

APPLICATION OF VOTING METHODS IN SURVEYS

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SUMMARY

The theory of social election has had great presence in the universities curricula careers be they economy orientated, graduate or post graduate degrees. It has to do with collective decision making as from the individual preferences of the members of a society to become a social preference. The voting procedures have a wide use as method assignments and of decision making. Generally, when a marketing poll is made a variety of options are offered, for each one of the variables and the election of an only one is requested. In this paper, we carry out a study of the possible modifications in the results, which would take place if it were urged to prioritize three of those options for each variable and the voting methods were used to process the information. The interest of the application is centred in the possibility that it does not only interest the first value or obtained option but rather that one speculates in which the following ones would be in order of preference.

KEY WORDS: preference; election; voting methods; media

INTRODUCTION

In the XVIII century, with Jean-Charles Borda and the Marquis of Condorcet, begins the use of mathematics as a tool for the resolution of social problems. Borda outlined that the vote plurality among several candidates can lead to an unfair election, because to determine the elected one,

one only keeps in mind the one in the first place in the list of each voter's preferences. On the other hand, Condorcet stresses in the comparisons of pairs of candidates and that the elected candidate should be the one that beat all the other ones. Later on different methods were developed.

We should highlight that the election method that is used can influence the final decision. There is no ideal electoral method that can be applied to all situations. The voting procedures are broadly used as assignment methods and for decision making. When seeking to extrapolate the voting methods to other fields it is supposing that, once processed, a survey of one only option, it is not only the greater frequency one that is considered, but one speculates as to which one would follow him in order of importance.

For this paper, data from a research project have been used, where the qualities are researched as to what the university youths want from the next candidate for governor of the Province of Misiones, to possess, likewise the media through which they would prefer to perceive those qualities. The survey was annually done in June, as from 2001, to the entire population of first year students which study Algebra at the degree course at the Faculty of Economic Sciences, belonging to the Misiones National University.

In each one of the populations studied, there are representatives of all the Misiones Province Departments and approximately 95% of the students are urban residents. They also, maintain an approximate percentage relationship, in every year as one observes in the chart N° 1.

Chart N° 1 – Percentage Comparison per sex and per populations' age, interviewed in the different years

YEARS	2001	2002	2003	2004	2005	2006
Women's percentage	55,3	50,1	53,9	44,1	55,8	57,9
Under 18	6,4	6,1	6,1	5,3	5,8	6,5
18 years old	47,9	46,5	41,1	50,7	77,5	38,1
19 years old	20,5	21,2	14,6	14,8	0,5	29,5
20 years old or more	25,2	26,3	38,2	29,2	16,2	25,9
Males' percentage	44,7	49,9	46,1	55,9	44,2	42,1
Males under 18	6,3	5,1	6,1	3	4,6	3,2
18 years old	43,4	35,5	41	33,9	74,2	56,1
19 years old	21,7	21,3	14,6	26,7	0,7	18,7
20 years old or more	28,6	38,1	38,2	36,4	20,5	21,9

The students are proposed eleven media, requesting them to choose three in order of preference. The formulated means are: political space in television; political space on the radio; publicity in television; publicity on the radio; publicity in newspapers; political meetings; visits to neighbourhoods.

The surveys have been done during consecutive years, no matter if they were years with elections or not.

FOUNDAMENTATION OF THE USE OF VOTING METHODS

It would be necessary to work with the values obtained in one survey but one works with all of them to be able to analyse behaviour variations.

To be able to apply the voting methods, each survey considered -corresponding to June 2001; 2002; 2003; 2004; 2005 and 2006 - as one voting and each student interviewed as a voter: It

is observed that the following fulfil the necessary fundamental properties, as detailed:

- a) Anonymity:** all voters (students) are treated in an equitable way
- b) Neutrality:** each candidate (media) has the same possibility of being chosen and their position only depends on individual preferences.
- c) Egalitarianism:** each voter's opinion (student) is given the same value.
- d) Independence:** the candidates (media) chosen only depend on the decision of the voters (students).
- e) Non manipulated:** each voter (student) expressed his/her preference and was not susceptible to strategic manipulation.
- f) Comparability:** allows the bilateral comparisons.

CHARACTERIZATION OF THE PROBLEM:

A group of citizens (students) has several alternative candidates groups, (communication channels) which they can choose classifying according to hierarchical order, three of the variables.

