

## An Axiomatic Control for Rational Behavior of Political Leaders in Democratic States

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### Abstract

*The main purpose of the present paper is to develop a new axiomatic system for the control or self-control of rational behavior of political leaders in contemporary democratic states. The axiomatic system is based on stringent criteria for rational behavior (proposed by A. N. Kolmogorov and R. Wilson) and contains 14 axioms. Axioms with ordinal numbers 4, 10, and 14 have a particular important role. In the present study we use Nash optimization principle, as well as a generalization of this principle developed by N. N. Vorobiev. The proposed axiomatic system is clear, meaningful and enjoys the lack of contradiction property. The obtained theoretical results are applied in Republic of Albania.*

**Keywords:** rational behavior, stringent criteria, democracy, political leader, axiomatic system.

### 1. Introduction

*“The future of humanity should be based on rational behavior”*

*Aristotle*

*“The power of a political leader is identified in the ability of harmonization of his will for the realization of the aims of people, led by logic and collaboration”*

*Woodrow Wilson, President of USA*

*“The rational behavior of a political leader has the primary goal to put the interest of people over the self-interest of the leader”*

*A.N. Kolmogorov Russian Mathematician, Bolzan Prize Winner*

*“The rational behavior of the individual in a capitalist democracy is the prudent and intelligent maximizing of self-interest”*

*Amartya Sen, Indian-American economist, Nobel Award Winner*

In human society there are many processes, in which the participants have different interests and use different methods for realizing their aims. Such processes are described as **conflicts** and so naturally arise whenever some individuals, companies, monopolies, parties, party coalitions, social groups or countries aims to control the development of various processes. The conflict represents the core of many political, economic, legal, military, diplomatic, ecological, demographic, psychological, religious, biological, medical, technological processes. An important special case of the conflict is **competition**. The mathematical model of the conflict contains four components:

**Firstly:** Given all participants in the conflict, who are able to make decisions. These participants are called players.

**Secondly:** Given the set of possible actions for each player. These possible decisions are called the strategy of the player.

**Thirdly:** Given the individuals, parties, party coalitions, or countries participating in the conflict that protect some specific interests. These are called players of interests.

**Fourthly:** Given the formulas for the expected profits or losses of player of interests. This is done usually by the utility function of each player of interests. The purpose of each player of interests, who are participants in the conflict, is **maximizing the utility function**.

#### **Definition of the game as a mathematical model of the conflict:**

**The game is the set composed by players of actions, strategies of these players, players of interests, and the utility functions of these players.**

The game is the basic concept of the Modern Mathematics. It is as important as the concept of derivative, integral, series, probability or differential equation. A particular characteristic of most games, is that each player does not know exactly the strategies to be used by other players. In this sense, the game is made in the present of strategic uncertainty. According to the conception of the American mathematicians, the participants in the game are called "players" and according to the Russian mathematicians made a clear distinction between players of actions and players of interest. In the current study, the conception of Russian mathematicians is used, hoping that accurately reflect the political conflicts, economic and social disparities that exist in the Republic of Albania. Game Theory was created as a mathematical discipline in 1944 by the famous Hungarian-American mathematician Johann von Neumann (1903-1957) and by the Austrian-American economist Oskar Morgenstern (1902-1977). The study of each conflict is performed in three aspects:

1. Descriptive aspect, which describes the conflict, showing its connections with other conflicts or represents a conflict through other conflicts.
2. Constructive aspect that specifies the four components of the conflict.
3. Normative aspect which gives the purposes of the players of interests.

The primary aspect of any conflict is the normative aspect, while the other two aspects are complementary. The descriptive aspect of the conflict can or cannot be mathematically formulated, while two other aspects of a conflict can always be mathematically formulated. According to the Russian mathematician A. N. Kolmogorov, the Game Theory is the mathematical theory of making the optimal decisions in conflicting processes. The optimal decisions should be mathematically defined. Issues relating to optimal decisions of players and optimal results of the conflicts are fundamental in Game Theory.

1. In which mathematical principle is the optimization of conflict based on?
2. How are the optimal solutions of the game found?

In fact, there are three important classes of games: antagonistic games, non-coalitional games and coalitional games.

