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Semantic Shifts of Democracy in Political Science Discourse

– A Diachronic Word Embedding Approach

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Abstract

Democracy, a contested ideal, has seen its meaning expand and contract in response to historical events, institutional change, and scholarly priorities. Despite extensive theoretical work on democratic models, a significant challenge remains in systematically quantifying how abstract political concepts evolve semantically over time, as traditional approaches have relied primarily on qualitative case studies or theoretical frameworks without empirical measurement of linguistic patterns. Yet little is known about how the term itself has evolved within political science discourse in the recent decades. This research is particularly significant given the global phenomena of democratic erosion and the increasingly multidimensional nature of democratic theory that has developed in scholarly discourse over recent decades.

This thesis applies a relational semantic framework, treating concepts as dynamic networks of associations, to over 6,000 articles published between 1971 and 2024 in the *American Journal of Political Science* (AJPS) and the *British Journal of Political Science* (BJPS). Using diachronic word-embedding models trained on bootstrapped sub-corpora, five semantic dimensions are constructed, electoral, liberal, participatory, deliberative, and egalitarian, based on anchor words drawn from the Varieties of Democracy framework and Democratic Erosion Event Dataset codebook. I then measure how closely "democracy" and a broader democracy–authoritarian dimension align with each dimension over time and across journals.

The findings reveal that while electoral principles remain foundational to democracy's scholarly conceptualization, a significant expansion has been incorporating liberal, participatory, and egalitarian dimensions. Academic discourse mirrors real-world democratic decline through the weakening association with deliberation and increased usage of terms related to erosion and backsliding. Journal-specific differences highlight distinctive normative priorities in how democracy is framed against authoritarianism. These semantic shifts illuminate how scholarly understandings of democracy evolve in response to both intellectual developments and global political challenges, demonstrating the value of computational approaches to conceptual analysis in political theory.

Keywords: democracy, meaning, semantic association, diachronic word embedding, relational theory

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Introduction

Democracy, as both an ideal and a practice, lies at the heart of modern political life. From ancient experiments in Athens to contemporary debates about rights, representation, and participation, democracy has been invoked to justify revolutions, shape constitutions, and guide social movements. Yet despite the prominence of democracy, scholars continue to debate its core meaning, measurements, and manifestations across cultural and historical contexts. While minimalist conceptions focus primarily on electoral competition (Dahl, 1989; Schumpeter, 2013), maximalist approaches integrate substantive outcomes like equality and justice (Beetham, 1999). Early research focused on the spread of democratic institutions after the Cold War, suggesting a wave-like progression toward liberal rule (Huntington, 1991; O'Donnell & Schmitter, 2005). However, more recent evidence suggests that democratic achievements can be fragile and reversible, as institutions erode slowly under the pressures like populism, polarization, and digital misinformation (Bermeo, 2016; Levitsky & Ziblatt, 2018).

This study brings a relational perspective to these debates by examining how the term democracy has changed in meaning in political science scholarship in recent decades. Rather than treating democracy as a fixed concept, the relational approach views it as a dynamic network of semantic associations that evolves through social and institutional interactions. In this view, democracy's meaning emerges not from isolated definitions but from its changing relationships with other concepts and practices across scholarly discourse (Goldberg, 2011; Mohr, 1998). Previous studies have traced institutional regressions (Bermeo, 2016), mapped national-level democracy indicators (Coppedge et al., 2011), or analyzed media discourse on democracy (Wevers & Koolen, 2020), but little is known about how academic definitions in peer-reviewed journals have changed. Nevertheless, through editorial decisions, methodological norms, and conceptual debates, these journals have played a pivotal role in shaping the terms in which democracy is studied and understood

To fill this gap, this research assembles a corpus of over 6,000 articles published between 1971 and 2024 in two leading political science journals: the *American Journal of Political Science* and the *British Journal of Political Science*. By applying diachronic word embedding techniques, two research questions are examined:

1. How has the meaning of democracy changed over time?

2. Do American and British scholarship exhibit distinct semantic trajectories, and if so, in what respects?

By quantifying shifts in the semantic associations between "democracy" and its constitutive principles, electoral, liberal, participatory, deliberative, and egalitarian, this research provides a systematic, longitudinal account of democracy's conceptual evolution in academic discourse. The analysis reveals not only the broadening of democracy beyond electoral foundations toward multidimensional conceptualizations but also fluctuations in democratic discourse that suggest resilience alongside erosion. Moreover, by comparing American and British journals, the study shows how scholars frame and prioritize aspects of democracy, reflecting different institutional legacies and scholarly cultures. This approach complements institutionalist definitions with a language-based, inductive perspective that reveals how understandings of democracy shift across contexts and time.

The remainder of the thesis proceeds as follows. The next section reviews the literature on democratic theory, backsliding, relational meaning, and its computational approaches. The data and methods section provides details on corpus assembly, preprocessing steps, dimension construction, and embedding techniques. Then the results of anchor word frequency trends, semantic alignment scores and regression tests are presented. The discussion covers theoretical and practical implications, recoginizes the limitations of this study, and suggests avenues for future research. Finally, a concluding chapter elaborates on the contributions of this study and the broader significance of understanding the evolution of democratic meanings.

Literature Review

Conceptualizations, Challenges, and Scholarly Discourse on Democracy

This section explores the complex nature of democratic theory, tracing its evolution from basic electoral definitions to more intricate frameworks that include liberal, participatory, deliberative, and egalitarian principles. Within this theoretical context, democratic backsliding is explored through recent cases such as Brexit and Trump's presidency. Then, this section discusses how various scholarly traditions, methodological orientations, and national institutional contexts influence the discourse of democracy in academic publications, particularly emphasizing the differences between political science journals in the U.S. and the U.K.

The Evolution of Democracy: From Minimalist to Multidimensional Conceptions

Democracy is a political concept that has been the subject of extensive scholarly debate and practical implementation for centuries. The conceptual history began in Ancient Greece with the emergence of the word demokratia in Athens in the 5th century B.C., which is derived from demos (people) and kratos (rule) (Hansen, 1999). In Athens, democracy manifested as a direct rule by free male citizens through assemblies like the Ecclesia, a system Aristotle analyzed but viewed skeptically as "rule by the poor," potentially degenerating into mob rule that threatened stability and wisdom in governance (Miller, 1998). This ambivalence toward popular governance persisted through the Roman Republic's mixed constitution and throughout medieval Europe, where democratic elements remained subordinate to monarchical and aristocratic power (Stasavage, 2016). The Renaissance revived classical political thought, yet democracy remained largely theoretical and suspect until the Enlightenment era, when thinkers like Locke and Rousseau reconceived popular sovereignty and government by consent as the foundation of legitimate authority (Robertson, 2015). However, the term underwent critical modification in the late 18th century, with Madison, Sieyès, and other constitutionalists distinguishing between direct democracy (viewed as dangerously unstable) and representative government (deemed both practical and prudent) (Dari-Mattiacci & Kehoe, 2020).

The mid-20th century marked a pivotal period in the semantic expansion of democracy as political scholars grappled with the aftermath of World War II and the ideological tensions of the Cold War (Sartori, 2016). The electoral principle emerged as democracy's foundational

modern conception when theorists framed democracy primarily through an electoral lens, equating it with competitive elections and majority rule (Schumpeter, 2013). This principle embodies the core value of making rulers responsive to citizens through periodic elections, as captured by Dahl's (1989, 2008) influential conceptualization of "polyarchy". This minimal concept defines democracy primarily through regular, free, and fair elections with universal adult suffrage and genuine competition between political alternatives (Coppedge et al., 2011). Such elections create the primary mechanism for peaceful leadership selection, accountability, and citizen consent, and voters can reward or punish incumbents, shape public policy, and confer legitimacy on governing institutions (Shapiro & Hacker-Cordón, 1999). While later democratic theorists would argue that this conception is insufficient on its own, the electoral principle remains indispensable: without genuine competition and universal suffrage, no other democratic ideal can take root.

The liberal principle arose in response to regimes that held elections yet violated basic freedoms, revealing the insufficiency of a purely electoral definition and emphasizing the protection of individual rights and constitutional safeguards (Morlino, 2004). Building on Dahl's polyarchy, theorists insisted on institutional guarantees, like civil liberties, judicial independence, and legislative checks to block majoritarian excess and protect dissenting voices (Dahl, 1989). Diamond (1999) drew a clear line between electoral and liberal democracy that the latter encompasses broader institutional guarantees, while Sartori (2016) argued that genuine democracy balances popular sovereignty (the will of the people) with constitutional limits to ensure stability and fairness. Similarly, O'Donnell and Schmitter (2005) showed that durable democratic transitions require not only voting procedures but also robust safeguards against arbitrary rule. In this light, liberal democracy demands not just the franchise, but a rule-of-law framework and effective separation of powers that together secure individual and minority rights (Morlino, 2004).

However, critics soon argued that focusing solely on electoral competition and procedural safeguards obscured democracy's deeper promise: empowering citizens to shape collective decisions (Mansbridge, 2011). Participatory democracy emerged in this context, driven by grassroots movements and demands for meaningful inclusion in political life (Della Porta, 2012). Barber (2009) argued that democracy requires active participation by citizens in all political processes, not merely at election time. Arnstein's "ladder of citizen participation" (1969) offered a typology for assessing the depth of engagement, from token consultation to genuine citizen control. At its core, the participatory principle holds that representative

institutions alone cannot realize democracy's full potential (Mansbridge, 2011). It values direct rule and continuous civic engagement through civil society organizations, social movements, and other mechanisms of direct democracy (Della Porta, 2012; Fung, 2006). By extending democratic practice beyond periodic elections to everyday civic life, this principle seeks to embed popular power across the fabric of governance.

