinion by adding the number of individuals who agree with this opinion. Not every *j* individual is, however, visible to *i*: this is shown by the formulation *Nj/i,x* that expresses that every *j* is included in the "network" of *i* from which we have to deduct how much *i* evaluates *j*, that is to say, what weight *i* attaches to the opinion of *j* (*Ej/i,x*). We have to multiply this result by the variable 1/0, which shows whether or not the *j* individuals express their opinion (*Aj/x*) and then we have to add these results. This process is repeated in case of every individual within the given population and this way we get how the individuals estimate social support for a certain opinion or cause. This serves as a basis of the decision of individuals.[3]

The simulations based on the mathematical models produce various interesting dynamics of behavioral contagion. We also often experience in reality that a certain opinion or idea suddenly captivates the population or the opposite when the enthusiasm rapidly disappears. The simulations can clearly show that no radical opinion change is needed for such phenomena. Let's take the simplest case and let's examine a population where everybody agrees with a certain opinion but nobody expresses it under condition that they all have a threshold value of 1 or above. With this threshold value it is enough if only one or two individuals start to assert their opinion in public, and it will rapidly become popular because someone started the process, setting the contagion dynamics in motion.

Similarly, an opposite dynamics can be also observed. Large segments of the population can be silenced – even though their actual opinion did not change – as a consequence of silencing or elimination of certain key individuals. But the simulations showed that the more complex and fragmented the social networks are, the more useless it is to try to change mass behavior by influencing the behavior of any individual. With the decrease of networks, the individual decision-making reacts less sensitively to the actions of other people. Thus, in a fragmented society it is more difficult to de-mobilize the mobilized population or on the contrary, to mobilize the silent people. The relationship can be reversed: with the densification of social groups individual decision-making is more influenced by the actions of others and behavior is becoming more collective, not only the indicator of a lucky coincidence (Krassa 1991: 285–285).

"WE ARE MANY, BUT NOT ENOUGH": A SIMULATION OF DIFFUSION OF OPINIONS

In this chapter we are going to examine the applicability of Krassa's model under different parameters. Originally the aim of the model could be the examination of the diffusion of any kind of opinions. Krassa tried to demonstrate the applicability of the model in practice with political examples related to elections (Krassa 1991: 286–288). As one of the most important fields of opinion research is, indeed, the research aiming to forecast the results of elections, in this paper we use the results of the Hungarian

3 The mathematical introduction of the model is taken from Krassa 1991: 274–278.

parliamentary elections of 2002 and of the EU parliamentary elections of 2004 to illustrate what results can be drawn from the model with different presumptions.

As an explanation, the model is interesting particularly in the case of the elections of 2002, because in this case the forecasts failed more spectacularly than in the case of EP elections – where, however, the forecasts assumed also wrongly, that a lower level of participation would contribute to the success of MSZP (Hungarian Socialist Party). We also emphasize that electoral data is used here only as an illustration. The aim of the paper is not to explain specific forecast results.

The method used is the following. We built the model of Krassa (with certain modifications) into a simulation algorithm with which we could examine the dynamics of the diffusion of opinions. As a result, we could observe the effects of different opinion assertion threshold distributions on the ratio of (proclaimed) opinions under a given distribution of opinions corresponding with party preferences.

In Krassa's model there is only one opinion, with which people can either assert their compliance or not – but, in this case, we do not know whether it is because they do not agree, or they agree but they do not want to express their opinion. Our model is more complicated in the sense that we have two contradictory opinions (A and B) which are present in the society with a given ratio. The use of two opinions instead of one is explained by the fact that in this way the opinions could be interpreted as preference for one of the two major rival parties competing during the elections.

We also simplified the model in another aspect. In the perception of the ratio of opinions we do not take into account that the opinions of different persons are perceived by a given person with different weights. We gave the same weight for every single opinion perceived.

The simulation program creates a population of 10,000 persons, and in the first step, one of the opinions, either A or B is assigned to each member of the population with the proper probability according to the given parameters. Every person is also assigned a threshold level which indicates the minimal ratio of people sharing the person's opinion that must be perceived by the person to make him publicly assert his opinion. This ratio can be interpreted in two different ways: we might see it as either the proportion of people asserting the given opinion within the whole population, or as the proportion within those who express any opinion at all. As the models using the first interpretation usually die out soon, due to the nature of the model, we mainly use the second interpretation, that is, we compare the threshold level to the proportion within the visible opinions.

The simulation itself is the iteration of one step: people who have a lower threshold level than the proportion of people sharing this opinion in the previous step will assert their opinions, the other people will not. (The opinion of each person is given and constant from the beginning.) The proportion of people asserting each opinion in a moment, thus, depends on the proportion of people asserting the given opinion in the previous moment, and, on the distribution of the threshold levels within the group of people sharing the given opinion.

$$P_t = f(P_{t-1}, F(V_i))$$

where and stand for the ratio of people asserting a given opinion in the t-th and (t-1)-th moment (that is, the probability of asserting one's opinion), and stands for the distribution function of the threshold levels of those who share the *i*-th opinion.

The threshold levels can be interpreted as percentages; the threshold value for each person is generated by a random number generator from a uniform distribution between 0 and 100 percent by default. The input parameters of the model are the proportion of each opinion and the minimum and maximum values of the threshold distributions, for each group of people with different opinions, separately, so that the willingness to express their opinions can be different in the two groups. When modifying the distribution of the threshold levels, we always took care that the difference between the maximum and the minimum value should be equal in the two opinion-groups. This is necessary to ensure that the height of each density function is equal.

When we choose the parameters of the threshold distributions to be equal in the two opinion groups, the simulation always leads to the result that people with minority opinion will be silent after a few steps, and the opinion of the majority will be the only visible opinion, regardless of the specific distribution of the opinions. More interesting dynamics can be observed with the models where the distribution of the threshold levels is different in the two opinion groups. Below we will introduce the results of the model run with different parameters (although the model itself is the same, only the parameters are different, we are going to call them *models*).

Model 1.

Opinion	Proportion	Threshold Max	Threshold Min
(A)	30	60	0
(B)	70	100	40

In this hypothetical model the distribution of opinions is 30:70, and there is a great difference in the distribution of threshold levels between the two groups. People with minority opinion A are more willing to assert their opinions, because they need a lower level of support. As the maximum of the threshold distribution is 60 percent, there is no person with opinion A that would remain silent if he perceives that at least 60 percent of the asserted opinions agrees with his opinion. On the other hand, people with majority opinion B need much more public support to express their opinions. In this group, the threshold levels are distributed between 40 and 100 percent, that is, if their opinion is not supported by at least 40 percent of the opinions observed, every person with this opinion will be silent.

With these parameters, the dynamics of the expressed opinions will go as shown in. The number of persons with majority opinion B asserting their opinion – because of their lower willingness to do so – will decrease step by step, while more and more members of group A will assert their opinions, due to the decreasing proportion of the majority group. At the end, the minority opinion will completely win over the majority, and opinion A will be the only opinion observable.

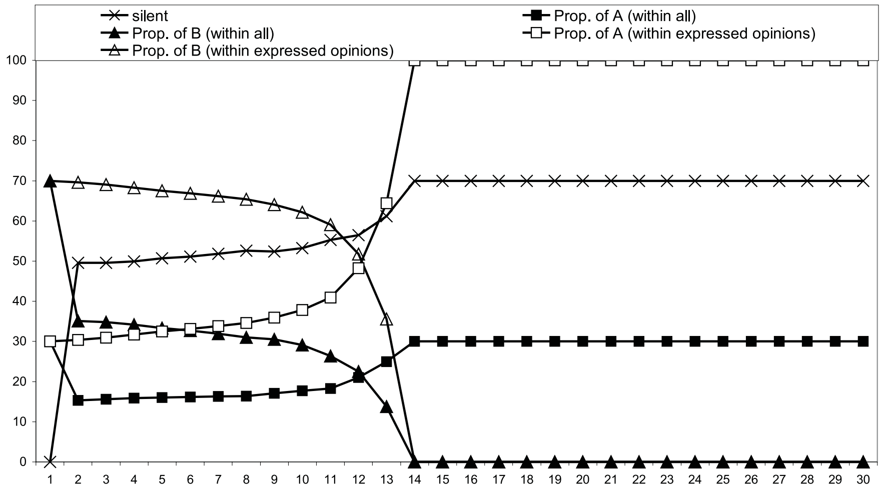

Figure 1. Dynamics of the Expressed Opinions in Model 1.

