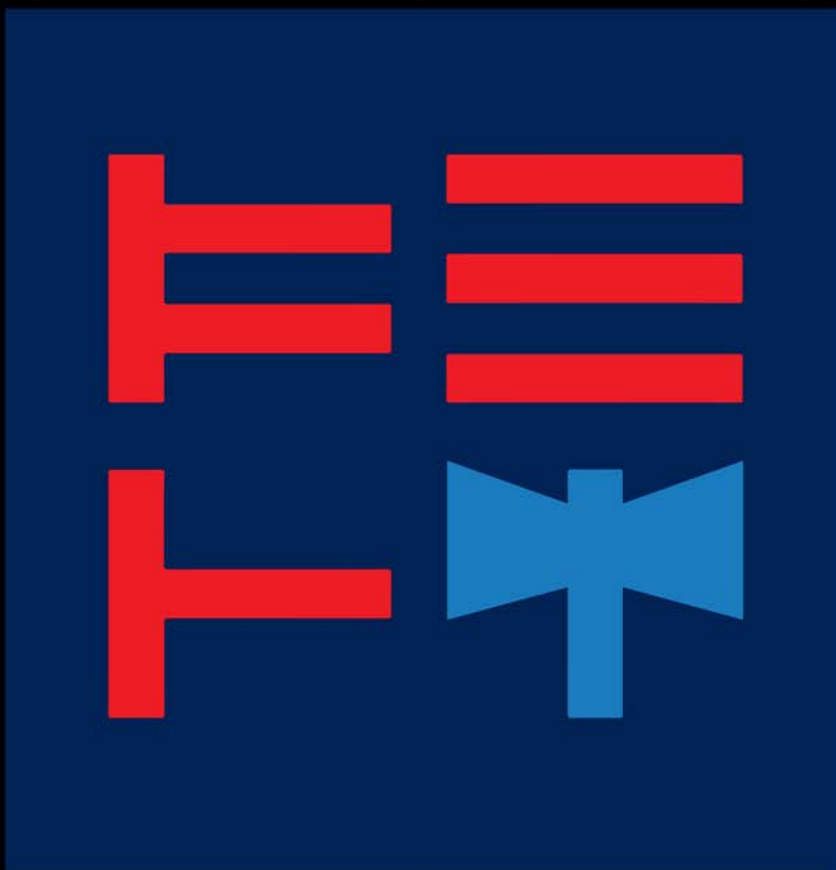


# Organization and Governance Using Algorithms



*Ioannis Avramopoulos*

DIGITAL ACTIVISM AND SOCIETY

ORGANIZATION AND  
GOVERNANCE USING  
ALGORITHMS

# DIGITAL ACTIVISM AND SOCIETY: POLITICS, ECONOMY AND CULTURE IN NETWORK COMMUNICATION.

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INVESTOR IN PEOPLE

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# PREFACE

In this book, we attempt to ground the organization of production of goods and services on a sound mathematical foundation. To that end, we develop an algorithmic theory of organizational governance wherein the individual contributing to organizational output is a first-order principal (in a fashion similar to how players are first-order principals in game theory). Our theory is in sharp contrast to the institution of hierarchical delegation that plagues organizations. Our main contribution is an organizational primitive we call *accountably anonymous delegation* based on which we design a pair of institutional mechanisms that can replace hierarchies. Our perspective and ideas are deeply ingrained in the foundations of Greek thought and are significantly influenced by modern American culture. The driver for this inquiry is the ongoing European crisis (but my thinking predates it).

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# INTRODUCTION

## 1.1 THE FLAWED INSTITUTIONAL FOUNDATION OF ORGANIZATIONS

*Gold Guns Girls*

–METRIC

Organization is ideologically oriented toward visions of *gold* and *bondage*. I use the term *gold* to express a desire for wealth and success (as in *gold medals* in sports competitions). I use the term *bondage* to express stimulating bondage be that organizational or erotic: Organizations are about fulfilling our dreams and erotic intimacy is certainly within the dreams that motivate us to have good performance in organizational tasks. (The idea that “bondage” plays a major role in organization dates back to Jean-Jacques Rousseau – see beginning of his famous book *The social contract*: “Man is born free, and everywhere he is in chains.”) In this book, a centerpiece of my discussion is hierarchical protocols of organization. Organizations are rife with hierarchical structures, which negatively affect organizational performance and the emotional experience of actors that partake in these structures. I discuss delegation hierarchies from an analytical perspective scrutinizing the elementary principles of their operation and how they can be harmful to our societies. I later draw on this discussion to design organizational methods at the antipodal bank of hierarchies.

### 1.1.1 Organization as the Production of Goods and Services

The main characteristic of an organization is an effort to reap the benefits of *coordination opportunities*, that is, situations whereby a coordinated effort to produce goods or services brings more benefits to the respective organizational actors than what they would have received otherwise. To that end, an organization leverages individuals and an institutional and hardware infrastructure. Since effort is a computational phenomenon, it is meaningful to model an organization as a distributed computing system (where organizational actors are computing elements), but caution is required to adopt such perspective: Modeling an individual as a Turing machine (as in the standard model of distributed computing) is an approximation (e.g., the Church-Turing thesis is an unsettled thesis in theoretical computer science). Nevertheless viewing organizational actors as processors that communicate through a shared infrastructure (physical and virtual) is a meaningful approximation.

### 1.1.2 Profit Maximization as a Goal of Corporate Organization

A defining characteristic of corporate organizations is that they often set profit maximization as a primary objective of their operation (interested, as management is, on share profit). That is, profit maximization often receives priority over other objectives in the synthesis of optimal products and services. Of course what is optimal from the perspective of product or service design naturally depends on who buys such a product or service. That said, it is often the case that organizations prefer to look for affluent customers (willing to spend important amounts on purchases) and optimize the experience of those customers at the possible expense of other, less affluent, customers, the organization's own employees, and the environment. Thus, profit maximization gives rise to *negative externalities* in an organization's operation process. In the recent history of humanity, these externalities started becoming conspicuously visible with the advent of the industrial age.

### 1.1.3 The Negative Externalities of Industrialization

Industrialization has indisputably come at a cost of magnitude that is not only visible but substantial enough to impress projections of a possible decline of human civilization in its entirety, if not of the complete annihilation of humans from the face of the planet: Industrialization has degraded the quality of the

terrestrial nature hosting us. From the perspective of economic theory, the reasons for this negative effect of industrial activity on the very same entities that strive to support the industrialization efforts (theoretically promising to advance their living standards), namely, the individual actors, are not to be ascribed to a fundamental flaw of human nature such as “greed” as unconscionable voices like to purport, but rather a manifestation of a simple phenomenon, well-studied in economic theory, namely, that of (the aforementioned) negative externalities (effects of possibly “optimal” decisions that, in trying to optimize artificial objectives such as *profit*, negatively influence the decisions through mechanisms external to the objective function being optimized).

Environmental detriments resulting from industrial production can, for example, be addressed by “internalizing” the environmental impact of polluting industry through international regulation (as it affects the competitiveness of national economies in global markets). This is difficult.

In this book, I argue that *poverty and inequality* in Western societies (such as that of the United States, for example) can be attributed to a similar phenomenon of *organizational pollution* having the same roots and analogous implications in its detrimental effects as industrial pollution has on the natural environment. These phenomena can be traced to negative externalities in the decisions of national states, corporations, and individuals, that manifest in internal mechanisms of operation (according to organizational institutions) and external mechanisms of interaction (such as markets) wherein the analogue of our natural environment is nothing but the human (body and soul). This schema of understanding inequality naturally explains the emergence of attempts to transgress humanity to antipodal banks of civilization, such as *anarchy and communism* (that blatantly failed owing to reasons our organizational theory explains), but also suggests scientific principles and mechanisms by which to correct inequality (we propose and analyze in the sequel).

#### 1.1.4 Emotions as Externalities in the Professional Environment

To a large extent, the philosophical and moral basis of Western civilization is, in fact, grounded on the tenet that in professional environments *even emotions are externalities*. This tenet is permeant in social organization to the extent that Western philosophy’s dictum that decision-making should be rid of emotional content is one many political and business leaders abide by. In one of the most deleterious practical applications of this tenet, pharmaceutical therapies for

psychopathological symptoms are treated with medication meant to induce *cognitive suppression*. I have suffered (and continue to suffer) from such despicable medical practices myself. I continue writing this book under the maxim: Enough is enough! We base our theory of organization on the tenet that emotional content deserves respect and that, in fact, organizational actors should be heartened to let their emotions thrive. In this and the next chapter, we discuss the lack of managing emotional content (other than a stimulus for emotional suppression) as a liability of our organizational faculty.

### 1.1.5 Understanding and Supplanting Parochial Hierarchical Organization

The preceding discussion suggests that organization suffers from being conducted around tenets that give rise to dysfunctional conditions having negative effects on our well-being and inducing even psychopathological damage to organizational actors. In this monograph, we theorize that the dominant factor contributing to the manifestation of such negative externalities (in the sense of “organizational pollution” affecting the employees of corporations and state organizations) is that organization is fashioned according to hierarchical structures that favor a very limited number of actors at the senior ranks and crowd out a majority of employees from meaningful contribution to organization output. But hierarchical organization damages employees in all ranks not only those at the bottom but also those at the top. Looking into related research in the psychopathology of organization, Langner et al. (2012) show a relationship between social hierarchies and depressive symptoms that manifest in relation to negative emotion suppression to avoid conflict. [Blaug \(2014\)](#) shows that hierarchical organization has a substantially negative effect even at the high ranks due to mechanisms involving the corrupting effect of unrestricted power. We, thus, believe that, in contrast to what is generally believed, the dominant factor in the phenomenon of organizational pollution is not profit maximization (but we do not eliminate the possibility that organizations also need to counteract other factors beyond organizational pollution such as negative environmental impact). In the sequel, we continue to analyze hierarchical organizations for the benefit of understanding what is at stake.

## 1.2 MOTIVATION: THE DESIGN OF A PUBLIC ADMINISTRATION SYSTEM FOR GREECE

The financial crisis in the United States circa 2008, in “rippling across the Atlantic,” instigated a disturbance in the creditworthiness of the Greek state, which provoked a financial and institutional crisis in Greece, a sovereign state and member of the Eurozone, that involves a complex of “organizational morphisms” residing in European Union’s young institutional establishment.

These morphisms emerged by virtue of this crisis outside of the scope of the centrally planned European institutions and their legitimacy has troubled theoreticians (e.g., legal theorists) and practitioners (e.g., political leaders) alike. Such spontaneous (political) formations instigate social dynamics (akin to the financial dynamics that threatened the US economy) that threaten the survival of the Greek people, the stability of the emerging notion of a European identity, and, over a longer time span, the survival of human civilization at large.

These observations motivate my thinking in this book: I stipulate that the bedrock of the ongoing crisis can only be prolifically understood through an intellectual framework broader than that concerned with the study of markets, financial institutions, and fiscal policies, in particular, through *organization theory* and *institutional design*. But do not expect there are “textbook recommendations” on how to address the aforementioned threats.

The motivation that drives my intellectual effort in this book concerns the design of a public administration system according to the principles of Greek thought as that manifests in public political debate in Greece and elsewhere (concerning Greece and the European Union at large). In my opinion, the essence of this debate is captured by a notion of *meritocracy* in the sense that the management of public affairs, whether in the running of political institutions or in public administration per se, should be entrusted to the *worthy*. Although the definition of *worth* of a public official is often left unspecified in the colloquial notion of meritocracy, the significance of this concept for Greek culture (as it manifests in public dialogue) cannot be overstated and, in fact, has arguably remained extant throughout the history of the Greeks since ancient times.

In investigating the design of a meritocratic public sector, I have come to believe that the notion of *merit* is not a first order principle around which the organization of the public sector ought to be based on. Nevertheless, the principles I lay out for theorizing about organization are deeply imbued in *Greek thought*: As a student in (Greek) high school I became acquainted with the fundamental principle of organization of the Greek nation, namely, that, as

I understood and remember this principle, Greece serves the Greeks rather than the other way round. But how is this possible?