Each one has their own preferences. Using the symbology proposed by Joaquin Perez Navarro¹¹, the following is defined:

- $X = \{x_1, x_2, x_3, \dots, x_n\}$ the group of candidates

In this case

$X = \{X_1, X_2, X_3, \dots, X_{11}\}$ is the media group, defined by extension: $X = \{$ political space in TV; political space on radio; publicity in TV; publicity on radio; publicity in newspapers; political meetings; visits to neighbourhoods and districts; news in TV; news on radio; news in newspapers; group meetings $\}$.

- $A = \{1, 2, \dots, m\}$, ($m \in \mathbb{N}$) finite group of electors (students).

In 2001 the cardinal of A was 423.

• $P = \{(x_i, x_j, x_k) / 1 \leq i \leq 11 \wedge 1 \leq j \leq 11 \wedge 1 \leq k \leq 11 \wedge i \neq j \neq k\}$ the group of preference profiles of A over X.

When working with themes which place in order the eleven variables, the cardinal of P is 990.

¹¹ Pérez Navarro, Joaquín (1999) *Votaciones de comisión: Una introducción a algunas de sus dificultades y paradojas* – Revista de la Escuela de Perfeccionamiento en I. O. N° 16 – EPIO –

- A situation is an ordered couple (A, P) where P is a profile of preferences A over X .
- Voting method is the function f that assigns to each situation (A, P) a subgroup non empty of X constituted by the winning candidates x_i of the voting.
- Be (X, p) a situation with n candidates and m voters, it is called comparisons matrix he/she calls himself matrix of (X, p) and M_p is symbolized, to the order matrix n whose term m_{ij} , denoted $p(X_i, X_j)$, is the number of voters that in the profile p prefers X_i to X_j .

DESCRIPTION OF THE VOTING METHODS

Simple Plurality Method

By this method the candidate elected is the one which possesses the first place in the preferences aggregate. It is necessary to observe that it is effective when there are only two candidates, when the number is bigger it has the inconvenience that one only keeps in mind each voter's favourite candidate and, when ignoring how the voter feel regarding the rest of the candidates, it creates the possibility that a leader is chosen which is rejected by the majority. To correct this problem partly, it has been determined in separate form, the three elected means in first, second and third place. They were worked on with percentage values, to avoid the differences of the population's dimension from one year to another.

Borda's Method

This method not only takes into account the preferences of the voters for its candidate but also for the others.

Borda's method is used in some associations to select among different alternatives based on the opinion of its members.

Be n the number of candidates and m the number of positions, to calculate each candidate's valuations one works with the positions matrix R_p (we must remember that r_{ij} indicates the number of voters in whose list of preferences the candidate X_i occupies the j -esimal position) and the sumatory is done:

$$\sum_{j=1}^m (m - j)r_{ij} \quad \forall i = 1, 2, \dots, n \quad \forall j = 1, 2, \dots, m$$

The winner is the candidate whose sum is greater.

Maximin Method

This method is the less stable one. Considered the comparisons matrix, one calculates the maximum of the minimum of the terms non diagonal per line.

Kemeny's Method

Given an orderly list y_1, y_2, \dots, y_n of candidates, the sum of NO TENGO LOS SIMBOLOS is called Kemeny's punctuation, and Kemeny's optimum is the one which reaches a maximum punctuation.

Condorcet Method

The candidates compared one by one, the winner (Condorcet Candidate) is the one that conquers all the other ones in the confrontations per couples. There is not always a winner by means of this method.

Those voting methods that fulfil Condorcet's Criteria are called Condorcet's methods.

Pareto Property

If in the situation (X, p) all the voters prefer x_i to x_j the candidate x_j cannot be chosen without x_i being chosen also.

RESULTS OBTAINED

a - Surveys with an only option

If one took the values obtained only as the selection of an only value of the variable, and one kept in mind the three greater frequencies we would have in that order:

Year 2001, 2003 and 2005:

News in television, publicity in television, visits to neighbourhoods and/or districts.