Deliberative democracy rose to prominence as scholars sought to complement participatory approaches with a focus on the quality of public reasoning (Cohen, 2003; Dryzek, 2000). Critics of liberal democracy argued that elections and rights protections, even when robust, did little to ensure that collective choices reflected genuinely informed, considered judgments rather than narrow interests or emotional appeals (Habermas & Habermas, 1999). The deliberative principle therefore holds that legitimate democratic decisions must emerge from inclusive, respectful, and rational dialogue, emphasizing reasoned debate and consensus building as core components of democratic practice (Cohen, 2003). Habermas (1999) grounded this view in the ideal of communicative rationality, where participants engage as equals in seeking understanding, while Gutmann and Thompson (1996) argued that authentic legitimacy depends on the transformation of individual preferences through public discussion. By prioritizing consensus building, transparency of rationale, and mutual justification, the deliberative principle further enriches democracy, ensuring that policy outcomes carry the weight of collective, reasoned endorsement (Dryzek, 2000).

The egalitarian principle addresses a critical flaw in procedural democratic models. Formal political equality, such as universal suffrage and equal voting rights, can coexist with socioeconomic and cultural inequalities that marginalize groups and limit their political influence (Anderson, 1999; Young, 2002). Democratic theorists like Young (2002) and Fraser (2010) argue that disparities in income, education, health, or social status undermine individuals' ability to exercise political rights and shape collective decisions. Thus, true democracy requires not only equal legal status but also de facto capabilities of accessing resources and opportunities to participate, run for office, set agendas, and influence policy outcomes (Bohman & Rehg, 1997). This principle gained urgency amid rising global inequality and the growing recognition that formal equality often remains unrealized for marginalized communities (Anderson, 1999).

Despite democracy's widespread usage and importance in contemporary politics, there is no consensus on defining democracy, neither in theoretical frameworks nor in empirical

studies (Coppedge et al., 2011; Held, 2006). Competing perspectives continue to shape democratic discourse. For example, the majoritarian perspective emphasizes rule by the numerical majority, centralized authority, and efficient decision-making through simple majority rule, while the consensual model stresses power-sharing, institutional checks, and minority protections to prevent domination (Lijphart, 2012). Similarly, some contrast direct democracy, in which citizens participate directly in decisions through mechanisms like referenda, with representative democracy, where elected officials mediate public will through institutional channels (Manin, 1997). Amid this definitional pluralism, five core principles have crystallized in the literature: electoral, liberal, participatory, deliberative, and egalitarian (Coppedge et al., 2011; L. Diamond & Morlino, 2004). Each principle embodies a different facet of "rule by the people" and prioritizes different democratic values.

The evolution of democratic thought reflects a historical progression from minimalist procedural understandings toward increasingly comprehensive conceptions in democratic theory (Morlino, 2011; Warren, 2017). If early usages of democracy invoked little more than voting and election, later discourse layered on concerns for individual rights, citizen engagement, reasoned public deliberation, and substantive equality. This theoretical broadening suggests that references to democracy have become more semantically linked with each of the five principles over time, which leads to my first hypothesis:

Hypothesis 1 The concept of democracy has moved from a focus on the electoral principle alone to encompass increasingly strong associations with the liberal, deliberative, participatory, and egalitarian principles.

The Rise of Democratic Backsliding: Incremental Erosion in Contemporary Democracies

While early scholarship on democratization focused on transitions from authoritarian rule to democracy and democratic consolidation (O'Donnell & Schmitter, 2005), the post-1990s revealed that democracy's trajectory was neither unidirectional nor irreversible (L. Diamond & Morlino, 2004). As Huntington's (1991)"third wave" of democratization receded in regions like Eastern Europe and Latin America, scholars recognized the need for analytical frameworks to understand democratic regression and erosion (Bermeo, 2016).

Democratic backsliding involves the incremental deterioration of democratic institutions, norms, and practices, distinguishing it from sudden breakdowns via coups d'état or other forms of rapid authoritarian reversion (Bermeo, 2016). The gradual nature of contemporary

democratic erosion represents its most defining and dangerous characteristic. As Levitsky and Ziblatt (2018, p. 77) incisively observe, contemporary democracies "die slowly, in barely visible steps", making backsliding particularly challenging to detect, measure, and counteract, as each individual step may appear relatively minor when viewed in isolation, yet cumulatively leads to substantial democratic damage.

Different pathways of democratic backsliding have been identified. Executive aggrandizement concentrates power in the presidency or prime minister's office by weakening judicial independence and legislative oversight, emerging as the most common form of democratic erosion since the early 2000s (Bermeo, 2016). More subtle forms of electoral manipulation preserve a façade of competition while skewing media access, campaign finance, and district boundaries to favor incumbents (Waldner & Lust, 2018). Constitutional retrogression exploits legal ambiguities to repeal or rewrite institutional safeguards through courts or compliant legislatures (Huq & Ginsburg, 2017). Meanwhile, the gradual capture of independent media by ownership concentration, regulatory harassment, strategic lawsuits, and the tightening of controls on civil society organizations undermine the public sphere essential for accountability (Levitsky & Ziblatt, 2018; Lührmann et al., 2020).

The Brexit referendum and Donald Trump's presidency offer striking cases of these erosion mechanisms. The Brexit campaign capitalized on the cultural backlash against globalization and immigration, framing the EU as an elitist entity that undermined British sovereignty (Inglehart & Norris, 2016). This narrative of "the people" versus "the elite" intensified societal divisions, evident in sharp regional and generational voting disparities (Orhan, 2022). Concerns about democratic legitimacy arose due to the narrow victory margin and widespread misinformation, questioning the referendum's integrity (Bartels, 2024). Post-Brexit, the Conservative Party's shift toward populist tactics further strained democratic stability, prioritizing electoral wins over institutional integrity, a trend that aligns with broader analyses of populism's impact on democracy (Mudde, 2004).

Similarly, Donald Trump's ascent to the U.S. presidency in 2016 exemplified how majoritarian appeals can erode democratic guardrails. Trump framed his mandate as the unmediated "will of the people", leveraging a sympathetic right-wing media ecosystem that prioritized ideological loyalty over factual accuracy (Inglehart & Norris, 2016). The subsequent refusal to accept the 2020 election results and the January 6 Capitol attack underscored the risks of conflating electoral victory with unconditional legitimacy, as

executive aggrandizement and norm-shattering rhetoric combined to undermine public trust in electoral institutions (Orhan, 2022).

The broader digital age environment has only magnified these tendencies, as O'Connor & Weatherall (2019) demonstrate that misinformation age dynamics, where false beliefs seed rapidly through social ties and echo chambers, undermine the deliberative quality of democratic discourse. Faris and Donovan (2017) further depict how platform design and targeted messaging have enabled political actors to manipulate public opinion at scale, skewing citizens' perceptions of institutional legitimacy and fueling polarization that paves the way for incremental democratic erosion.

Behind these processes lie structural pressures that cause backsliding. Economic struggles and increasing inequality have destabilized democratic institutions and fueled support for populist or autocratic options (Funke et al., 2016). For instance, the global financial crisis in 2008 paralleled democratic regression in several regions, implying the link between economic shocks and governance instability (Bermeo, 2016). Polarized ideology further undermines democratic practices by supporting zero-sum political competition in which opponents are viewed as existential threats, so that illiberal strategies are justified that violate democratic norms in order to ensure that the opposing side is not elected (Levitsky & Ziblatt, 2018; McCoy & Somer, 2019). These pressures lead to the situation in which formal democratic arrangements remain in place while the substance of democracy is lost.

With democratic backsliding on the rise, there will likely be a parallel shift in academic scholarship, where researchers move toward adopting terminlogy, frameworks, and conceptual lenses that reflect the incremental character of democratic decline, giving rise to the second hypothesis:

Hypothesis 2 Scholars increasingly incorporate erosion narratives into their analytical language during periods of democratic decline.

Framing Democracy: Variations Across Academic Journals

The democracy concept varies across not only traditions in scholarship but also across journals publishing work on it. Editorial priorities amplify these differences, as journals tend to cultivate distinct intellectual communities with shared conceptual frameworks, methodological preferences, and normative orientations. These affect the way democracy is framed, measured, and evaluated in published research (Collier & Levitsky, 1997; Munck,

2009). These differences are not solely indicative of research agendas but also of wider discipline and regional environments in which journals are embedded.

Political science journals tend to define democracy differently than those in neighboring fields. Coppedge (2012) found that core political science journals like the *American Political Science Review* and *Journal of Democracy* use procedural and institutional definitions of democracy and emphasize elections, constitutional arrangements, and formal political rights. On the other hand, sociology journals tend to define democracy through power relationships, social movements, and informal political involvement (Dryzek, 2000).

Methodological focus also shapes these journals' construction of democracy. Munck (2009) illustrated how quantitatively focused journals tend to employ minimalist, electoral understandings of democracy that are amenable to quantifying with large-N comparative research to measure institutional features. These journals often prioritize empirical rigor over normative dimensions. In contrast, interpretive and qualitatively oriented journals emphasize thicker, normative conceptions of democracy, using case studies and comparative historical analyses to explore how power inequalities, discursive practices, and social conditions affect citizen participation (Bohman, 1999; Warren, 2017). These publications frame democracy as a contextually specific set of practices, shaped by historical legacies, cultural contexts, and normative ideals that resist simple quantification.