-Many conflicts in human society are a complex mixture of non-coalitional and coalitional games.

-For example, political parties in the Republic of Albania have cooperated between them for Albania's membership in NATO or the EU and simultaneously have competed in parliamentary elections.

-Optimization of the normative component is more difficult than the other two components of the conflict.

In Game Theory, there is no an universal principle for optimizing the behavior of players. Different optimization principles are used in different classes of games. The remainder of the study is organized as follows:

Section 2 contains the optimization principles for games, section 3 presents the axioms for rational behavior of political leaders, section 4 contains applications for rational behavior of political leaders in Albania, while section 5 concludes the paper.

## 2. The optimization principles for games

The appropriate principle of optimization for the class of the antagonistic games is the Mini-Max Principle, proposed by J. Von Neumann. Sophistication of this principle of optimization have been made by mathematicians Lloyd S. Shapley and Martin Shubik.

The decisive step in the invention of the principle of optimization for non-coalitional games was made by the famous American mathematician John Forbes Nash, Nobel Award Winner in 1994. In Nash equilibrium each player maximizes individual profit, therefore, any reasonable player has no interest to deviate from Nash equilibrium. If each player will play differently, he would harm himself, but not other players. Nash equilibrium modifications for non-coalitional games are developed by the winners of a Nobel Prize JC Harsanyi and R. Aumann. Bayes-Nash-Harsanyi's equilibrium implemented in the game with incomplete information and has found important applications in politics, economics, technical sciences, natural sciences, bio-medicine, etc. The correlated equilibrium of a normal-form game is a solution concept developed by Professor Robert J. Aumann. This concept generalizes Nash Equilibrium. Some scientists feel that the correlated equilibrium is the most fundamental solution concept of all in Game Theory. R.B Myerson says: " If there is intelligent life on other planets, in a majority of them, they would have discovered correlated equilibrium before Nash equilibrium".

### Theorem:

For every Nash equilibrium, there exists a corresponding correlated equilibrium, in the sense that they induce the same probability distribution on the space of outcomes for the game.

The principle of achieving the goal, formulated by the Russian mathematician N. N. Vorobiev is the generalization of the Nash optimization principle. The mathematical formulation of the principle of achieving the goal has high scientific level and requires help from specialized mathematicians.

## Rational behavior of the players

The first assumption of Game Theory is the rational behavior of all players. According to R. B. Myerson, rational individuals make decisions in accordance with the principles and rules of logic, in order to achieve its goals. The present study analyzes the rational behavior of political leaders, government officials and politicians. This group includes the President, Prime Minister, President of the Parliament, Chairman of the Opposition, ministers, deputies, President of the Supreme Court, President of the Constitutional Court, the General Attorney, Heads of political parties, members of the High Council of Justice, Mayors, etc.

## 3. The axiomatic system for rational behavior of political leaders

How do the leaders in different states of the world make decisions? (see Mintz, 2004). What are the axioms that characterize rational behavior of political leaders, government officials and Politicians in their activity for resolving political, economic, social, administrative, territorial, legal, diplomatic, environmental conflicts? We will use the **stringent criteria of rational behavior** developed by A. N. Kolmogorov and R. Wilson. The scientific achievements of A. N. Kolmogorov (1982) and R. Wilson (2010) made possible the construction of an axiomatic system for the rational behavior of political leaders in the stringent sense. In the present study we develop an axiomatic system containing 14 axioms, which guarantees mathematical treatment of rational behavior of political leaders or key government officials in democratic states.

### **Axiom 1**

A political leader possesses complete information on the conflict.

### **Axiom 2**

A political leader is equipped with a team of qualified advisers and has available sufficient time to analyze the preferences and strategies of the participants in the conflict.

### **Axiom 3**

The strategies used by the political leader are the **best response** to the strategies used by other participants in the conflict.

### **Axiom 4**

For the optimal solution to political, economic, or social conflict, a political leader is guided by the principle that the people's interests are above personal interests.

### **Axiom 5**

Individual preferences of a political leader satisfy the transitive rule: if any leader prefers alternative A versus alternative B and alternative B versus alternative C, then the leaders should also prefer A versus C.

### **Axiom 6**

The utility function of a political leader is not commanding by any other person (s).

### **Axiom 7**

To resolve antagonistic conflicts, the political leader uses Mini-Max Principle, developed by J. Von Neumann, while to resolve non-antagonistic conflict, the political leader uses Nash bargaining or the principle of achieving the goal, developed by N. N. Vorobiev.

### **Axiom 8**

Nash bargaining game is fair and distributes justice, because any player who respects Nash bargaining principle undergoes no loss.

### **Axiom 9**

Nash bargaining is symmetrical: The outcome (profit or loss) of every player does not depend on the player's name. Every two players who have the same position in the scheme of Nash bargaining game, will ensure equal profits.

### **Axiom 10**

Nash bargaining is optimal in the sense of Vilfredo Pareto. In Nash bargaining, all players cannot simultaneously increase infinitely their profits. This axiom expresses the internal logic of the Nash optimization principle and is based on the concept of "Pareto optimal situation" of the non-antagonistic game.

### **Definition**

Players of the game are in an Pareto optimal situation if there is no other situation of this game, in which profits rise simultaneously to all players. In other words, any deviation from the Pareto optimal situation could be feasible for a part of the players and harmful to the rest of them. French mathematician Gerard Debreu, winner of the Nobel Award in economics and American mathematician Stephen Smale, winner of Fields Prize in Mathematics, have clarified some important theorems concerning the existence and uniqueness of the Pareto optimal situations for non-antagonistic games.

### **Axiom 11**

Nash bargaining is monotone: Players of the current bargaining must respect all previous orderly bargaining, that are more general than the current Nash bargaining.

### **Axiom 12**

In Nash bargaining game, the utility functions of the players are invariant in relation to linear transformation of the coordinate system. This means that the formulas of utility functions of players are independent of the linear transformation of the coordinate system.

### **Axiom 13**

In Nash bargaining game, the utility functions of the players are independent from the alternatives (conditions or circumstances) which have no relationship with the actual conflict.

### **Axiom 14** (not dictatorship)

A political leader of a democratic state is not a dictator, in the sense of Arrow.

### **Defined by K. J. Arrow**

**A political leader of a state is called a dictator if whenever the leader prefers alternative (candidate or party) A in comparison with alternative (candidate or party) B, than, the people of this state are obliged to prefer A compare to B.**

The proposed axiomatic system enjoys the property of the independence axiom from each-other. This means that each axiom contains an original contribution – specific and not inferred as the corollary of other axioms of this system. Axiomatic system of the present study is relatively complete, in the sense of David Hilbert. Also, the axiomatic system satisfies the lack of contradiction property. This means that the 14 axioms do not contradict each-other, but logical alignment between them.

## **1. Applications of the axiomatic system in the control of rational behavior of political leaders and key government officials in the Republic of Albania**

First stage: Formulate mathematically the conflict, with its four components.

Second stage: Made the classification of the conflict, based on the Game Theory: the antagonistic or non-antagonistic game without coalitions, or non-antagonistic games with coalitions. Depending from the classification of the conflict, the optimization criterion should be chosen for this game.

Third stage: Based on the data set, control the behavior of the political leader using 14 axioms. If the behavior enjoys all 14 axioms, a political leader admits rational behavior in conflict examined. If the behavior does not satisfy at least one of the 14 axioms, then the political leader has an irrational behavior. For a concretization of the ideas, some examples of control of rational or irrational behavior of the Albanian political leader in different conflicts are formulated.

**Example 1.** Be controlled by axiomatic system, the behavior of Albanian political leaders in the process of the new administrative-territorial division of the Republic of Albania.

**Example 2.** Be controlled by axiomatic system, the behavior of Albanian political leaders in the current reform of the justice system in Albania.

**Example 3.** Be controlled by axiomatic system of the behavior of Albanian political leaders to stop the cultivation and trafficking of narcotic drugs in Albania.

**Example 4.** Be controlled by axiomatic system, the behavior of Albanian political leaders for membership in NATO of the Republic of Albania.