Model 2.

Opinion	Proportion	Threshold Max	Threshold Min
(A)	49.4	50	10
(B)	50.6	55	15

In this model we start from the data of the Hungarian parliamentary elections in 2002, assuming that the factual ratios of party preferences during the period before the elections are equal to the ratios of the votes for party lists observed in the elections. The two opinions of the model correspond to the preference for one of the two leading political parties, the Fidesz-MDF alliance and the MSZP (preferences for other parties are not considered here). The ratio of the votes for party lists was 49.4% for Fidesz and 50.6% for MSZP. The results of the threshold model provide a potential explanation of how the opinion poll institutions could, without exception, forecast a superiority of the Fidesz, with this factual distribution of party preferences.

When trying to explain the failure of the forecast, the research institutions usually include in the explanation the effect which we try to illustrate here with the threshold models, that is, the people surveyed tend to hide their opinion, if they do not perceive a social support of the appropriate level (this is the hypothesis of the "hiding voter"). In this model, the "social support of the appropriate level" is the proportion of the given opinion compared to the threshold value of a person. In this case, the difference between the two opinion groups is set to the following values: the maximum value of the thresholds is 1 percent higher than their real proportion in the case of Fidesz voters, and almost 5 percent higher than their proportion in the case of MSZP voters. If we assume that the distribution of opinions in the period preceding the elections was equal with the ratio of the votes for party lists, the model with the above parameters would bring the result that the ratio of Fidesz voters – due to their higher willingness to express their opinion – would soon seem to be higher, than their factual proportion (). In a radical case it is also possible that the minority opinion might seem to have absolute hegemony within a short time period.

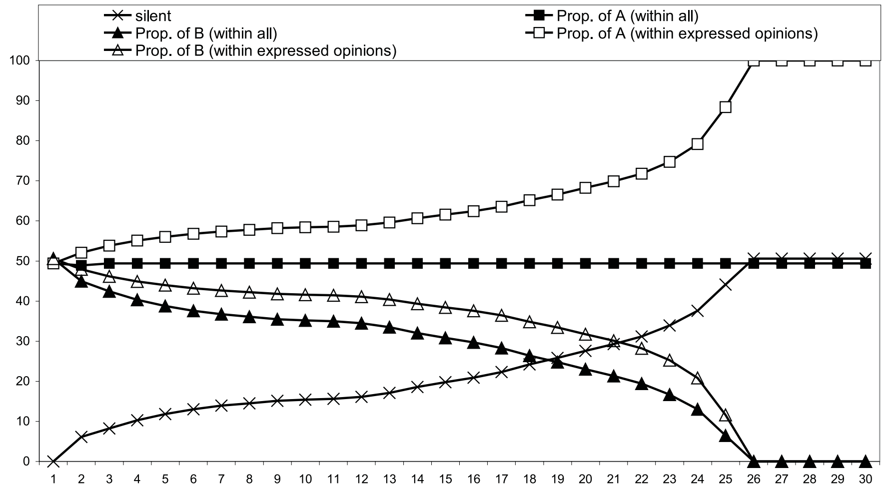

Figure 2. Dynamics of the Expressed Opinions in Model 2.

Model 3.