Regional scholarly cultures also leave their mark on how democracy is framed in academic journals. The structure of national institutions profoundly shapes these scholarly traditions. Democracy in the United States is based on a written constitution with a separation of powers between the legislative, executive, and judicial branches, creating a system of checks and balances designed to prevent the concentration of power (Cox & McCubbins, 2005). The federal structure distributes power between national and state governments, and the winner-take-all electoral system further shapes the dynamics of political representation (Gelman, 2009). Together, these features have fostered a scholarly community in which procedural definitions of democracy, formal theory, and rigorous empirical inference dominate flagship outlets like the *American Political Science Review* (Sigelman, 2006).

By contrast, the uncodified constitution and parliamentary sovereignty of the United Kingdom have encouraged a very different scholarly posture. Power derives from statutes, common-law precedents, and constitutional conventions developed over centuries (Bogdanor,

2009). The fusion of executive and legislature, where the prime minister and cabinet emerge from and remain accountable to Parliament, creates fundamentally different governance dynamics (King et al., 2013; Rhodes, 2003). British political scientists explore these evolving arrangements through narrative case studies and normative critique, probing how shifting conventions and power relations affect citizenship, identity, and social justice (Flinders, 2010).

If richer conceptualizations generate more frequent and stronger semantic links between democracy and the five principles, then systematic differences are likely in how the two journals associate those principles with the core term. These considerations point directly to a comparative prediction about semantic alignment:

Hypothesis 3 The British Journal of Political Science demonstrates a relatively stronger semantic associations between democracy and democratic principles compared to the American Journal of Political Science.

Relational Approaches to Meaning

The study of meaning represents a fundamental sociological endeavor, characterized by its dynamic and processual nature (Mohr, 1998). Berger and Luckmann (1991) observed that individuals align their interpretations through ongoing interaction, emphasizing that meaning is not inherent in objects or practices but arises from shared representations formed within specific social contexts. Expanding on this perspective, Pachucki and Breiger (2010) conceptualize meaning as a complex construct that emerges through intricate webs of cultural, historical, and institutional interactions. Instead of being a static entity, meaning is continually negotiated and reconfigured by social actors, reflecting the ongoing process of shared understanding.

Building on these insights, Goldberg (2011) further emphasized the fundamentally contextual nature of meaning that concepts derive meaning from their connections within broader discursive networks. This relational perspective suggests that a concept's identity is not formed in isolation but emerges through its connections with others in given historical and institutional settings.

Mohr's (1998) call to map cultural fields via co-occurrence networks provides an empirical approach to operationalize this relational view by constructing semantic networks in which nodes represent democratic principles and edges represent their co-occurences or proximities

in a vector space, it becomes possible to trace how democracy's "semantic neighborhood" evolves. Semantic associations thus emerge as a critical dimension of relational meaning, conceptualized as a dynamic network of conceptual connections. The meaning of any given concept is fundamentally shaped by its associations, underscoring the inherently interconnected and context-dependent nature of linguistic and social understanding (Goldberg & Singell, 2023). Relational theory in institutional sociology (DiMaggio & Powell, 1983) suggests that journals, professional associations, and policy networks actively shape concept usage. Examining how editorial networks or citation communities influence semantic associations can reveal the meso-level processes that drive the diffusion or fragmentation of democratic principles.

Any semantic association analysis is faced with validity challenges: changes in journal styles, optical character recognition errors in digitized archives, and variations in disciplinary vocabularies can all produce spurious evidence of change. It is therefore necessary that methodological improvements in diachronic corpora alignment (Kulkarni et al., 2015) and embedding space calibration (Hamilton et al., 2016) are made in order to guarantee that semantic drift observed is actually due to changes in understanding and not produced by the data.

This relational framework is applicable in the research of democracy, whose definition is neither fixed nor universal but continually evolves across political, cultural, and historical settings (Boese et al., 2022). Analyzing semantic associations of democracy provides critical insights into how democracy is constructed, contested, and redefined within academic discourse. To examine these dynamic semantic connections empirically, computational methods are promising analytic methods.

Computational Approaches to Semantic Analysis

Recent advances in natural language processing (NLP) allow us to empirically capture these semantic connections in large historical text corpora. Word embeddings and their diachronic extensions provide valuable tools in understanding how the concept and its semantic connections with associated terms change across time (Mikolov et al., 2013a). These word embedding models capture semantic connections by embedding words with similar semantic values in closer areas of the high-dimensional space on the basis of co-occurrence patterns in big corpora (Hamilton et al., 2016). By translating relational theory into quantifiable semantic

trajectories, these methods provide a robust framework for analyzing the evolving meaning of democracy (Kozlowski et al., 2019).

Several recent papers demonstrate how diachronic embeddings illuminate substantive social science questions. Kozlowski, Taddy, and Evans (2019) trace the shifts in semantic geometry of "class" in sociological texts; Best and Arseniev-Koehler (2023) map the shifting stigmatization of disease by social burden; and Rheault and Cochrane (2020) employ embeddings on parliamentary debates to uncover ideological drift in notions of governance. These papers show the strength of diachronic embeddings in both representing semantic change and resolving central questions of sociology and political science.

Previous studies investigating how the meaning of democracy shifts in text have mainly looked at political speeches or social media posts. Early research on democratic discourse used dictionaries and supervised learning models to spot major themes in political language (Grimmer & Stewart, 2013; Monroe et al., 2008). More recently, computational methods have enabled nuanced analyses of democracy's evolving meaning. Bonikowski (2017) applied qualitative content analysis and topic modeling to social media, showing how populist rhetoric constructs conflicting ideas of democratic legitimacy by pitting "the people" against "the elites. Wevers and Koolen (2020) employed word embeddings on historical Dutch newspapers to show how democracy shifted from procedural associations (e.g., elections) in the 1950s to more normative and international connotations (e.g., human rights) by the 1980s. Rodman (2020) applied dynamic embeddings to U.S. Supreme Court opinionsand identified corresponding semantic shifts in "equality" and "liberty" that mirror broader transformations in democratic discourse.

Despite these valuable contributions, a significant gap remains in the understanding of how democracy's meaning evolves within scholarly discourse. Academic journal articles are particularly well suited to fill this gap because peer review enforces a level of conceptual precision that is generally absent from news or social media. Journal authors must define their terms clearly, link them to prior work, and defend their conceptual choices before publication. Academic writing also reflects deep definitional work. These articles explicitly engage in definitional questions, challenge rival ideas, refine key terms, and develop new theoretical distinctions, making them ideal for studying how core concepts evolve. As a result, academic texts offer detailed and explicit reflections on what "democracy" means, how it should be measured, and which elements matter most. By tracing how these discussions change over

time, we can pinpoint exactly when certain aspects of democracy become more or less prominent.

Word embeddings have several advantages compared to methods like topic models, which assign documents to broad thematic clusters (Rodriguez & Spirling, 2022). In contrast to topic models, embeddings capture subtle, continuous semantic relationships between individual words, enabling precise analysis in political texts (Mikolov et al., 2013a). This granularity is crucial for tracing the changing semantic neighborhood of democracy over time. Moreover, embeddings measure distances between words and support operations, such as analogies, that uncover hidden conceptual connections (Mikolov et al., 2013a; Rodriguez & Spirling, 2022). These features make embeddings a powerful tool for studying democracy's dynamic meaning in scholarly corpora.

This paper tracks the semantic evolution of "democracy" through diachronic word embedding techniques, taking advantage of embeddings' capacoty to capture continuous semantic relationships and quantify concept drift. The analysis specifically focuses on the semantic associations between democracy and five core principles of democracy, the electoral, liberal, participatory, deliberative, and egalitarian. Training and aligning models on the *American Journal of Political Science* and the *British Journal of Political Science* achieves both precise time slicing and theoretical rigor. Journal-based approach ensures that detected shifts are indicative of actual scholarly debate and hence fill a significant gap in the literature on the changing meaning of democracy in the political science academy. The next section introduces the data and analytical strategies for testing my hypotheses.

Data and Methods

Data Collection and Preprocessing

To compile a representative corpus of political science scholarship, the study targeted two leading journals in the field: the *American Journal of Political Science* (AJPS) and the *British Journal of Political Science* (BJPS), spanning publications from 1971 to 2024. The collection was limited to research articles and book reviews, deliberately excluding front matter, back matter, volume information, editorial notes, and other non-research content to ensure analytical consistency.

Both journals were selected for several key reasons. First, the U.S. "winner-takes-all" system and the U.K. Westminster model share significant institutional similarities, e.g., electoral and legislative processes, facilitating meaningful comparison of scholarly analyses of comparable democratic systems (Lijphart, 2012). Second, while both journals maintain global authorship networks and international perspectives, they primarily concentrate on their respective regional political contexts, ensuring that observed differences in democratic framing reflect substantive conceptual variations. Finally, as two of the discipline's most prestigious, methodologically diverse, and widely cited publications, AJPS and BJPS offer a unique perspective on how the meaning of democracy has shifted in scholarly debate over more than five decades.

Data collection proceeded through a three-stage process. First, 4,375 articles were retrieved using the Constellate API (JSTOR), which served as the primary data source. Second, for articles unavailable through Constellate, manual downloads were conducted via Cambridge University Press (956 articles) and Wiley Online Library (843 articles) platforms, utilizing institutional access provided by Linköping University Library. Despite these efforts, 739 articles from BJPS remained inaccessible due to limitations in the university's subscriptions. These unavailable articles were consequently excluded from the analysis. To facilitate temporal comparison, the collected articles were organized into subcorpora by decade and journal publication.

A structured text preprocessing pipeline was implemented to standardize the corpus for analysis. Due to the manual downloading process from multiple sources, the acquired texts contained various forms of academic publishing metadata that required systematic removal. A custom set of stopwords was developed by extending standard English stopword lists with

terms commonly found in academic publishing metadata. These additional terms included publishing-related vocabulary (e.g., downloaded, doi, Wiley, volume, issue), institutional affiliations (e.g., Oxford, Cambridge, midwest, linköping), references to open-access policies (e.g., Creative Commons, open access), and month names.