**Example 5.** Be controlled by axiomatic system, the behavior of Albanian political leaders for granting the status of “candidate for EU membership of the Republic of Albania.

**In the present study we investigate only example 1.** Conflictual processes, modeled mathematically as non-antagonistic game, are the new administrative-territorial division of the Republic of Albania. Players are Albanian citizens. Political or governmental leaders are Bujar Nishani, Edi Rama, Ilir Meta, Lulzim Basha, etc. In this game, some players of interest are mutually players in action. The rational or irrational behavior of any political leader or governor may be checked based on the 14 axioms presented in the current study. In the present study, we make a reasonable assumption: any political leader or main governor satisfies axioms 1 and 2.

According to the World English Dictionary, ***gerrymandering*** is a practice that attempts to establish a political advantage for a particular party or group by manipulation district boundaries to create partisan advantaged districts. In addition to its use in achieving desired electoral results for a particular party, gerrymandering, may be used to help or hinder a particular demographic, ethnic, racial, linguistic, religious, or class group.

#### **Gerrymandering tactics are as followed:**

The primary goals of gerrymandering are to maximize the effect of supporters' votes and to minimize the effect of opponents' votes. This can be accomplished through a number of ways:

**“Cracking”** involves spreading voters of a particular type among many districts in order to deny them a sufficiently large voting bloc in any particular district.

**“Packing”** is to concentrate as many voters of one type into a single electoral district to reduce their influence in other district.

**“Hijacking”** redraws two districts in such a way as to force two incumbents of the same political party to run against each-other in one district, insuring that one of them will be eliminated, while usually leaving the other district to be won by someone from a different political party.

**“Kidnapping”** aims to move areas where a certain elected official has significant support to another district, making it more difficult to win future elections with a new electorate. This is often employed against politicians who represent multiple urban areas, in which larger cities will be removed from the district in order to make the district more rural. These tactics are typically combined, in some form, to each-other.

Gerrymandering is effective because of the wasted vote effect. By moving geographic boundaries, the incumbent party packs opposition voters into a few districts they will already win, wasting those extra votes. While the wasted vote effect is strongest when the party wins by narrow margins across multiple districts, gerrymandering narrow margins can be risky when voters are less predictable.

The word ***gerrymander***(originally written *Gerry-mander*) was used for the first time in the Boston Gazette on March 26<sup>th</sup> 1812. The word was created in reaction to a redrawing of Massachusetts state senate election districts under Governor Elbridge Gerry. In 1812, Governor Gerry signed a bill that redistricted Massachusetts to benefit his Democratic-Republican Party. When mapped, one of the contorted districts in the Boston area was said to resemble the shape of a salamander. Gerrymander is a portmanteau of the governor's last name and the word *salamander*. In proportional-election systems, where political parties are represented in proportion to the total numbers of votes they receive, gerrymandering has little or less significance.

**Some countries such as Australia, Canada, and the UK, authorize non-partisan organizations composed by scientists and experts to set constituency boundaries in an attempt to prevent gerrymandering.**

Some scientists have estimated gerrymandering as a pathological illness of politics in the USA, Germany, France, Greece, etc. Research studies for the Gerrymandering are presented by Balinski (2008), Friedman and Holden (2008), Fryer and

Holden (2007), Humphreys (2009), James (2010), Kenneth (2008), Niemi, Grofman, Carlucci and Hoffeller (1990), Polk (2011), Wasserman (2011) and Wang (2013).

### Examples of gerrymandering in the USA

In favor of Tom DeLay, Candidate of Republican Party, district 22, Texas, since 2003. In favor of Grace Napolitano, Candidate of Democratic Party, district 38, California, since 2005. Elections for Congress in California, in 2008, in favor of new applicants for the Republican Party. Elections in Columbus, Ohio, in 2010, in favor of Democratic candidate. Elections in New Jersey, in 2010.