Opinion	Proportion	Threshold Max	Threshold Min
(A)	46.3	47	17
(B)	53.7	55	25

In this model we accept again the results of the elections as the real distribution of the opinions, but now we consider not only the votes for MSZP, but the votes for either MSZP or SZDSZ as one of the opinions (saying that the current government should be replaced). The other opinion is the same as in the previous model that is, voting for the Fidesz–MDF alliance. Thus the proportion of the opinions preferring Fidesz is 46.3 percent, while the “government replacing” opinion has 53.7% of support. The difference between the two opinions is a little bit bigger, than in the previous model. At the same time, we decreased the difference of the distribution of thresholds between the to opinion groups. The Fidesz voters are still more willing to assert their opinion, but the difference between the maximum of the thresholds and the real proportion of the opinion is not so striking in the voters of the two parties. In the case of

Fidesz–MDF, the maximum of the thresholds is almost 1 percent higher; in the case of MSZP–SZDSZ it is a bit more than 1 percent higher than the real proportion of the given opinion.

This model does not lead necessarily to the result that the minority opinion, due to the higher willingness to assert the opinion, should seem bigger than the majority opinion. However, there is a possible result of the dynamics of opinion diffusion, where, after a certain time, minority opinion gets firstly a slight, later a definite superiority over the majority opinion, and people with the majority opinion start to keep silent (). In the case of opinion diffusion with a dynamics similar to this one, it can easily happen that an opinion poll institution would measure such a ratio of the opinions, where the party factually in minority is forecast to be the winner of the elections. One month before the day of the elections TÁRKI (a leading opinion poll institution) measured a ratio of 53:47 for Fidesz–MDF against MSZP–SZDSZ,[4] which is exactly the case of the model of in the 19th step. In this case, if we tried to measure the diffusion of opinions with a survey in the simulated population, we would get (falsely) the same result as TÁRKI did.

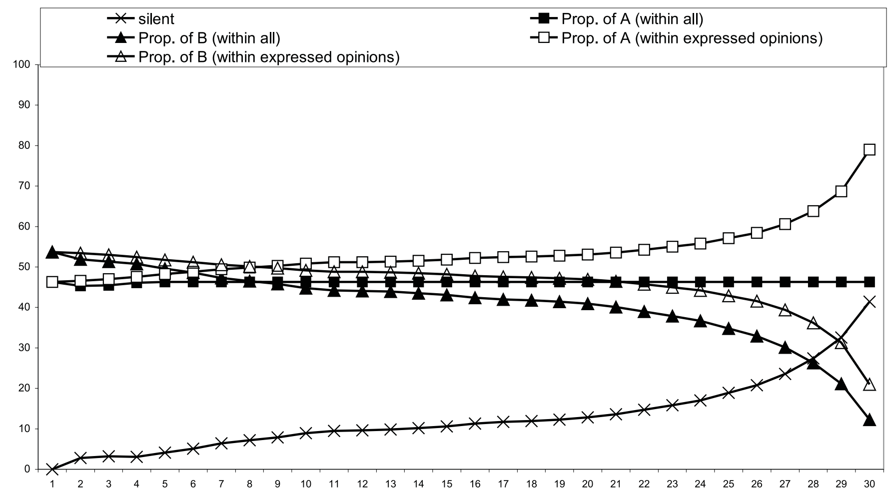

Figure 3. Dynamics of the Expressed Opinions in Model 3.

In 2004, at the time of the elections for the European Parliament, the forecasts were more cautious, because of the fault in 2002. TÁRKI, for instance, introduced three different scenarios, depending on the rate of people participating in the elections.[5]

4 *Source:* Tárki Omnibusz, March 2002. TÁRKI Data Bank, 2002 Budapest.

5 The forecast of TÁRKI for the European Parliament elections in Hungary, source: *http://www.tarki.hu/integracio/ep_valasztas.html*

Table 1. EP Elections Forecast – All Parties

	Probable number of votes	40% participation	45% participation	50% participation
MSZP	1.5–1.7 million	46%	45%	43%
FIDESZ	1.4–1.8 million	42%	44%	45%
SZDSZ	220–250 thousand	7%	6%	6%
MDF	100–160 thousand	3%	3%	4%
Other	60–80 thousand	2%	2%	2%
Together	3.3–4.0 million	100%	100%	100%