Sentence-level preprocessing was then applied. First, the text was segmented into sentences using a natural language processing tokenizer, and each sentence was converted to lowercase to ensure consistency. Systematic filtering using regular expressions removed metadata patterns such as emails, copyright notices, conference presentation acknowledgments, and reference sections to eliminate non-substantive content. Additional cleaning steps involved the removal of URLs, numeric characters, custom stopwords, and unnecessary punctuation. By combining custom stopwords with targeted regular expressions, the pipeline ensured comprehensive noise removal, preserving the integrity of subsequent textual analysis. The number of articles, original word counts before preprocessing, and token counts after processing are summarized in Table 1.

Table 1. Article and Text Volume Metrics by Journal and Decade

Decade	American Journal of Political Science		British Journal of Political Science	
	Articles (Words)	Tokens	Articles (Words)	Tokens
1971-1980	472 (2,919,923)	1,726,759	325 (2,559,913)	1,448,357
1981-1990	435 (3,977,142)	2,392,325	264 (2,490,315)	1,443,350
1991-2000	538 (5,114,556)	3,147,906	279 (2,828,226)	1,641,830
2001-2010	593 (6,944,718)	4,316,805	529 (5,812,471)	3,422,037
2011-2020	1,242 (14,231,219)	8,864,092	823 (9,934,559)	6,096,198
2021-2024	360 (4,419,635)	2,629,907	314 (3,383,388)	1,913,057
Total	3,640 (37,607,193)	23,077,794	2,534 (27,008,872)	15,964,829

Note: The *British Journal of Political Science* had missing articles in early decades: 325 (50% of expected) in 1971-1980, 264 (50%) in 1981-1990, and 150 (35%) in 1991-2000, totaling 739 missing articles.

Word embeddings and Alignment Scores

To examine how closely democracy aligns with different principles of democracy over time, this study constructs word embeddings and computes semantic alignment scores through a

multi-step process. First, bigrams are detected and incorporated into the input to preserve compound concepts commonly used in political discourse. Next, a bootstrapping procedure is applied to each journal–time subcorpus to reduce the influence of sampling bias and enhance the stability of the embeddings. Finally, alignment scores between the word democracy as well as a broader democracy-authoritarian dimension and each principle dimension are calculated using cosine similarity. This metric quantifies the degree of semantic alignment, with higher scores indicating a stronger association with pro-democratic ideals and lower scores reflecting closer proximity to authoritarian language.

Bigram Construction for Embedding Input

Following sentence-level preprocessing, a bigram detection model was applied to identify frequently co-occurring word pairs that express compound semantic meanings (e.g., civil rights, political participation). Incorporating bigrams as analytical units was crucial for preserving the conceptual integrity of multi-word expressions commonly used in political science discourse.

To detect these meaningful collocations, Gensim's Phrases module (Řehůřek & Sojka, 2010) was employed to train bigram models on each subcorpus, using tokenized sentence lists as input. The model analyzes adjacent word pair frequencies and computes a collocation score to determine the strength of association between words, relative to their individual occurrence rates. Two key parameters, min_count and threshold were tuned to control how frequently a word pair must appear before being considered, and how strong their association must be to qualify as a bigram.

Model performance was evaluated by comparing the automatically generated bigrams against reference n-gram provided by the Constellate API. Precision, recall, and F1-score were calculated to assess how accurately the bigram model captured valid collocations (Burkov, 2019):

$$Precision = \frac{True\ positives}{True\ positives + False\ positives}$$

$$Recall = \frac{True\ positives}{True\ positives + False\ negatives}$$

$$F1 = \frac{Precision \times Recall}{Precision + Recall}$$

These metrics rely on the counts of true positives, which refer to bigrams correctly identified by the model and present in the reference set; false positives, which are bigrams detected by the model but not found in the reference set; and false negatives, which are bigrams present in the reference set but missed by the model. Based on these definitions, precision reflects the proportion of detected bigrams that are present in the reference set, recall captures how many reference bigrams were successfully identified, and the F1-score represents the harmonic mean of both metrics. Among the parameter combinations tested, the best-performing configuration was min_count = 10 and threshold = 5, with threshold = 8 yielding comparable results but with reduced noise[1]. To balance coverage and precision, the final bigram model was set to min_count = 10 and threshold = 8, and the trained model was serialized for use in subsequent word embedding construction and semantic analysis.

Word Embedding Models and Bootstrapping

Following bigram detection, the corpus for word embedding training was constructed using a bootstrapping procedure. For each journal–time window subcorpus, 25 bootstrapped samples were created by randomly sampling entire articles with replacement while preserving the original sample size. This strategy mitigates the instability of word embeddings due to over-reliance on individual documents and follows best practices for improving embedding robustness (Antoniak & Mimno, 2018). Each resampled article was segmented into individual sentences using a custom delimiter, and then each sentence was written to a new line for sentence-level processing. A pre-trained bigram model was applied to identify and merge frequent collocations into multi-word expressions. The resulting corpus for each bootstrap consists of tokenized, phrasified sentences used as input for word embedding training.

To examine how the conceptualization of democracy evolves, word embeddings will be trained separately for each journal-time subcorpus. Given the relatively modest token counts of the subcorpora and the nature of political discourse, which often includes infrequent yet meaningful terms, the skip-gram variant of the Word2Vec algorithm was used, as implemented in Gensim (Řehůřek & Sojka, 2010). The skip-gram model predicts surrounding context words given a central target word and is particularly effective for small to medium-sized corpora (Mikolov et al., 2013a). Its use of negative sampling, where true context words

[1] See Appendix 1.1 for precision, recall, and F1-score results for all tested parameter combinations.

are distinguished from randomly sampled noise words, enhances training efficiency and allows the model to capture subtle semantic relationships, especially for less frequent terms (Mikolov et al., 2013a; 2013b).

Each model was trained on the bootstrapped subcorpora with a vector size of 300, a commonly used dimensionality that balances performance and computational efficiency (Rodriguez & Spirling, 2022). The context window was set to 10, meaning the model considered the 10 words preceding and following each target word. Words that appeared fewer than 10 times in the corpus were excluded from training, and negative sampling was performed with 15 negative examples. Each model was trained for 10 epochs, which means the entire dataset was processed 10 times, allowing the model to refine its word embeddings and capture more accurate semantic relationships.

In total, 25 bootstrapped embeddings were trained for each of the 6 time periods, 2 journals, resulting in a total of 300 embeddings. These embeddings represent the semantic structure of the words in each time window and were used for further semantic analysis and conceptual shift tracking.

Dimensions and Anchor words

To operationalize the conceptual dimensions of democracy, this study draws on the Varieties of Democracy (V-Dem) framework, which outlines five key principles of democracy: electoral, liberal, deliberative, participatory, and egalitarian (Coppedge et al., 2019)[2]. For each principle, a set of anchor words was selected to represent both its pro-democratic and anti-democratic poles. The pro-democratic anchors were derived from the normative ideals embedded in the V-Dem conceptual scheme, for example, electoral integrity, civil liberties, and consensus. In contrast, the anti-democratic anchors were arised from the coding categories and key terms found in the Democratic Erosion Event Dataset codebook, which catalogs key mechanisms of democratic backsliding and autocratic strengthening (Baron et al., 2024). These included terms such as electoral authoritarianism, state repression, and coercion.

To assess how the word “democracy” semantically aligns with each of the constructed dimension vectors over time, a broader democracy-authoritarian dimension was constructed

[2] The V-Dem framework identifies two more principles of democracy, the majoritarian and consensual principles in addition to the five ones used in this study. The latter two are not included here due to the debate over whether majoritarianism and consensualism represent opposite ends of a single dimension rather than distinct principles (Coppedge et al., 2019).

beyond relying solely on the word vector for "democracy" itself. This dimension represents a comprehensive interpretation of democracy. It is defined by two sets of anchor terms, on one side, terms associated with democratic ideals, and on the other, concepts associated with authoritarianism or erosion. It provides a more interpretable and robust measurement for capturing the broader conceptual landscape of regime-type contrast, and provides a useful tool for tracking changes in alignment with democratic ideals over time.

To construct a semantic dimension for each principle, word vectors were averaged separately for the pro-democratic and anti-democratic anchors. The mean vector of the anti-democratic terms was subtracted from the mean vector of the pro-democratic terms, yielding a directional vector that represents the semantic axis of each democratic principle. The list of anchor words and corresponding dimensions is shown in Table 2. These axes were then used to project words from the corpus and evaluate their alignment with democratic or autocratic language use. The alignment of each word with these dimensions was then quantified by measuring its position using cosine similarity, which is defined as:

$$\text{Cosine Similarity} = \frac{\mathbf{A} \cdot \mathbf{B}}{\|\mathbf{A}\|\|\mathbf{B}\|}$$

where A and B are the vectors or dimensions being compared, and $\| A \|$, $\| B \|$ represent the Euclidean norms of the vectors. Cosine similarity values range from -1 to 1, with higher scores indicating stronger alignment with the pro-democratic pole (e.g., electoral integrity) and lower scores indicating stronger alignment with the authoritarian pole (e.g., electoral fraud). This approach enables a quantitative assessment of how closely concepts align with democratic versus autocratic principles across different dimensions.

