



# Accidental politicians: How randomly selected legislators can improve parliament efficiency

Alessandro Pluchino<sup>a,\*</sup>, Cesare Garofalo<sup>b</sup>, Andrea Rapisarda<sup>a</sup>, Salvatore Spagano<sup>c</sup>,  
Maurizio Caserta<sup>c</sup>

<sup>a</sup> Dipartimento di Fisica e Astronomia, Università di Catania, and INFN sezione di Catania, Via S. Sofia 64, I-95123 Catania, Italy

<sup>b</sup> Dipartimento di Analisi dei Processi Politici, Sociali e Istituzionali, Università di Catania, Via Vittorio Emanuele II 8, I-95131 Catania, Italy

<sup>c</sup> Dipartimento di Economia e Metodi Quantitativi, Università di Catania, Corso Italia 55, I-95100 Catania, Italy

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## ABSTRACT

We study a prototypical model of a Parliament with two Parties or two Political Coalitions and we show how the introduction of a variable percentage of randomly selected independent legislators can increase the global efficiency of a Legislature, in terms of both the number of laws passed and the average social welfare obtained. We also analytically find an “efficiency golden rule” which allows to fix the optimal number of legislators to be selected at random after that regular elections have established the relative proportion of the two Parties or Coalitions. These results are in line with both the ancient Greek democratic system and the recent discovery that the adoption of random strategies can improve the efficiency of hierarchical organizations.

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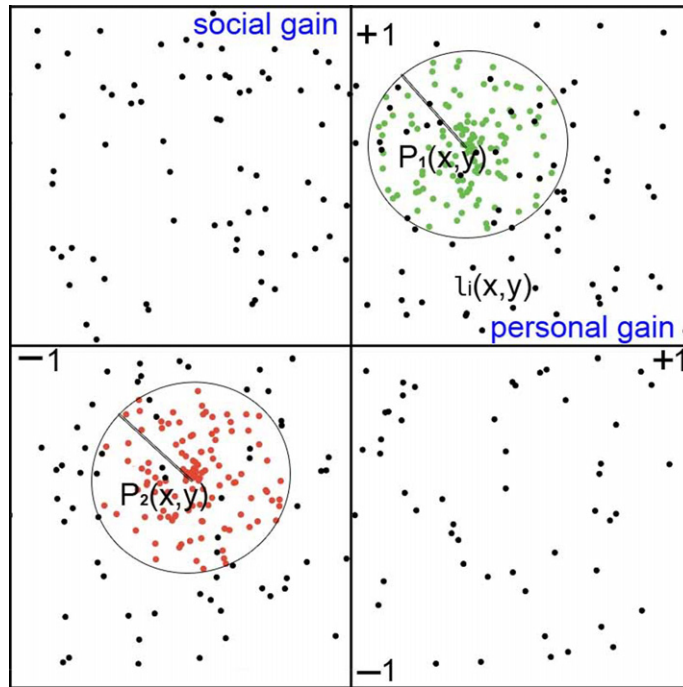
## 1. Introduction

In ancient Greece, the cradle of democracy, governing bodies were largely selected by lot [1–3]. The aim of this device was to avoid typical degenerations of any representative institution [4]. In modern democracies, however, the standard is choosing representatives by vote through the Party system. Debate over efficiency of Parliament has therefore been centered on voting systems, on their impact on parliamentary performances and, ultimately, on the efficiency of economic system [5–8]. In recent years also physicists have started to provide a quantitative understanding of social and economical phenomena [9–15] and it is in this perspective that the present work should be placed. In this paper, rediscovering the old Greek wisdom and recalling a famous diagram about human nature by Cipolla [16], we show how the injection of a measure of randomness improves the efficiency of a parliamentary institution. In particular, we present numerical simulations of the efficiency of a prototypical Parliament modeled by means of an agent based model [17]. We also find an analytical expression, whose predictions are confirmed by the simulations, that determines the exact number of randomly selected legislators, in an otherwise elected parliament, required to optimize its aggregate performance. The latter is estimated by the number of approved acts times the average social gain. This result, on one hand is in line with the positive role which random noise plays often in nature and in particular in physical systems [18–20]. On the other hand, it goes also in the same direction of the recent discovery [21,22] that, under certain conditions, the adoption of random promotion strategies improves the efficiency of human hierarchical organizations in order to face the problem of the so-called “Peter Principle” [23].