Year 2002 and 2004:

News in television, visits to neighbourhoods and/or districts, publicity in television

Year 2006:

News in television, publicity in television, political spaces in television

b - Surveys with hierarchization of three options

Applying the voting methods one obtains the following orders of preferences:

Method of simple plurality

Chart N° 1: Students' percentage according to first means through which they want to receive information on the qualities of the candidates to Governor of the Province of Misiones. First Year. Faculty of Economic Sciences. UNaM. Argentine Republic. Years: 2001-2002-2003-2004-2005-2006.

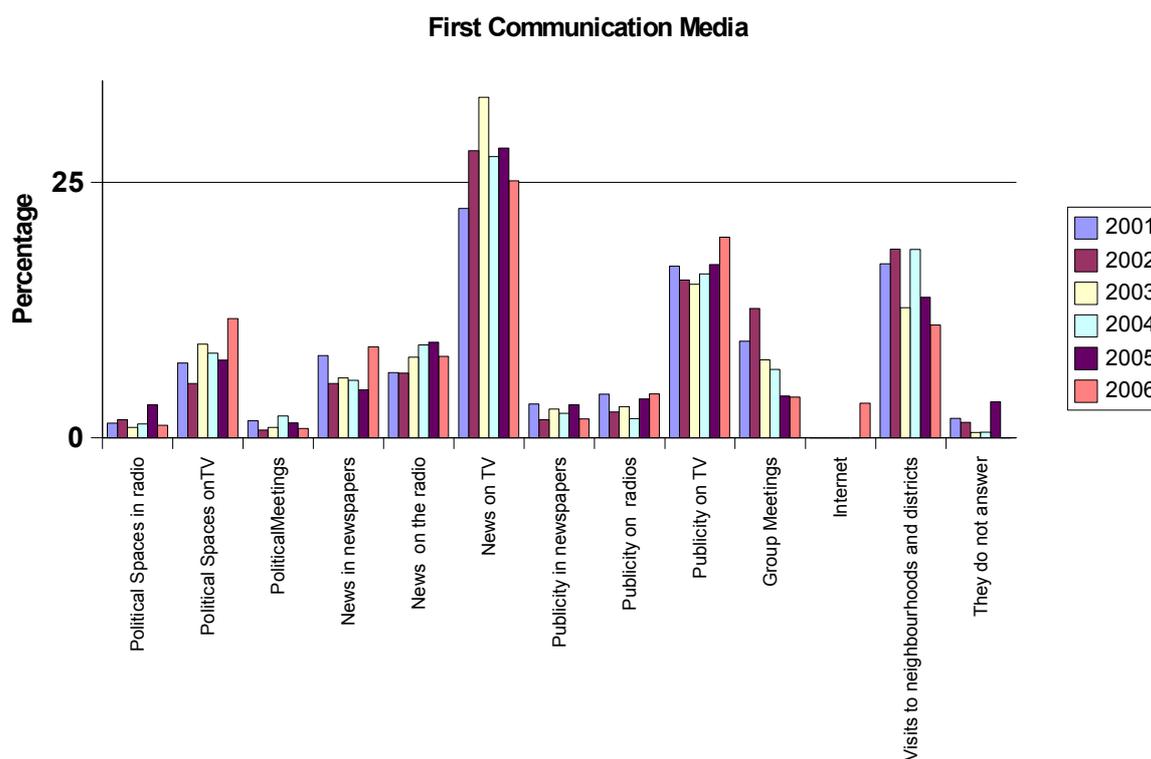


Chart N° 2: Students' percentage according to second means through which they want to receive information on the qualities of the candidates to Governor of the Province of Misiones. First Year. Faculty of Economic Sciences. UNaM. Argentine Republic. Years: 2001-2002-2003-2004-2005-2006.

Second Communication Media

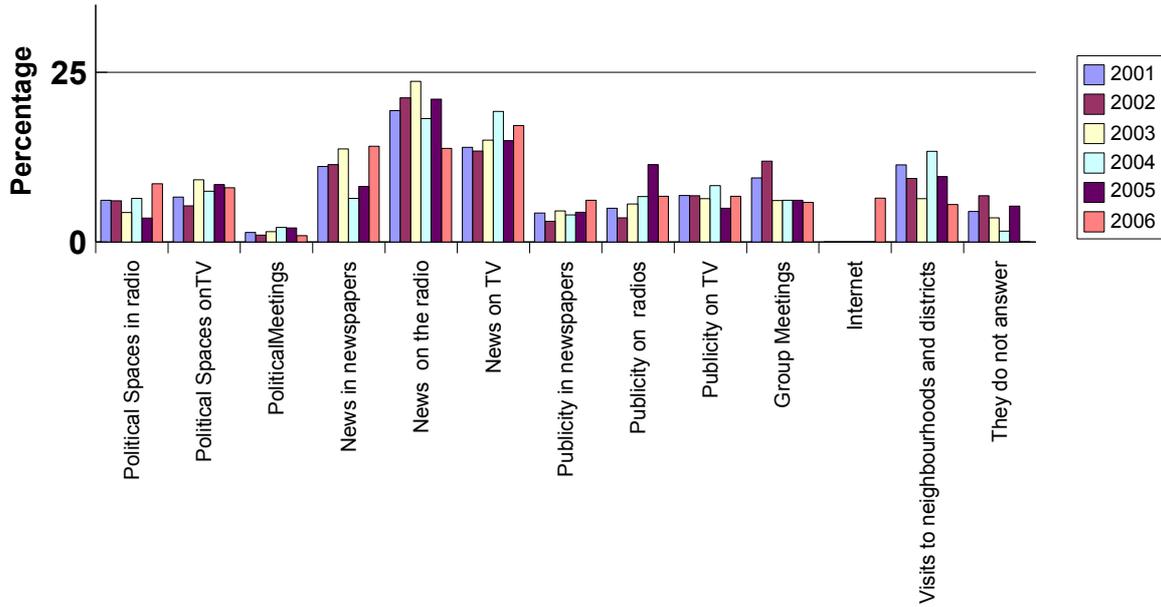
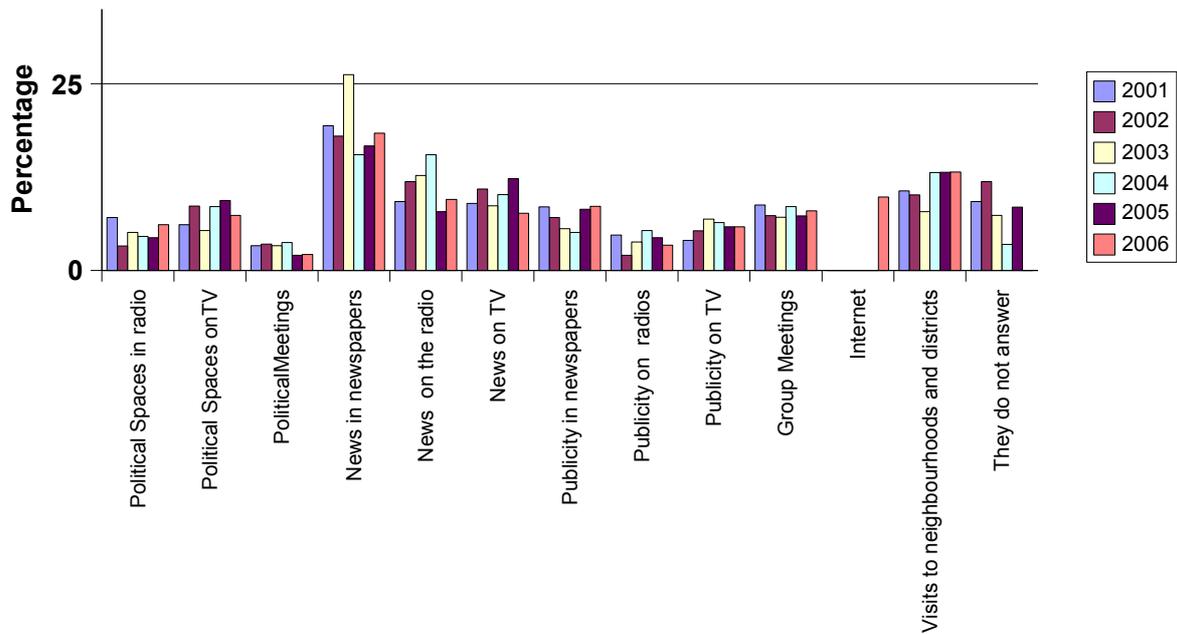


Chart N° 3: Students' percentage according to third means through which they want to receive information on the qualities of the candidates to Governor of the Province of Misiones. First Year. Faculty of Economic Sciences. UNaM. Argentine Republic. Years: 2001-2002-2003-2004-2005-2006.