If we now consider only two contradictory opinions, we can take the voting for MSZP as one opinion, and voting for Fidesz as the other one. In this case the rate of the two opinions is the following, according to the forecast:

Table 2. EP Elections Forecast – Two Main Parties

	Probable number of votes	40% participation	45% participation	50% participation
MSZP	1.5–1.7 million	52%	51%	49%
FIDESZ	1.4–1.8 million	48%	49%	51%
Together	2.9–3.5 million	100%	100%	100%

That is, the forecast did not indicate significant difference between the two opinions. According to the forecast, it was also possible that either one or the other opinion could surmount the other one. The scenarios forecast the superiority of MSZP in case of a low level of participation, and that of Fidesz in case of a high level.

The results of the elections, however, were the following.[6]

6 *http://www.valasztas.hu/04/hu/10/10_0.html.*

Table 3. The Results of the Elections

	N of Votes	%	Mandates
FIDESZ-MAGYAR POLGÁRI SZÖVETSÉG FIDESZ – HUNGARIAN CIVIC UNION	1 457 750	47.4%	12
MAGYAR SZOCIALISTA PÁRT HUNGARIAN SOCIALIST PARTY	1 054 921	34.3%	9
SZABAD DEMOKRATÁK SZÖVETSÉGE ALLIANCE OF FREE DEMOCRATS	237 908	7.7%	2
MAGYAR DEMOKRATA FÓRUM HUNGARIAN DEMOCRATIC FORUM	164 025	5.3%	1
MAGYAR IGAZSÁG ÉS ÉLET PÁRTJA HUNGARIAN JUSTICE AND LIFE PARTY	72 203	2.4%	(List below 5%)
MUNKÁSPÁRT LABOUR PARTY (now HUNGARIAN COMMUNIST WORKERS' PARTY)	56 221	1.8%	(List below 5%)
MAGYAR NEMZETI SZÖVETSÉG HUNGARIAN NATIONAL ALLIANCE	20 226	0.7%	(List below 5%)
SZOCIÁLDEMOKRATA PÁRT SOCIAL DEMOCRATIC PARTY	12 196	0.4%	(List below 5%)

The ratio of Fidesz and MSZP – if we consider only these two parties – is 58:42 for Fidesz. Participation was a little lower than it was expected (only 3 million votes and a few altogether), but there was a much higher superiority of Fidesz than the forecasts suggested.

We are, therefore, searching for a model, which – assuming the ratio of opinions to be 58:42 – may lead to a result where a survey would indicate a lower difference between the two opinions, or it would show the 'smaller' opinion to be the 'bigger' one.

Model 4.

Opinion	Proportion	Threshold Max	Threshold Min
(A)	58	60	45
(B)	42	44	29

In this model, the maximum of the threshold values for both opinion groups are assumed to be 2 percent higher than the real proportion of the opinion. At the 7th step of the iteration people with majority opinion think that nobody supports their opinion, and keep silent and the minority opinion starts to dominate the group of visible (and measurable) opinions. Preceding the 7th step, there is also a situation when the actual, more widespread opinion seems to be in majority, but – due to the higher threshold level – people do not feel the higher percentage high enough and more and more of them tend to subside into silence.

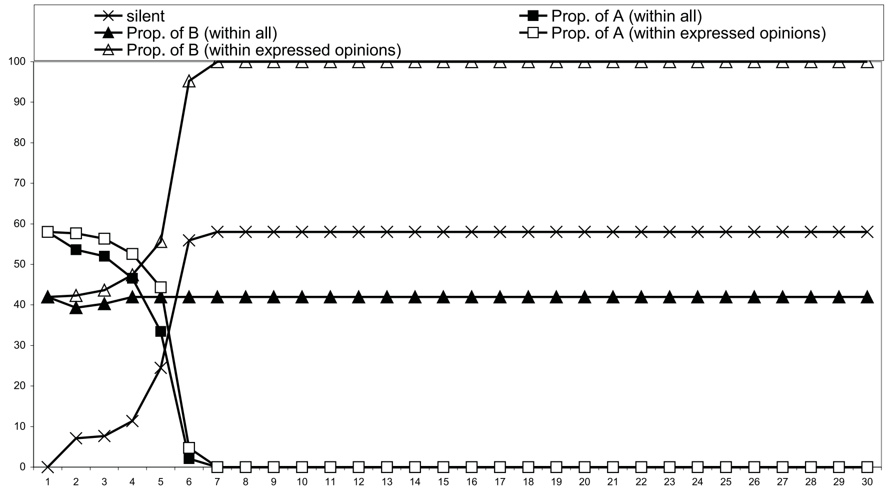

Figure 4. Dynamics of the Expressed Opinions in Model 4.

If we count with a wider range of threshold values, the result will not be so drastic.

Model 5.

Opinion	Proportion	Threshold Max	Threshold Min
(A)	58	60	20
(B)	42	44	4

In this model people with minority opinion are willing to express their opinions even with low support while there are some people of the majority opinion who feel it is enough to assert their opinion if one-fifth of the visible opinions support them. With a distribution of threshold values like this, it is not too probable that either of the opinions would die out, because there will always be a few people who will express their opinion even if the level of support is low.

Providing that not only the ratio of party preferences, but also the distribution of the threshold values of the two great parties changed between the parliamentary elections of 2002 and the EU elections of 2004 – namely, that now the voters of Fidesz feel a higher need that their opinion should be supported by others in a relatively large proportion – then the dynamics of opinion contagion, with proper parameters, can lead to a result where the ratio of the expressed opinions is stabilized on a more or less similar level. In this case, in the 22nd step of the iteration, the majority opinion seems to be slightly higher, but from the 24th step on, the minority opinion surmounted it, and the dynamics stopped at this point.

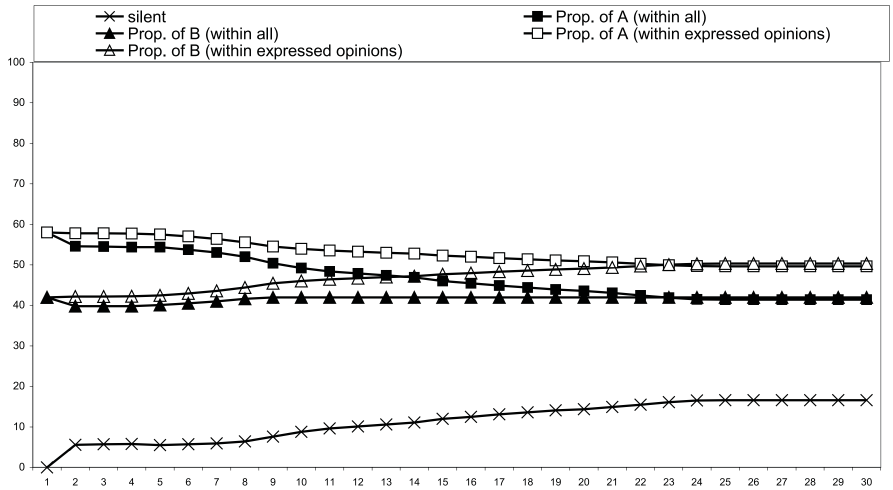

Figure 5. Dynamics of the Expressed Opinions in Model 5.

CONCLUSION: THE EVALUATION OF THE SIMULATION MODEL

The results of the simulation showed that it can happen that we measure minority opinion to be higher than the real distribution of the opinions as a consequence of the different distribution of the threshold values of opinion assertion. We can, nevertheless, formulate three criticisms of the practical application of the model.

First, the model has some problematic assumptions. It does not take into account the network distribution of the perception of opinions, namely that the individuals do not uniformly perceive the distribution of opinions. The perception of individuals is thus influenced by the distribution of the opinions that they see in their own social networks (also this problem can be solved with the help of a more sophisticated simulation process). Further, it is not necessarily true that the willingness to express an opinion exclusively depends on the perceived social support. The hypothesis that opinions are constant is likewise problematic. In the model the change of the perceived distribution of opinions was only the result of the change of the proportion of people who expressed this opinion – while the ratio of the actual supporters did not change. In reality, people's opinion can change, too – otherwise the same party would have won all of the elections in Hungary after 1990. Last, with respect to opinion assertion, the model assumes that if people are willing to assert their opinion, then they will tell what they actually think – although in public opinion poll the separation of public and private opinions is a well-known phenomenon, when, under a certain normative pressure the individuals assert a different opinion in public than their internal conviction to which they listen when they actually vote.