Table 2. Anchor Word Sets Defining Democratic Principles and Democracy–Authoritarian Dimensions

Dimension	Positive Anchor Words	Negative Anchor Words
Electoral	Directly elected, Electoral competition, Electoral integrity, Multiparty, Free speech, Free press	Appointed, Appointment, Electoral authoritarianism, Electoral fraud, Single party, Censorship, Propaganda
Liberal	Independent judiciary, Legislative oversight, Transparent, Civil liberties, Privacy, Transparency	State intervention, Legislative supremacy, Corrupt, State repression, Surveillance, Corruption
Deliberative	Discretion, Rationale, Common good, Ideological diversity, Consensus	Emotional appeals, Hate speech, Self-interest, Polarization, Coercion

Participatory	Suffrage, Apportionment, Direct democracy, Politically active, Civic engagement, Mass participation, Decentralize, Decentralization, Decentralized	Disenfranchisement, Malapportionment, Bureaucratic politics, Apolitical, Apathy, Indifferent, Centralize, Centralization, Centralized
Egalitarian	Equality, Minorities, Ethnic minorities, Gender equality, Redistribution	Inequality, Ruling elite, Racial discrimination, Discrimination, Income inequality
Democracy-Authoritarian	Democracy, Polyarchy, Pluralism, Egalitarian, Consensual, Deliberative, Participatory, Liberal, Feminism, Social democracy, Representative	Dictatorship, Autocracy, Authoritarianism, Populism, Erosion, Coup, Fascism, Conservatism, Backsliding, Totalitarianism, Oligarchy

Several steps were taken to validate the constructed semantic dimensions and their corresponding alignment scores. First, to assess the specificity of the anchor word selection, the frequency of anchor words per 1,000 tokens was calculated for each subcorpus. As shown in Table 3, the relatively low occurrence rates across all dimensions suggest that the anchor words are not broadly distributed throughout the corpus but instead reflect a targeted and conceptually specific language[3]. This pattern supports the argument that the constructed semantic dimensions are grounded in meaningful, theoretically relevant contrasts rather than being dominated by general or commonly used vocabulary.

Table 3. Anchor Word frequency in Subcorpus per 1000 tokens

	American Journal of Political Science				British Journal of Political Science			
Dimension	Mean	Sd.	Max	Total	Mean	Sd.	Max	Total
Electoral	0.035	0.049	0.193	2.525	0.044	0.055	0.273	3.159
Liberal	0.049	0.128	0.641	2.919	0.076	0.25	1.42	4.556
Deliberative	0.061	0.075	0.346	3.642	0.084	0.129	0.834	5.050
Participatory	0.039	0.063	0.309	3.253	0.052	0.104	0.607	4.340
Egalitarian	0.106	0.153	0.662	6.369	0.117	0.166	0.768	7.038
Democracy-Authoritarian	0.122	0.26	1.313	16.163	0.183	0.408	2.249	24.2

Next, the classification accuracy of anchor words expected to fall at either pole of each dimension was evaluated, yielding an accuracy of around 70% across dimensions[4]. To further assess the face validity of the dimensions, the nearest neighbors, i.e., words that mapped closest to each pole of the dimensions, were examined across different time periods. Their

[3] See Appendix 1.2 for each anchor word frequency across journals and decades.
[4] The 80:20 train-test split was applied to all positive and negative anchor word groups. See Appendix 1.3 for full classification accuracy results.

meanings were found to align with the conceptual expectations of democratic and autocratic principles. Finally, Pearson correlation coefficients (r) were used to determine whether the five democratic principle dimensions (electoral, liberal, deliberative, participatory, and egalitarian) captured overlapping or distinct semantic content. The results revealed no substantial overlap or high correlation between the dimensions, suggesting that each dimension represents a relatively independent aspect of democratic discourse[5].

Regression Analysis

To analyze the relationship between the independent and dependent variables, two regression approaches were employed: one applied to each bootstrapped sample individually, and the other based on the averaged results across all bootstrap iterations.

Dependent Variable: Alignment Score

The dependent variable in this analysis is the alignment score, calculated as the cosine similarity between the following pairs of vectors:

- The word vector "democracy" and the democratic principle dimensions: electoral, liberal, deliberative, participatory, and egalitarian.
- The democracy-authoritarian dimension and the democratic principle dimensions: electoral, liberal, deliberative, participatory, and egalitarian.

These alignment scores reveal how closely the word "democracy" and the broader democracy-authoritarian dimension correspond to different theoretical conceptualizations of democracy. By tracking these scores over time, the analysis quantifies the alignment of the word "democracy" and the broader Democracy-Authoritarian dimension with various aspects of democratic discourse over time.

Independent Variable

Journal Dummy differentiates between the two journals included in the analysis. The variable takes the value of 1 if the article is from the British Journal of Political Science and 0 if it is from the American Journal of Political Science. This variable helps identify any potential differences between the two journals.

[5] See Appendix 1.3 for Pearson correlation coefficients across dimensions and dimensions pairs with democracy-authoritarian dimension.

Decade is a continuous variable that represents the time periods as integers ranging from 1 to 6, categorizing the data into six distinct time periods. This variable is designed to capture temporal trends in the conceptualization of democracy.

Dimension variable is categorical and represents the five principles of democracy: electoral, liberal, deliberative, participatory, and egalitarian. The electoral principle of democracy serves as the baseline for this variable. Therefore, the analysis compares all other principles (liberal, deliberative, participatory, and egalitarian) against the electoral principle.

Interaction term between Journal and Dimensions captures how the relationship between journal affiliation and democratic principles varies across contexts. This interaction term helps determine whether the two journals, the *American Journal of Political Science* and the *British Journal of Political Science*, differ in how they emphasize or conceptualize specific democratic principles or their alignment with democracy.

Interaction term between Decade and Dimensions captures how the relationship between the time periods (Decade) and the respective dimensions influences alignment with democratic or autocratic language. This interaction term allows the model to account for temporal shifts affecting the conceptual alignment of the democracy or democracy-authoritarian dimension.

Mixed-Effects Regression Model for Bootstrapped Results

A linear mixed-effects regression model is applied for this study due to the hierarchical structure of the data, where multiple alignment scores generated through bootstrapped models are nested within each subcorpus. This nested structure introduces potential dependence between observations within the same subcorpus, violating the independence assumption of standard linear regression models. The mixed-effects framework addresses this issue by incorporating both fixed and random effects, allowing for robust inference on both the overall relationships and the group-level variation (Muradoglu et al., 2023).

To examine how democratic concepts align across time and publication venue, two sets of linear mixed-effects models were estimated, each sharing the same underlying structure but differing in their dependent variables and predictor variables. The model is specified as follows:

$$y_{ij} = \beta_0 + \beta_1 x_{1i} + \beta_2 x_{2i} + \sum_{k=2}^{K} \beta_{k+1} x_{3k,ij} + \sum_{k=2}^{K} \beta_{K+k}(x_{1i} \times x_{3k,ij}) + \sum_{k=2}^{K} \beta_{2K-1+k}(x_{2i} \times x_{3k,ij}) + \zeta_i + \epsilon_{ij}$$

For both sets of models, y_{ij} is the cosine similarity (i.e., alignment score) computed from the j-th bootstrap sample within subcorpus i, and a random intercept ζ_i is included to account for repeated observations within the same subcorpus. β_0 is the overall model intercept, and ε_{ij} is the residual error term. The fixed effects in both models include a journal dummy $\beta_1 x_{1i}$, and a continuous Decade variable $\beta_2 x_{2i}$. The categorical predictor $x_{3k,ij}$ represents the democratic principle dimensions, with the electoral principle serving as the reference category. Each predictor was added to the model separately to assess its individual effect on the cosine similarity scores. A comprehensive model was then estimated by including all predictors and their interaction terms simultaneously.

In Model Set 1, the dependent variable is the alignment score between the word vector "democracy" and each of the five democratic principles (electoral, liberal, deliberative, participatory, and egalitarian). The interaction term $x_{1i} \times x_{3k,ij}$ accounts for potential differences between the two journals in their conceptual alignment of the democracy with each democratic principle. The interaction term $x_{2i} \times x_{3k,ij}$ captures how the alignment of the democracy with each democratic principle changes over time.

In Model Set 2, the dependent variable is the alignment score between the democracy-authoritarian dimension and the same five democratic principles. As in the first model, the interaction term between journal and the categorical variable dimension $x_{1i} \times x_{3k,ij}$ evaluates whether the association between different democratic principles and the democracy-authoritarian contrast varies across the two journals, and the interaction between decade and the categorical variable dimension $x_{2i} \times x_{3k,ij}$ assesses whether the relationship between the broader regime-type contrast and democratic principles shifts across time.

OLS Regression Model for Averaged Results

After completing the bootstrapping procedure, alignment scores were averaged across bootstrap samples for each subcorpus. These aggregated results representing independent observations were then analyzed using an Ordinary Least Squares (OLS) regression model. The OLS approach is methodologically appropriate here because the averaging process produces independent observations, effectively removing the hierarchical data structure that initially required a mixed-effects modeling approach. This complementary analytical strategy

serves as a robustness check, confirming whether the core relationships identified in the mixed-effects models persist in the aggregated data.

In all models, positive coefficients reflect a stronger semantic alignment with democratic language. All figures present raw data, not estimates from regression models.

Results

The following sections present the findings on how the semantic associations of "democracy" vary across democratic principle dimensions. A visual breakdown of how pro-democracy and anti-democracy anchor word usage varies across journals and time is presented in Figure 1. Figures 2 and 3 visualize alignment trends between each democratic principle dimension and both the democracy vector and the broader democracy–authoritarian dimension across journals and time periods. The y-axis represents mean alignment scores, with shaded bands indicating 92% confidence intervals derived from bootstrapped embeddings[6]. Table 4 shows the results of linear mixed-effects regressions predicting alignment scores between "democracy" and each democratic principle dimension. Table 5 extends this analysis by replacing the single word "democracy" with a broader democracy–authoritarian dimension. Changes in coefficients from one model to the next reflect the inclusion of additional variables and interactions. For robustness, Tables 6 and 7 report Ordinary Least Squares (OLS) regressions based on averaged alignment scores.

