A mathematical model of the pressure of an extreme ideology on a society

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Abstract

Extreme behavior is produced by small groups, but affects a large amount of people. The fear, the usual strategy of these groups, influences the decisions of the whole population. In this paper we propose a dynamical mathematical model to study the ideological evolution of the population in a region where some groups want to get political goals through violence. After a classification of the subpopulations using data from votes obtained by political parties in general elections, model parameters have been estimated and future tendencies are studied.

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1. Introduction

Fanatical behavior is produced by small groups but affects large groups of people. The fear, the usual strategy of these groups, influences the decisions of the whole population. The understanding of the transmission dynamics of such behavior increases the knowledge of the mechanism behind the evolution of cultural norms and values. Also, it can give us tools to prevent the appearance of these groups, to know their *a priori* evolution, and how to achieve their disappearance.

The development of this paper has as a starting point, the Reference [1], to our knowledge the only antecedent of a type-epidemiological continuous mathematical model where the spread of fanatical behavior is considered. In [1] the dynamics of the spread of extreme behavior is studied as a type of epidemiology contact process (recruitment) that may be under the influence of friends, mates, environment, fear, menace, terrorism, propaganda, force of the law, etc. Then a mathematical model is built and its equilibrium points, thresholds and bifurcations studied.

Following the continuous model proposed in [1], in [2] a discrete model is developed and similar conclusions are reached.

Another interesting reference is [3] where type-epidemiological mathematical models are proposed to understand how ideas and rumors spread in certain populations.

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In this paper, our objective is to obtain a type-epidemiological mathematical model that help us to understand the situation in the Basque Country [4]. The Basque Country is a northern Spanish region where there exists an armed Basque nationalist organization ETA (Basque for "Basque Homeland and Freedom") [5]. ETA was founded in 1959 and evolved from a group advocating traditional cultural ways to an armed group using violence to demand Basque independence. Its ideology is Marxist–Leninist. Now, ETA is proscribed as terrorist by the Spanish authorities, the European Union, the United States and the United Nations.

The democratic system in the Basque Country and in the rest of Spain is affected by the terrorist acts of ETA (murders, kidnapping, vandalism, etc.). Therefore terrorism is one of the most important topics for Spanish public opinion.

In the Basque Country the population is divided into people that:

- agree with ETA in the objective of independence and the use of violence to get it,
- agree with ETA only in the objective of independence, without the use of violence,
- completely disagree with ETA.

Also, ETA supporters are about the 10% of population in the Basque Country and they help ETA members when needed.

The paper is organized as follows. From electoral manifestos and using statistical techniques, in Section 2, a classification of different political parties respect to the political goal "independence" is done in order to determine the ideological landscape. In Section 3 an epidemiological-type mathematical model where the pressure of the terrorism affects the ideology of the others is proposed. The model developed in Section 3 is not appropriate for data obtained in Section 2 (same units), hence Section 4 is devoted to scale the model properly to be fitted with classification data obtained in Section 5. Simulations to predict the short-term ideological evolution of population in the Basque Country are presented in Section 6. Finally, in Section 7, conclusions are presented.

2. Classification of ideological groups

Let us consider as source data results of the general elections to the Spanish Parliament in the Basque Country since June 15th 1977 to March 14th 2004 [6]. Since 1977, 85 political parties nominated candidates to, at least, one general election in the Basque Country electoral district. General election data have been considered because, in Spain, experts consider that general elections give a more realistic political/ideological landscape than local elections [7].

Now, let us classify the parties with respect to their relation with the political objective "independence". To do this, a survey is prepared to be answered from the party's election manifestos. The survey consists of the following questions (or ideological characteristics):

(1) Nationalist (Yes/No),
(2) Religious (Yes/No),
(3) Defense violence (Yes/No),
(4) Interventionist (Yes/No),
(5) Ecologist (Yes/No),
(6) Independence (Yes/No),
(7) Ideology (right wing or center/left wing/nationalist).

It should be mentioned that data of some political parties were not available, but these parties obtained a very small number of votes (less than 1%). Furthermore, some questions could not be answered for some parties due to the lack of details, or ambiguity, in the manifesto.

A non-parametric bivariant analysis [8, Chap. 9] is carried out in order to determine the ideological characteristics (questions of the survey) related with the defense of the use of the violence to get the independence. These characteristics were "independence", "nationalism" and "ideology", with associated p-values less than 0.01. In the multiple correspondence analysis [9, Chap. 10] three different profiles can be seen (see Fig. 1), nationalist parties related with independence and the use of violence, right-wing and center parties against independence and, in the middle of these profiles, left-wing parties with a non homogeneous and/or ambiguous position respect to independence and the use of violence.

These three profiles lead us to do a non-hierarchical cluster analysis with three groups of parties, whose definition is determined by the following characteristics: