

Towards Computational Comparative Politics: modelling the trajectories of political regimes

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From the cyclical theory of the evolution of political systems attributed to Polybius in the second century BCE, through the ‘iron law of oligarchy’ of Michels, to the evolution of self-governing institutions due to Ostrom, there have been many attempts to analyse, explain, control and predict the trajectories of political regimes, institutions, organisations and other rule-based systems. Moreover, as the number of online communities proliferates, the need for such understanding, and the insight it would offer for designing and operating fair and sustainable mechanisms of self-governance, becomes increasingly pressing, in order to offer citizens a ‘better’ quality of life in the Digital Society.

It may be that the trajectories of such systems are affected by how ‘well’ they address (inter alia) three fundamental challenges for self-governance: firstly, making information available for socially productive purposes, in such a way that a diverse collective can not only more readily and rapidly reach a ‘right’ decision, but can also act on it effectively; secondly, how to strike a balance between majority preference and expert judgement; and thirdly, ensuring that the limits of potentially unrestricted self-modification are neither too strict to inhibit innovation nor too loose to enable some form of tyranny, thereby providing the material conditions for human flourishing and the benefits of social existence.

Through an ongoing study of classical Athenian democracy, political science has shown how the Athenians addressed each of these challenges: firstly, through knowledge management processes that provided a superior capacity for resolving public collective action problems [1]; secondly, Aristotle’s procedure for relevant expertise aggregation which offered a process for collective decision-making which was both ‘democratic’ and ‘epistemic’ [2], and thirdly, designing a legitimate, stable and effective form of collective self-governance which avoided tyranny in all its various guises [3].

By applying the methodology of socially-inspired computing [4], we have tried to formalise and operationalise these political studies, in algorithmic form. In particular, we have developed: a model of interactional justice which uses social networking to transform subjective opinion into ‘collective knowledge’ [5]; an operationalisation of design principles for knowledge management which provide the basis for decentralised fair and sustainable common-pool resource allocation [6]; a study of democratic tolerance for political dissent which allows critics to expose inconsistencies between core values and current practices and in ways in which the interaction between the knowledge produced by ‘Rulers’, ‘Police’ and ‘People’ agents can evolve to prevent tyranny through collective action and accommodate institutional self-regulation [7]; an algorithm for relevant expertise aggregation which combines evolutionary computing and deliberative voting, thereby taking into account the judgement of experts and the preferences of the majority [8]; and an animation of Ober’s first principles theory of Basic Democracy, which shows that basic democracy principles of legislation and entrenchment can mitigate the risks of an ‘entropic’ tendency towards oligarchy, autocracy or majoritarian tyranny [9].

This work has at least three implications. Firstly, it has some import for historical political science, for example, that the description of classical processes was sufficiently detailed to enable a precise algorithmic specification and implementation, and that the Athenians were themselves learning and innovating ‘on the fly’ rather than relying on some external authority. Secondly, it has implications for the public understanding of *politics*, providing insight into the purpose and functioning of civic education, civic discourse and civic dignity. Thirdly, it offers general design principles for engineering socio-technical systems for the Digital Society, stressing that ‘democratic governance’ needs to be considered as a primary design requirement from the outset, not something to be grafted on at some indiscriminate point in the system life-cycle.

In conclusion, comparative politics is a field of political science characterized by an empirical approach based on the comparative method. Comparative politics involves the study of national politics through examination of political institutions, international politics through the conflicts between countries. It analyses both comparisons at one time between organisations and states, and comparisons over time within the trajectory of a single organisation or state, emphasizing key features of similarity and difference. In this sense, we would propose that this programme of work constitutes preliminary studies in *computational comparative politics*: the study of political institutions, regimes and processes and their comparative representation in algorithmic form, as a basis for dynamical analysis (e.g. using evolutionary game theory), computer simulation, and systems engineering.

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