Democracy's Semantic Evolution Across Principles

Figure 1 captures the changing frequency of principle-specific anchor words over time. The electoral dimension displays a relatively flat trajectory across both the American Journal of Political Science (AJPS) and the British Journal of Political Science (BJPS). This suggests a stable, baseline understanding of democracy grounded in electoral mechanisms. Figure 2 complements this frequency-based perspective with a visual overview of the alignment scores between "democracy" and each of the five democratic principle dimensions across different decades.

A clear pattern emerges: the electoral dimension consistently exhibits the highest baseline semantic association with "democracy" throughout the entire time period. This observation is strongly supported by the regression results reported in Model 3 of Table 4. When the democratic dimensions are included in this model, the constant term, which represents the electoral dimension as the reference category, shows a significant positive association ($\beta = 0.083$, $p < 0.001$).

[6] The 92 percent confidence intervals exclude the highest and lowest of 25 bootstrapped scores.

The marked variation in semantic associations between "democracy" and the other principles, as reported in Model 3, further reinforces this pattern. Compared to the electoral dimension, all other dimensions exhibit significantly weaker semantic associations, as indicated by their negative coefficients. Specifically, the deliberative dimension exhibits the largest negative coefficient ($\beta = -0.093$, $p < 0.001$), followed by the liberal ($\beta = -0.074$, $p < 0.001$), egalitarian ($\beta = -0.047$, $p < 0.001$), and participatory ($\beta = -0.035$, $p < 0.001$) dimensions. This pattern indicates that, within political science discourse, "democracy" has predominantly been conceptualized through electoral frameworks.

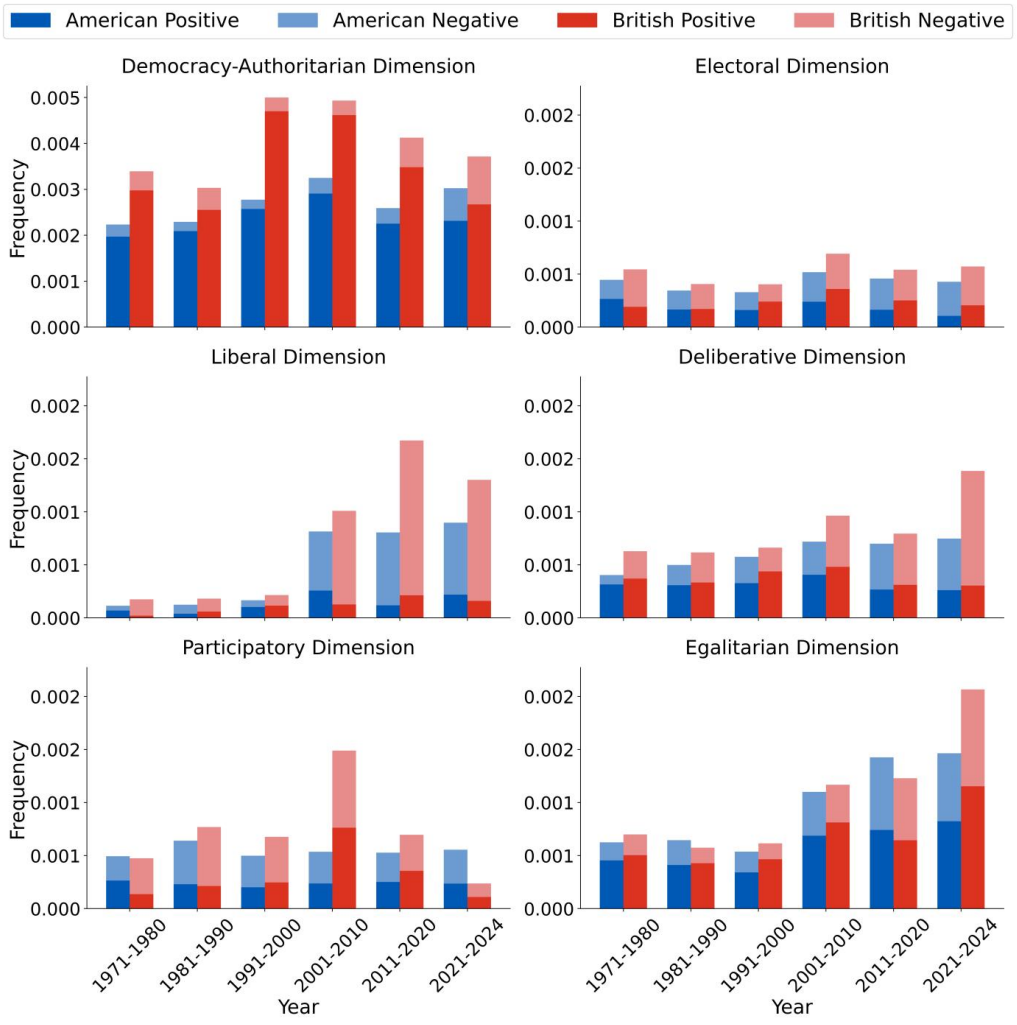

Figure 1. Temporal Distribution of Anchor Word Frequency by Journal and Democratic Dimension

Regarding temporal changes, the significant positive coefficient for Decade ($\beta = 0.006$, $p < 0.05$) in Model 2 indicates a modest but statistically significant general increase in the alignment scores between "democracy" and democratic dimensions over time. This coefficient represents the average rate of change per decade in the semantic association,

suggesting that regardless of which specific democratic principle is being examined, the term "democracy" has gradually strengthened its overall semantic ties to democratic principles between 1971 and 2024. However, it's worth noting that when we introduce dimension-specific temporal interactions in later models (Model 5 and 6 in Table 4), this main temporal effect becomes non-significant (β = -0.003, non-significant), indicating that the overall temporal trend is better explained by varying patterns across different dimensions rather than a uniform increase in democratic associations.

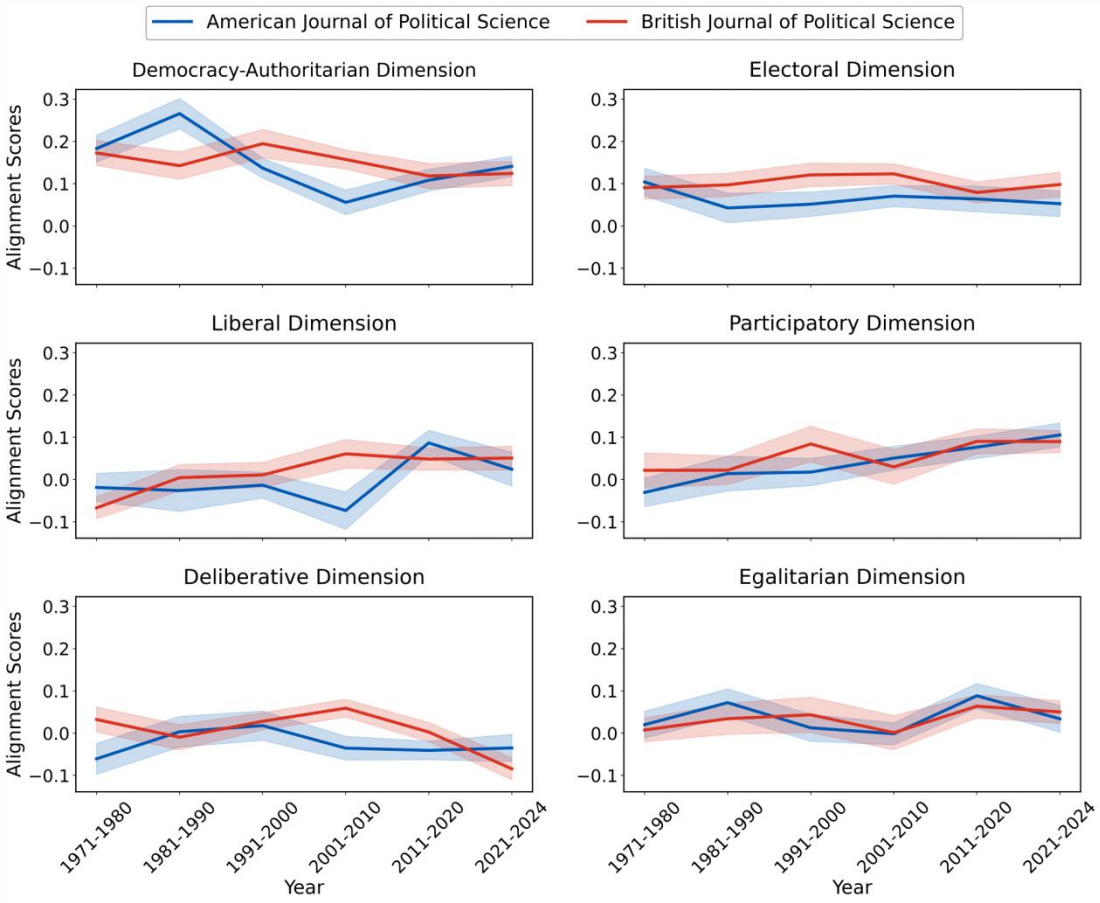

Figure 2. Alignment Scores between Democracy and Democratic Principle Dimensions across Time

Figure 2 visually reinforces these temporal dynamics. In particular, the liberal, participatory, and egalitarian dimensions show upward trends in their semantic similarity to "democracy" beginning in recent decades. These dynamics are further clarified in the interaction terms reported in Models 5 and 6 of Table 4. To illustrate, the liberal dimension's gap from the electoral baseline narrows from -0.136 in the 1970s to -0.126 in the 2020s, a small but statistically reliable shift toward the core meaning of democracy. Similarly, the participatory dimension with its decade interaction term (β = 0.023, $p < 0.001$) moves from -0.081 to 0.034, actually surpassing the electoral dimension in alignment with "democracy",

indicating that its initial substantial distance from the electoral dimension diminishes considerably over the decades. The egalitarian dimension also shows a significant positive temporal trend ($\beta = 0.008$, $p < 0.01$), though less pronounced than the liberal and participatory dimensions. Its coefficient in the 1970s would be -0.046, increasing to -0.006 by the 2020s.