Third Communication Media



As it is possible to observe in the precedent charts, in the surveys corresponding to every year one obtains the same order of preferences.

Indeed:

Year 2001, 2002, 2003, 2004, 2005 and 2006:

News in television, news in radios, news in newspapers

Borda's Method

Applying this method it is not homogeneous for every year.

Year 2001, 2002 and 2004:

News in television, visits to neighbourhoods and/or districts, publicity in television

Year 2003 and 2005:

News in television, news in radios, publicity in television

Year 2006:

News in television, publicity in television, news in newspapers

Kemeny's Method

There exists a survey in which the same order is not maintained.

Years 2001, 2003, 2004, 2005 and 2006:

News in television, news in radios, news in newspapers

Year 2002:

News in television, news in television, news in newspapers

Maximin Method

The values separate greatly from those obtained using the other methods.

Indeed

Year 2001:

Groups meetings

Year 2002:

News in newspaper, publicity in television, group meetings

Year 2003:

News in television

Year 2004:

News in radio, visits to neighbourhoods and/or districts

Year 2005 and 2006:

News in television, visits to neighbourhoods and/or Districts

Condorcet Candidate

In most of the years one does not find such a candidate that, in the comparisons of pairs stays as an only winner. In 2006 **publicity in television** is a Condorcet candidate, Pareto dominant.

FINAL ANALYSIS

As it was supposed from the beginning, the first option is the same one if one considered a survey as an only option or to three options.

If in a survey to one option the second frequency were used in order of importance, this would not be the elected one in second place for most of those surveyed. Notice that the news in newspapers and on radios have not been considered applying this method and, on the other hand, they are present maybe in different order, but in all the voting methods.

Due to this it is suggested the use of a survey where, if possible the proposal of several options, one asks the interviewed for the selection of three of them in a hierarchical order (1 the one that he considers more important, 2 the one that continues in importance and 3 the less important one) and then to process the data at least they should apply the methods of simple plurality, i.e. Borda and Kemeny's.

You could object to this proposal the great quantity of calculations and comparisons required by each one of the voting methods; but this fact can be saved with the use of software designed especially for this purpose.

ANOTHER INTERESTING OBSERVATION

The politicians have found in television the best means of coming closer to multitudes. But this has led to intellectual speeches that by mid last century were delivered in public tribunes and in the deliberative saloons, true literary works that have been compiled in books. At present the

politician "enters through the eyes"; he/she has to have a pleasant visible image and a speech, maybe less profound, but more charismatic. Maybe for the same circumstance that it is said at the present time that the human being has stopped to be a political-individual, to become a mediatic-individual.

In the same survey the youths choose **strength of ideas, seriousness and honesty** as qualities required and nonnegotiable for a candidate to governor of Misiones. It is then interesting to wonder why the youths choose **news in television** and not, for example, **political spaces in television?** Since: "a television news program or an up to date present day program, maintains with the afternoon TV novel, a much closer continuity relationship than we imagine" (Quevedo, L, 1992, p. 16), television always maintains a portion of unreality and fantasy. One must also keep in mind the news are adjusted to the television agendas, that suppose that they can be emitted fractionally and/or outside of context, so it could be thought that in the television space that is offered to the political party it would be more appropriate to synthesize platforms and objectives. But surely the politologists (new word in fashion and not yet incorporated into to the Real Academia Española, Spanish for "Royal Spanish Academy") will know the answer, the same as the specialists in political marketing will be able to use each mediatic segment appropriately.

Of course it would be fatuous to deny the influence of the television journalists in thought and in collective feeling. A very close example has been the presence of journalists of different channels of the Autonomous City of Buenos Aires, in the proselytizing campaign corresponding to the election of conventional constituents of the Province of Misiones, carried out on Sunday October 29th 2006. Their news and accusations gave national transcendence to the act, making the whole country expectant of the results. But it is also important to highlight that in the mentioned campaign there arose for the first time in the Province, new such means of political propaganda, as text messages to mobile phones, chat rooms and blogs. Which causes us to suppose that for the elections for governor of the Province in 2007 the whole range of more modern technologies will be used and surely those tools will be mainly focused on the youngest segment.

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