### 1.3 OUR CONTRIBUTIONS

In this monograph, our contribution is a mathematical theory of organization wherein the individual actor is a first order principal of organization (and organizations are meant to serve these principals). To that end, we draw on a conceptual separation between *organizational actors* (the members of an organization) and *organizational roles* (capacities under which actors contribute to organizational output). Computational perspectives on organization and the theory of algorithms are central to render this separation meaningful and effective. We believe this is the first academic work to analyze the foundations of organization from a computational perspective.

Coming back to the question that motivated this book, we do not attempt to design a public administration system tailored to the specific needs of any manifestation of state organization whether in Greece, in Europe, or elsewhere. Instead, we think from first principles how to structure efforts of designing organizations. In this vein, we make several detailed contributions.

#### 1.3.1 An Analysis of Hierarchical Organization and Delegation

Hierarchies exacerbate the flaws in the institutional foundation of organizations, for example, in subduing every but the highest ranked individual to an upper administrative echelon that alienates the lower echelons of actors. Furthermore, hierarchies create an antagonistic collegiate environment in promoting a struggle to secure high-ranked prominent positions. There exists a rich literature on the perils of hierarchical organization. Our perspective in this monograph is one related to *errors* and *fault tolerance*: Hierarchical architectures based on delegation chains give rise to *single points of failure* in organizational function. We argue that positioning infallible individuals at the root of hierarchies is a futile pursuit as an infallible human nature falls beyond our present grasp.

### 1.3.2 The Design of Organizations Based on Accountably Anonymous Delegation

We design two organizational institutions based on a primitive we call *accountably anonymous delegation*. In one system, delegation is performed by an *online learning algorithm* and, in the other delegation can be organized in a democratic fashion based on algorithms for matching the role preferences of organizational actors with anonymous evaluations by peers and experts.

## 1.4 THE INCANDESCENT LIGHT OF THE ORDERS OF REASON

In this monograph, I take the opportunity to address the West from a philosophical perspective in the light of Greece as that resonates in me. To that end, I try to distance myself from Western culture, a process that is certainly facilitated by the fact that Greece has maintained a spiritual orientation independent of that of the West.

To address the West, I feel it is important to appeal to the West's ecclesiastical tradition. That I should consider the religious origins of Western culture occurred to me in virtue of viewpoints and critical thinking expressed in public dialogue by Rev. Nikolaos Loudovikos.<sup>1</sup> He mentions, in particular, that the West's ecclesiastical tradition has had a deep influence on Western philosophy, a viewpoint that both puzzled and captivated me. What was puzzling is that dogmatic faith should interfere with pure reason. But I convinced myself this is a viewpoint I should seriously investigate in recalling related passages from John W. O'Malley's *Four Cultures of the West*.

With this background in mind, my argument is *technical* in the sense of pursuing truth by pure reason. The line of my discourse is paradigmatic of what I consider *good* philosophy in the sense of being useful to science. Unfortunately, philosophy has taken a course independent of science, which many others also acknowledge and similarly criticize. I should remind that science grew out of philosophy and, therefore, that being good to science is something philosophy ought to take responsibility for is not my idea.

Beyond the previous accounts, my motivation for taking on this topic draws on a figure that had haunted me at the *Κατεχάκη* and *Μεσογειών* traffic light (near the campus of the National Technical University of Athens) I was driving through as an undergraduate student in Athens. There was an elderly but

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1 See: <https://www.youtube.com/watch?v=yuQOa2h87oM>.

vibrant man selling sesame bagels (*κουλουρια*) with a sense of tragic enthusiasm that was reminiscent of my father's enthusiasm in buying lottery tickets. I had taken it up as a responsibility back then to use my best effort to do something about this. Should I feel content that my ethical obligation toward that man trying to make a living in that traffic light against hardship has been fulfilled with this book? I hope that time will tell.

#### 1.4.1 Overview of the Rest of This Book

Chapter 2 is about the cognitive foundation that serves as a basis for organization (and further discusses the duality between the cognitive dimensions of emotion and reason). Chapter 3 poses design requirements and principles organizations should strive to satisfy. Chapter 4 discusses the limitations of hierarchical organization. The elements of our algorithmic theory of governance are presented in Chapter 5 wherein we also present specific designs of organizational systems. We conclude this book in Chapter 6 and further discuss open problems.