The second problem is that the relationship between the tie and the opinion dynamics is not so direct and obvious as the model assumes. Krassa, too, admits that we are faced with a very complex and specific network: namely, we have to identify the persons who can significantly influence A individual to assert an opinion or, on the contrary, to be silent. It can happen that A is a good friend of B but it does not matter to A whether or not B supports X cause because A considers B to be a born loser. At the same time A can be influenced by a person with whom he or she has never met (e.g. a television reporter, a politician or a football player). A further practical difficulty is the identification of social groups in the network of A, who negatively influence A's opinion assertion. In reality, it can happen that precisely individuals connected with strong ties have a negative effect on each other (the most typical case is the revolt of sons against fathers). Further, the model makes no distinction between strong and weak ties. It seems to assume that contagion is faster in case of stronger ties. Everyday life, however, often gives opposite examples (e.g. the Hungarian family quarrels about the election). As the above examples show, the relationship between the ties and the dynamics of opinion contagion has not yet been fully explained. At any rate, the relationship is likely to be non-linear – but if we define the tie as Krassa does – that is to say, the social network of individuals, to whom A individual listens with respect to X cause – we get a mere tautology.

Third, even if we accept the problematic assumptions, the model does not help us to determine the actual distribution of opinions from the measured values. The first problem is that we know neither the distribution function of the thresholds of opinion assertion nor the differences of the function between two opinion camps. The second problem is that we do not know how far the dynamics of opinion contagion got to at the moment of our survey. In our last model referring to the parliamentary elections (*Figure 3*), if we take the survey in the 19th step of the simulation, we get the same results what TÁRKI obtained one month before the election. But if we take the survey in the 3rd step we get just the opposite – because until then the minority opinion has not yet prevailed, even though the minority camp looked somewhat larger than its real size, its ratio was only 47% as opposed to 53% of the majority opinion. Thus, in both cases we would measure a ratio of 47:53% in favor of one opinion but we would not know if we measured the actual majority or the minority camp to be larger. Similarly, there are situations in the models of the EU-election (*Figure 4 and 5*) when the paths of the two opinion camps cross each other and the ratio of the two opinions after crossing is just the opposite of the ratio before crossing.

Finally, even if we know the distribution of the thresholds and we also know how far we are in the dynamics of opinion contagion at the moment when we take the survey, we do not know which possible outcome will be realized. In case of the parameters of model 4, it is a possible path that the concrete thresholds of the individuals – under an identical distribution function – differ slightly, which can be also the case if we took a representative sample. This slight difference can, however, produce totally different dynamics – namely that we always measure the majority camp to be larger than the real size.

In sum, we have to state that while the simulation process undoubtedly reveals certain relationships in the dynamics of opinion contagion, so far it offers little perspective for the improvement of the electoral prognosis. The model is insensitive to the wider social context, in which support for a certain cause or party is asserted or silenced. Probably less Americans would have been receptive to the nationalistic-rhetorical turn of the Bush-leadership before the terror attack of 11 September. Similarly, we do not learn from the model how the threshold changes in a certain moment and how the supporters of an X cause "visibly" multiply. From a sociological perspective these are the really exciting research questions. The modeling of public opinion – as Krassa admits it, too – is not an easy task, particularly because of the almost unlimited number of variables and possible combinations. While Krassa's method is almost exclusively quantitative, we believe that the combination of the quantitative and qualitative methods would be more beneficial, which would take into account not only the complex relationship between the ties and opinion dynamics but it would also try to consider the wider social context. Contrary to the hypothetical models of computer simulation, in reality it is not at all without consequences where and which cause is supported by a "visible" majority.

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