### Examples of gerrymandering in Greece

The most infamous case of gerrymandering was in the 1956 elections. While in previous elections the districts were based on the prefecture level for 1956 the country, was, split in, districts of varying sizes, some being the size of prefectures, some the size of sub-prefectures and others somewhere in between. The districts were created in such a way that small districts were those that traditionally voted for the right, while large districts were those that voted against the right. This system has become known as the three-phase system or the **baklava system** (because as baklava is split into full pieces and corner pieces, the country was also split into disproportionate pieces). The opposition, being composed of the center and the left, formed a coalition with the sole intent of changing the electoral law and then calling new elections, despite the fact that only seven years earlier, the center and the left had fought each other in the Greek Civil War. Even though the centrist and leftist opposition won the popular vote (1,620,007 votes against 1,594,992), the right wing ERE won the majority of seats (165 to 135) and was to lead the country for the next two years.

Modern Theory of Parliamentary or Local Elections in the Democratic States condemns gerrymandering as a manipulation to provide some unfair advantages to a competition between political parties, because violated at least one of the following two basic rules:

1. **Constituencies must be convex sets.**
2. **The constituencies should have the same number of inhabitants.**

The first rule is evaluated by scientists as a preventive of gerrymandering. Currently these two rules are respected in 35 states of US. President B. Obama is supportive of these two rules.

Definition (by N. Burbaki)

Region D of space is said to be convex if for any two points A and B belonging to D, all interior points of the interval AB will be belonging to D.

Gerrymandering is interpreted as political art in the practice of territorial division in the electoral regions, often in geometric shapes, that aims to guarantee an unfair advantage to the majority party for parliamentary or local elections, weakening in maximum the power of opposition votes.

To reduce the impact of gerrymandering in the election results, were built and implemented several methods objectively, scientifically accurate, for the territorial division in the state election districts or municipalities. **We investigate one of these methods, called "The shortest-split line algorithm"**.

### The shortest-split line algorithm for drawing N congressional districts

Start with the boundary outline of the state. Let  $N=A+B$ , where A and B are as nearly equal whole numbers as possible. (For example,  $A=B=N/2=0.5N$ , more precisely,  $A=0.5(N+1)$  and  $B=0.5(N-1)$ ). Among all possible dividing lines that split the state into two parts with population ratio A:B, choose the *shortest*. (Notes: Since the earth is round, when we say "line" we more precisely mean "great circle". If there is an exact length-tie for "shortest" than break that tie by using the line closest to North-South orientation, and if it's still a tie, then use the Westernmost of the tied dividing lines. "Length" means distance between the two furthest –apart points on the line, that both lie within the district being split.) We now have two hemi-states, each to contain a specified number (namely A and B) of districts. Handle them recursively via the same splitting procedure.

If anybody's residence is split in two by one of the split lines (which would happen, albeit very rarely) than they are automatically declared to lie in the most-western (or if the line is EW, then northern) of the two districts.

Advantages of algorithm:

- Its simplicity
- Its low cost
- Its scientific rigorousness

A unique solution was found for the territorial division in constituencies. Minimize gerrymandering because sketched constituencies will satisfy rules 1 and 2 fair territorial division within the real possibilities of the border. Some scientists believe that a deficiency of the method is that the algorithm does not guarantee favorite electoral districts for minority. So will happen if the territorial distribution of the minority population is not a convex set. Therefore, there is a risk of reduced minority representation in Parliament or in local government.

### **In June of 2007, Algorithm became ready for use, for drawing electoral maps in 50 states of USA.**

Recommended that each member of the Albanian Parliament to examine whether the new administrative-territorial division, satisfy or do not satisfy the rules of regular territorial division in the democratic state.

From behavioral control of Albanian political leaders during the period January 1998-July 2014 in the different political, economic, social, conflicts, results that in some cases of conflicts, their behavior has been rational, while in other cases their behavior was irrational. How can be explained that in various political, economic and social conflicts changed the behavior of leaders? Perhaps, some Albanian political leaders do not know the Game Theory. Also, there is the possibility that some leaders do not want to use Nash bargaining to resolve non-antagonistic conflicts from the field of politics or economics, or social, because they may prefer to use the super modular Game Theory.

## **2. Conclusion**

The main purpose of the study is the formulation of axioms which characterize exactly rational behavior of political leaders in democratic states based on stringent criteria of rational behavior.

Recognizing the important role of political leaders in the development of the democratic states is a bit strange that this axiomatic system to be so delayed.

