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Methodology challenge in political science research

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Introduction

After a century of dominance in political analysis and political methodology, the *empirical approach* to political science research employing survey-based research and field collected empirical data have been decisively challenged by the research methodologies developed by means of the new technologies of the artificial: internet and web, big data and web semantics, artificial intelligence and artificial life, machine learning and data mining, artificial societies, polities, and cultures.

Fundamental areas in political science consequently require *advanced methodologies* able to provide support for finding the answers to basic questions concerning the human world as a hybrid world made up of multiple environments and realities, requiring specific kind of knowledge and cognition, and empowering humans for political participation.

The areas where this challenge appears with high relevance concern *political organization, governance, and policy*.

Empirical approach to political science

Undoubtedly at the heart of political science, *methods* and *measurements* shape a prominent place meant to provide for the relevance and validity of data, reliability of results, quality of performances, and ability to approach the causality of political phenomena on empirical grounds (Curini and Franzese, 2020).

Traditionally, political science research has been intensively based on experimental methodologies (Druckman et al., 2011) covering *classic methods* as well as *measurements* which basically employ survey research and statistical analysis with a solid background in empirical data (Buttolph Johnson et al., 2020). As such, they provide for specific structural-functional representations, analysis, causality-based explanations making possible predictions, and control of the political system defined in the cybernetic terms of the classic system theory (Easton, 1953, 1965).

Deeply marked by the diffusion of technological innovation of computers, networks, and internet, the second half of the 20th century has emphasized the beginning of a substantial transformation of the human world into a hybrid world made up of both physical and virtual environments, as well as human and artificial agents able to simultaneously live in multiple worlds and learn from multiple immersive and augmented realities. Starting with the 1980s, the technologies of the web, wi-fi communications, GPS, and satellite data have provided support for the development of methodologies for accessing, and processing huge amounts of data, create and manage immense data flows, and globally available databases, allow easy individual as well as collective access to data on the internet and enhancing communication

on the socializing networks. Moreover, the theories on complex systems at all levels—social, economic, financial, political, communicational, and cultural—have emphasized the need for *methodologies* which could cover and eventually combine empirical data analysis and the advanced technologies of complex data and interactions in an equally complex mix of physical and artificial environments which constitute the human world of our time.

At least for the political research methodologies, this was the time of revealing new ways to understand and approach political phenomena. All this has been assimilated with a complex cultural change still undergoing at all societal and political levels on several fundamental dimensions:

First and foremost, besides its natural (physical) dimensions, the human world acquired virtual dimensions, provided by means of computers and networks. Their integration into a hybrid world was not just the sum of their attributes, but a deep re-configuration and change in the ways this hybrid world can be known. This has inspired research in the artificial cognition systems (Poli, 2001, 2006) such that ontology and epistemology studies have faced one of the greatest challenges in the areas of political, cultural, and social research (Voinea, 2020).

Secondly, the technologies of the artificial as well as the capacity to approach the complexity of social and political interaction in the social networks have stimulated the introduction of new concepts concerning the multiple realities, identities and capabilities humans get in immersive and augmented realities.

The types of agents and environments interacting in this hybrid world have revealed it as a complex system thus emphasizing the necessity of a paradigmatic change in the research methodologies which could cover the gap between the empirical-based and complexity-based approaches to political science research.

Complexity approach to political science

Electorate studies, and political behavior represent areas with most extensive development of methodological research going from agent-based to big data and internet-based types. Advanced technologies of the artificial, like artificial intelligence, artificial life, machine learning and artificial autonomous agents have provided support for the development of research methodologies (Voinea, 2020; Voinea et al., 2022) addressing the complexity of political and social systems by means of the agent-based modeling and simulation methodologies (Axelrod, 1995; Cederman, 1997; Vallier, 2017), artificial society (Epstein and Axtell, 1996), artificial polity (Cioffi-Revilla and Rouleau, 2010), and artificial culture (Axelrod, 1995). The high impact of new disciplinary areas like Social Simulation (Gilbert and Troitzsch, 2005), computational modeling (Taber and Steenbergen, 1995; Taber and Timpone, 1996) have been emphasized by the increasing relevance of such methodology for the study of political information processing, political reasoning and judgement, electoral, and voting behavior (Kim et al., 2009; Lodge and Taber, 2013).

The agent-based methodologies allowed for a paradigmatic shift from the empirical approach with positivist theoretical background toward constructivist approaches in culture and

political culture research (Lane, 1992; Wilson and Hodges, 1992; Axelrod, 1995).

Relevant as well as extensive in terms of classes of methodologies, text, content, and political discourse analysis has proved an explosive development by integrating empirical data analysis methods with methodologies employing Big Data, Data Mining, and Machine Learning. Moreover, web semantics as well as new concepts, and practices on the socializing network going from *emoji* to the deep analysis of a wide range of psychological phenomena have emphasized another paradigmatic shift toward contextual analysis of cultural phenomena (Thompson et al., 2006), and a strong interpretivist trend in social and political sciences, employing narratives, crowdsourcing, and a wide range of both traditional and innovative qualitative methods.

Qualitative and interpretivist approaches to governance, policy making and public value co-creation

One of the major transformations induced by the technological innovation based on computers, internet, and the sciences of the artificial is undergoing in the areas of political organization system and governance. From a classic cybernetics-based hierarchical architecture of both state and governance systems, the governance networking (Ansell, 2000; Bevir and Rhodes, 2003; Marsh, 2011; Torfing, 2012) has systematically developed such that it is co-existing and/or replacing old governance structures and data flows with a horizontal architecture based on networking and fast, effective data flows between groups, and communities participating in the policy making processes.

This new framework has fundamentally changed several key areas, like the public value co-creation, and political cultures. Moreover, it seems to be driving research methodology toward an essential paradigmatic shift from object- or event-based to meaning-based epistemology studies aimed at answering the most fundamental research questions concerning multiple worlds and realities, knowledge and cognition, communication, and interaction. Integrating a previously developed consistent research approach to methodology which covered narratives and traditional qualitative methods (Roe, 1994; Schlauffer et al., 2022), the interpretivist trend has represented a major challenge for revisiting research methodologies in political science (Bever and Rhodes, 2002).

Aims of a new design

While recognizing the value of methods and measurements in the empirical approach to the political science research, it is this deep transformation of the human world which requires a more advanced approach on *methodology* defined as the study of the research methods along with the concepts, principles, theories, and technological considerations which count in the elaboration of both the ontological and epistemological milieu of the domain.

For this reason, our section opens its framework such that Political Science Methodologies represents a much more comprehensive approach to the complex area of research methods and their conceptual and philosophical backgrounds defining the numerous schools of methodological thinking identifying positivist, constructivist, or interpretivist epistemic research communities.

Widening this section for including classic and innovative research methodologies opens new frontiers in methodology research in political science thus justifying our choice for a new section design, and our aim of joining the computational choices already made by almost all the other social sciences.

Author contributions

CV: Conceptualization, Writing—original draft, Writing—review and editing.

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