Taken together, these findings provide strong empirical support for Hypothesis 1. The results indicate a clear evolution in the scholarly conceptualization of "democracy" from a predominantly electoral focus towards a more multidimensional understanding that increasingly incorporates liberal, participatory, and egalitarian principles. This expansion of normative concerns reflects a richer and more complex semantic space surrounding the term "democracy" in contemporary political science literature.

Table 4. Linear Mixed-effects Models Predicting Alignment Scores Between "Democracy" and Democratic Principle Dimensions

	1	2	3	4	5	6
Constant	0.022** (.007)	0.011 (.011)	0.083*** (.006)	0.064*** (.008)	0.092*** (.012)	0.074*** (.011)
Journal	0.021* (.010)			0.037*** (.011)		0.037*** (.011)
Decade		0.006* (.003)			-0.003 (.003)	-0.003 (.003)
Dimensions[a]						
Liberal			-0.074*** (.004)	-0.068*** (.006)	-0.145*** (.010)	-0.138*** (.010)
Deliberative			-0.093*** (.004)	-0.089*** (.006)	-0.074*** (.009)	-0.070*** (.010)
Participatory			-0.035*** (.004)	-0.025*** (.006)	-0.114*** (.009)	-0.104*** (.010)
Egalitarian			-0.047*** (.004)	-0.027*** (.006)	-0.075*** (.009)	-0.054*** (.010)
Interactions[b]						
Liberal x Journal				-0.013 (.009)		-0.014 (.008)
Deliberative x Journal				-0.008 (.009)		-0.008 (.008)
Participatory x Journal				-0.020* (.009)		-0.020* (.008)
Egalitarian x Journal				-0.042*** (.009)		-0.042*** (.008)
Liberal x Decade					0.020*** (.002)	0.020*** (.002)
Deliberative x Decade					-0.006* (.002)	-0.006* (.002)

Participatory x Decade					0.023*** (.002)	0.023*** (.002)
Egalitarian x Decade					0.008*** (.002)	0.008*** (.002)
Observations	1494	1494	1494	1494	1494	1494
NO. Groups	12	12	12	12	12	12
Log-Likelihood	2000	2000	2226	2240	2323	2340
AIC	-3992	-3992	-4437	-4457	-4622	-4647
BIC	-3971	-3971	-4400	-4393	-4558	-4557

Note:Standard errors are in parentheses.
[a] The reference category is electoral dimension.
[b] The reference category is the interaction of the electoral dimension with both the journal and the decade variables.
***p < 0.001, **p < 0.01, p < 0.05.
All models include random intercepts by Subcorpus.

Semantic Shifts in Times of Democratic Regression

In examining both the alignment scores and regression results, notable declining trends emerged that caught the attention of downward semantic shifts in democratic discourse. As illustrated in Figure 2, the alignment scores between the word "democracy" and the democracy-authoritarian dimension demonstrate a clear downward slope from the 1980s to the 2000s for the British Journal of Political Science (BJPS), and from the 1990s to the 2010s for the American Journal of Political Science (AJPS), followed by a slight rebound in more recent years. This pattern suggests that the semantic alignment between "democracy" and pro-democratic ideals was temporarily weakened during these decades. Although the alignment scores remain positive, indicating that "democracy" continues to be associated with democratic values, the observed decline signals a subtle but meaningful weakening of these associations in how democracy is conceptualized and discussed within academic discourse during key periods of democratic crisis or uncertainty.

This semantic shift becomes particularly pronounced in the deliberative dimension. Relative to the electoral baseline, the deliberative dimension in BJPS steadily declines from the 2000s onward, while in AJPS it falls from near zero in the 1990s to sustained negative alignment thereafter. The regression results shown in Model 5 and 6 of Table 4 reinforce this decline, revealing a significantly lower alignment of the deliberative dimension compared to the electoral baseline ($\beta = -0.070$, $p < 0.001$), as well as a negative interaction with time ($\beta = -0.006$, $p < 0.01$). In the 1970s, the deliberative coefficient would be calculated as -0.076, further decreasing to -0.106 by the 2020s, indicating the semantic distance between deliberative principles and democracy has widened over time.

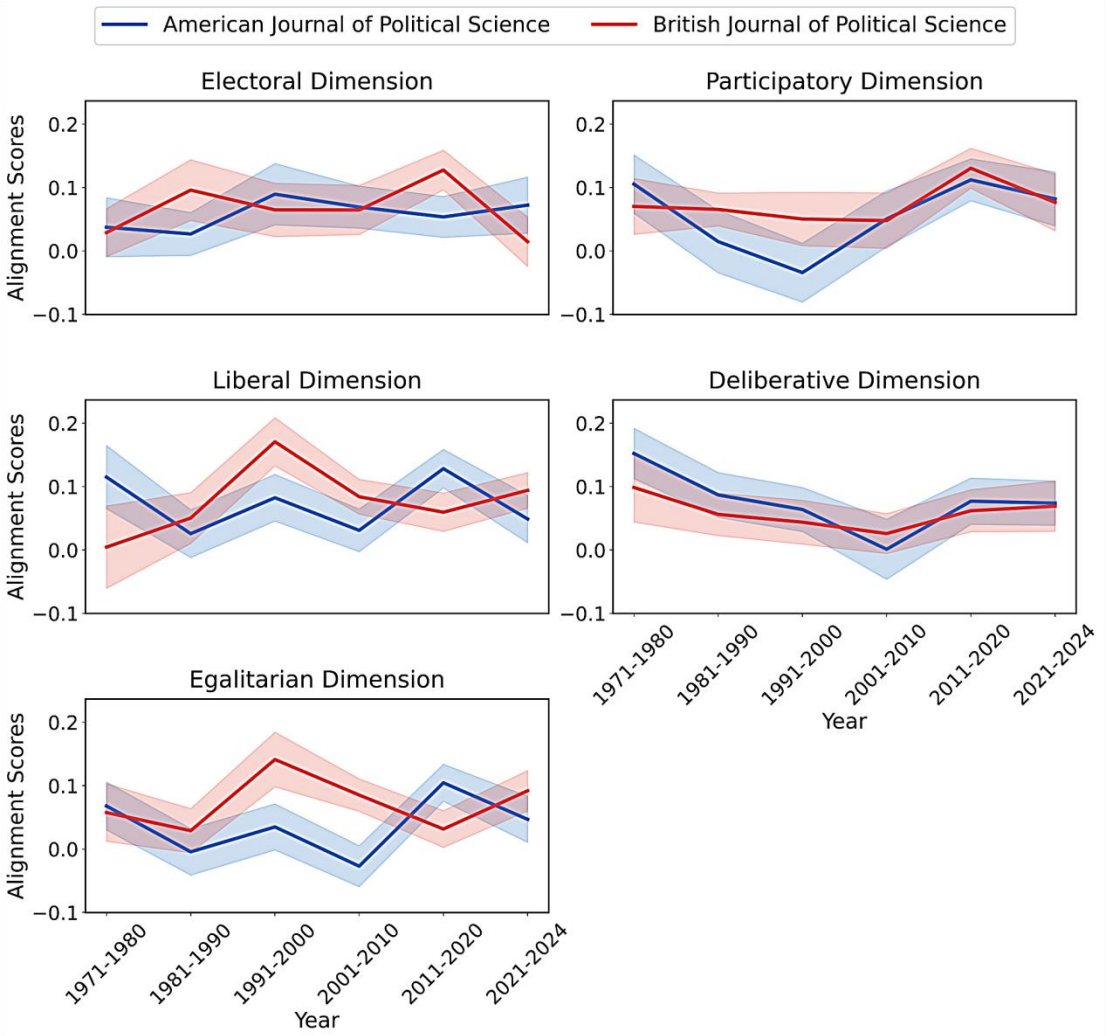

Figure 3. Alignment Scores between Democracy-Authoritarian Dimension and across Decade

Figure 3 further illustrates this downward trajectory by plotting deliberative alignment against the democracy–authoritarian spectrum. From 1971 to 2001, both journals show a declining alignment, indicating a weakening semantic link between deliberative values and the normative core of democracy. Regression results in Models 5 and 6 of Table 5 confirm this trend: despite initially strong positive associations ($\beta = 0.050/0.062$, $p < 0.001$), the significant negative interaction with time ($\beta = -0.013$, $p < 0.001$) reveals a steady erosion in this relationship relative to the electoral baseline. While deliberation is more associated with the democracy-authoritarian dimension than electoralism in the 1970s, by the 2020s this effect is weakly negative. Put simply, deliberation has fallen behind electoralism as a defining feature of democracies as opposed to authoritarianism.

Figure 1 further corroborates this downward semantic trajectory, highlighting a notable rise in negative anchor terms across several democratic dimensions during the 2011–2024 period.