The paper is organized as follows. In Section 2, we describe the Parliament model and its dynamics. In Section 3, we present the main numerical and analytical results. Then, in Section 4, we discuss several historical examples in order to give an empirical support to our findings. Finally, conclusions and remarks are drawn.

\* Corresponding author.

E-mail addresses: [alessandro.pluchino@ct.infn.it](mailto:alessandro.pluchino@ct.infn.it) (A. Pluchino), [cesaregarofalo@yahoo.com](mailto:cesaregarofalo@yahoo.com) (C. Garofalo), [andrea.rapisarda@ct.infn.it](mailto:andrea.rapisarda@ct.infn.it) (A. Rapisarda), [salvo.spagano@gmail.com](mailto:salvo.spagano@gmail.com) (S. Spagano), [caserta@unict.it](mailto:caserta@unict.it) (M. Caserta).



**Fig. 1.** Cipolla diagram. Each point in this diagram, with coordinates in the intervals  $[-1, 1]$ , represents a member of Parliament, according to his/her attitude to promote personal or social interests. The Parliament consists of  $N = 500$  members: black points represent  $N_{ind} = 250$  independent legislators, while green and red points refer to the remaining members, belonging to the two Parties  $P_1$  and  $P_2$ . We report also the circles of tolerance of the two Parties, with equal radius  $r = 0.3$ , see text for further details. Please notice that some free points could apparently fall within the circle of tolerance of some Party, but of course the correspondent legislators will remain independent.

## 2. The parliament model

Human societies need institutions [24,25], since they set the context for individuals to trade among themselves. They are expected, therefore, to have an impact on the final outcome of those trading relations [26]. This paper looks at a specific institution, the Parliament, designed to hold the legislative power and to fix the fundamental rules of society.

### 2.1. The Cipolla diagram

A Parliament can be modeled as resulting from the aggregate behavior of a number of legislators, who are expected to make proposals and vote. In doing so they are pictured as moved by personal interests, like re-election or other benefits, and by a general interest. Taking both motivations into account, it is possible to represent individual legislators as points  $l_i(x, y)$  (with  $i = 1, \dots, N$ ) in a diagram (see Fig. 1), where we fix arbitrarily the range of both axes in the interval  $[-1, 1]$ , with personal gain on the  $x$ -axis and social gain (understood as the final outcome of trading relations produced by law) on the  $y$ -axis. Each legislator will be therefore described through his/her attitude to promote personal and general interest.

This diagram takes after a very famous one proposed in 1976 by the economic historian Carlo M. Cipolla [16], who represented human population according to its ability to promote personal or social interests. Of course people do not always act consistently, therefore each point in the Cipolla diagram represents the weighted average position of the actions of the correspondent person.

The basic idea of this study is to use the Cipolla classification in order to elaborate a prototypical agent based model [17] of a Parliament with only one Chamber, consisting of  $N = 500$  members and  $K = 2$  Parties or Coalitions, and to evaluate its efficiency in terms of both approved acts and average social gain ensured. In particular, all the points  $l_{jk}(x, y)$  representing members of given Party  $P_k$  will lie inside a circle with a given radius  $r_k$  and with a center  $P_k(x, y)$  falling in one of the four quadrants. The center of each Party is fixed by the average collective behavior of all its members, while the size of the respective circle indicates the extent to which the Party tolerates dissent within it: the larger the radius, the greater the degree of tolerance within the Party. Therefore, we call the circle associated to each Party *circle of tolerance*. It is clear that, in real Parliaments, the fact of belonging to a Party increases, for a legislator, the likelihood that his/her proposals are approved. But it is also quite likely that the social gain resulting from a set of approved proposals will be on average reduced if all the legislators fall within the influence of some Party (more or less authoritarian). In fact, even proposals with little contribution to social welfare will be approved if Party discipline prevails, while, if legislators were allowed to act according to their judgment, bad proposals would not receive a large approval. Therefore, the main goal of this paper is to

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