People needed a scientific theory of rational behavior of political leaders, formulated with some axioms clear and understandable. On the other hand, political leaders need temperance of rational behavior. In the present study, we construct an axiomatic system, which serves to control rational behavior of political leaders in political, economic or social conflicts. The behavior of political leaders is rational, if and only if all 14 axioms are satisfied.

We suggest several applications for our study. Modern democratic states should be led by rational leaders, who seek to maximize the expected benefits or minimize expected risk of policy choices, using Mathematics (especially Game Theory). Types of decisions made from political leaders include: conflict resolution, detection and punishment of corruption, use or non-use of force, fighting against terrorism, war and peace decisions, war termination, significant drop in public support for specific governmental policy, interparty rivalry or interparty competition, coalition formation, management, survival and cost, decisions made by experts, negotiations, economic performance, unemployment rate, framing, diversionary use of force, significant drop in government popularity, the estimation of electoral results, potential collapse of the coalition government, the existence of third pivotal party in parliamentary government, domestic opposition situation ( objectives and strategies), internal or external challenges to the government, initial crises reaction, national security, NATO membership obligations, tests of nuclear weapons, money laundering control, excessive speculation, threats to a leader's survival, threat to political power, dignity, honor or legitimacy of a leader, demonstrations, riots and so forth, environment protection, leader's influence on advisers, defection and retaliation, crime rate, monetary policy, government debt, microeconomic priorities, foreign direct investment, etc.

Nash equilibrium for non-coalitional games is defined as strategies profile of players, such that no player will not win if deviate from this situation, using a different strategy. In Nash equilibrium, each player maximizes individual profit. Nash equilibrium modifications for non-coalitional games developed by the Winners of the Nobel Award JC Harsanyi and R. Aumann. Bayes-Nash-Harsanyi's equilibrium implemented in the game with incomplete information and has found important applications in politics, economics, technical, sciences, natural sciences, biomedicine, etc.

The "principle of achieving the goal", formulated by the Russian mathematician N. N. Vorobiev, is generalization of Nash Optimization Principle. The mathematic formulation of the principle of achieving the goal has high scientific level and requires help from specialized mathematicians.

## References

- [1] Balinski, M.(2008) .How to eliminate gerrymandering? *American Mathematical Monthly* , 114 (2), 96-115
- [2] Friedman, J.N. and Holden, A.D. (2008) Optimal gerrymandering,*American Economic Review*,98(1), 123-144
- [3] Fryer, R.G.J. and Holden, R.T. (2007) .Measuring the compactness of political districting plans NBER Working Paper,13456
- [4] Gerrymandering examples, html retrieved 5 august 2009
- [5] Gerrymandering and a cure-shortes splitline algorithm
- [6] Gerrymandering in the US ,15 april 2010
- [7] Humphreys, M. (2009) .Can compactness constrain gerrymander? Columbia University Press
- [8] James,C. (2010) .Flagrant gerrymandering
- [9] Keneth, M.C. (2008) The original gerrymander,*Political Geography* ,27(4), 833-839
- [10] Kolmogorov, A.N.(1992).Complete Works, (5),128. *Russian Academy of Sciences, Moscow*
- [11] Mintz, A. (2004). How do leaders make decisions? *Journal of Conflict Resolution*, 48 (1), 3-13.
- [12] Myerson, R.B. (2006) .Bipolar multicandidate elactions with corruption.*Scandinavian Journal of Economics*, 8(4), 727-742
- [13] Niemi ,R.G. Grofmann, B., Calucci ,C. and Hoefeller ,T.(1990).Measuring compactness and the role of a compactness. Standard in a test for gerrymandering, *The Journal of Politics* 52(4), 1155-1181
- [14] Polk, J. (2011) Why your vote for Congress might not matter.CNN Friday 18 november 2011 Wang:s(2013) The great gerrymandering of 2012,*The New York Times*,2 February 2013 Wassermprn,D.(201 U.Perrymander.NationalJ.ourna! ,19 August 2001
- [15] Wilson, R. (2010), Stringent criteria for rational strategic behavior, Jean-Jacques Laffont Lecture