This shift is especially visible in the democracy–authoritarian, liberal, deliberative, and egalitarian dimensions. This lexical trend reflects a broader scholarly concern with democratic backsliding and erosion, consistent with the second hypothesis.

Taken together, these findings underscore a semantic shift toward erosion narratives, as both the meaning and usage of "democracy" appear to adapt in response to contemporary political developments. The weakening alignment with deliberative ideals and the rise in negative language marks a downward turn in the semantic landscape of democracy, one that mirrors a broader erosion of democratic ideals in academic discourse.

Table 5. Linear Mixed-effects Models Predicting Alignment Scores Between Democracy-Authoritarian Dimension and Democratic Principle Dimensions

	1	2	3	4	5	6
Constant	0.060***	0.058***	0.062***	0.058***	0.049**	0.045**
	(.009)	(.015)	(.007)	(.010)	(.017)	(.018)
Journal	0.011			0.008		0.008
	(.013)			(.014)		(.014)
Decade		0.002			0.004	0.004
		(.004)			(.004)	(.004)
Dimension[a]						
Liberal			0.014**	0.014	0.014	0.014
			(.005)	(.007)	(.012)	(.013)
Deliberative			0.005	0.018*	0.050***	0.062***
			(.005)	(.007)	(.012)	(.013)
Participatory			0.002	-0.003	-0.009	-0.014
			(.005)	(.007)	(.012)	(.013)
Egalitarian			-0.007	-0.021**	-0.008	-0.022
			(.005)	(.007)	(.012)	(.013)
Interactions[b]						
Liberal x Journal				-0.000		-0.000
				(.010)		(.010)
Deliberative x Journal				-0.025*		-0.025*
				(.010)		(.010)
Participatory x Journal				0.010		0.010
				(.010)		(.010)
Egalitarian x Journal				0.028**		0.028**
				(.010)		(.010)
Liberal x Decade					-0.000	-0.000
					(.003)	(.003)
Deliberative x Decade					-0.013***	-0.013***
					(.003)	(.003)
Participatory x Decade					0.003	0.003
					(.003)	(.003)
Egalitarian x Decade					0.000	0.000
					(.003)	(.003)

Observations	1494	1494	1494	1494	1494	1494
NO. Groups	12	12	12	12	12	12
Log-Likelihood	1982	1982	1990	2004	2008	2022
AIC	-3956	-3956	-3967	-3985	-3991	-4010
BIC	-3935	-3934	-3929	-3921	-3927	-3920

Note:Standard errors are in parentheses.
[a] The reference category is the pair of electoral dimension and democracy-authoritarian dimension.
[b] The reference category is the interaction of the pair of electoral and democracy-authoritarian dimension with both the journal and the decade variables.
***p < 0.001, **p < 0.01, p < 0.05.
All models include random intercepts by Subcorpus.

Journal Differences in Democracy Framing

Model 1 in Table 4 examines whether the two leading journals in the analysis differ systematically in their framing of democracy. The positive coefficient for Journal ($\beta = 0.021$, $p < 0.05$) indicates that the *British Journal of Political Science* (BJPS) shows slightly but significantly stronger semantic associations between "democracy" and democratic principles compared to the *American Journal of Political Science* (AJPS). This difference remains robust even after controlling for dimensions and their temporal interactions in Model 6 ($\beta = 0.037$, $p < 0.001$), suggesting a consistent pattern across models. Figure 1 further supports this observation. Across most non-electoral dimensions, BJPS consistently shows higher frequencies of positive anchor words, especially in recent decades.

Figure 2 echoes this pattern: BJPS consistently displays higher alignment scores across most democratic dimensions. For instance, in the electoral dimension, BJPS remains consistently above AJPS across all decades, suggesting a more persistent procedural framing of democracy. In the liberal dimension, BJPS shows a gradual increase in alignment, while AJPS experienced a notable dip around the early 2000s, followed by a slow recovery, indicating a shift in its conceptual framing during that period. In the participatory dimension, BJPS leads during the 1990s, but the two journals converge after the early 2000s, with both exhibiting upward trajectories over time. A similar pattern of convergence also appears in the egalitarian dimension, where the gap remains small across all decades, pointing to a relatively shared framing of democracy in terms of equality.

The regression results from Models 4 and 6 in Table 4 reveal important nuances in these patterns. While the main journal effect indicates that the BJPS generally frames democracy in

closer association with democratic principles, the negative interaction terms suggest that this effect varies considerably across dimensions. In particular, the interaction between Journal and the participatory dimension ($\beta = -0.020$, $p < 0.05$), indicates that BJPS is less aligned with participatory framings than AJPS, relative to the electoral baseline. The values for BJPS (-0.124) versus AJPS (-0.104) suggest that participatory principles are more distantly associated with democracy in BJPS relative to its electoral baseline. Similarly, the strong negative coefficient for the egalitarian dimension ($\beta = -0.042$, $p < 0.001$), shows an even more pronounced difference between journals, with the association in the BJPS (-0.096) being substantially lower than in the AJPS (-0.054). Egalitarianism appears to be significantly less related to democracy in the BJPS when compared to its electoral framing.

Unlike in Table 4, where the BJPS shows a consistent and significant positive association with democratic principles overall, the main effect of Journal in Models 1 and 4 of Table 5 is small and not statistically significant. This suggests that BJPS and AJPS do not differ reliably in their overall placement of democratic principles relative to authoritarianism. In other words, while BJPS may conceptualize "democracy" in closer association with democratic principles in general, it does not necessarily define those principles in stronger opposition to authoritarianism than AJPS.

However, distinct patterns emerge in how each journal foregrounds specific democratic dimensions within this contrastive frame. As shown in Models 4 and 6 of Table 5, BJPS exhibits a significantly stronger association with the egalitarian dimension as opposed to authoritarianism ($\beta = 0.028$, $p < 0.01$). AJPS shows a value of -0.021/-0.022, while for BJPS this increases to 0.007/0.006, suggesting that BJPS more sharply defines equality as central to the ideological boundary between democracy and authoritarianism compared to AJPS. Conversely, for the deliberative dimension, the interaction is significantly negative ($\beta = -0.025$, $p < 0.05$). The coefficient for AJPS is 0.018/0.062, while for BJPS it decreases to -0.007/0.037, indicating that AJPS is more likely than BJPS to associate deliberative ideals with the contrast between democracy and authoritarianism. In contrast, the liberal and participatory dimensions show no significant journal interactions, suggesting these principles are treated similarly across both journals within the democracy–authoritarian spectrum.

These regression results are further corroborated by the temporal patterns shown in Figure 3. Across decades, the alignment scores of the egalitarian dimension are consistently higher in BJPS than in AJPS, reinforcing the interpretation that BJPS more strongly associates

equality with the distinction between democracy and authoritarianism. Conversely, the deliberative dimension displays a persistent trend of higher alignment in AJPS, mirroring the negative interaction observed in the regression and suggesting a more prominent role for deliberation in AJPS's contrastive framing of democracy.

Together, in terms of semantic proximity to the standalone word "democracy," BJPS demonstrates a stronger overall association with democratic principles than AJPS. Yet, when compared relative to the electoral baseline, AJPS places greater weight on participatory and egalitarian principles, indicating that BJPS is comparatively less aligned with these dimensions. Furthermore, in the contrastive democracy–authoritarian framing, AJPS leans more heavily on deliberative dimensions to mark democracy's opposition to authoritarianism, whereas BJPS most sharply elevates egalitarianism in that ideological boundary when compared relative to the electoral baseline. These patterns highlight that even within a shared commitment to democratic discourse, journals vary in the specific normative framings they choose to emphasize.

Table 6. OLS Regression Models Predicting Alignment Scores Between "Democracy" and Democratic Principle Dimensions

	1	2	3	4	5	6
Constant	0.022* (.009)	0.010 (.014)	0.083*** (.011)	0.064*** (.016)	0.092*** (.022)	0.074*** (.023)
Journal	0.020 (.013)			0.037 (.022)		0.037* (.018)
Decade		0.007 (.004)			-0.003 (.006)	-0.003 (.005)
Dimensions[a]						
Liberal			-0.076*** (.016)	-0.068** (.022)	-0.148*** (.031)	-0.140*** (.032)
Deliberative			-0.093*** (.016)	-0.089*** (.022)	-0.074* (.031)	-0.070* (.032)
Participatory			-0.035* (.016)	-0.025 (.022)	-0.114*** (.031)	-0.104*** (.032)
Egalitarian			-0.047** (.016)	-0.027 (.022)	-0.075* (.031)	-0.054 (.032)
Interactions[b]						
Liberal x Journal				-0.016 (.031)		-0.016 (.026)
Deliberative x Journal				-0.008 (.031)		-0.008 (.026)
Participatory x Journal				-0.020 (.031)		-0.020 (.026)

Egalitarian x Journal				-0.042 (.031)		-0.042 (.026)
Liberal x Decade					0.021* (.008)	0.021** (.008)
Deliberative x Decade					-0.006 (.008)	-0.006 (.008)
Participatory x Decade					0.023** (.008)	0.023** (.008)
Egalitarian x Decade					0.008 (.008)	0.008 (.008)
Observations	60	60	60	60	60	60
Adj. R2	0.026	0.034	0.389	0.403	0.561	0.595
AIC	-190	-190	-215	-212	-230	-231
BIC	-185	-186	-204	-191	-209	-200

Note:Standard errors are in parentheses.
[a] The reference category is electoral dimension.
[b] The reference category is the interaction of the electoral dimension with both the journal and the decade variables.
***p < 0.001, **p < 0.01, p < 0.05.

Robustness Checks

Tables 6 and 7 present OLS regression results based on aggregated mean alignment scores, serving as robustness checks for the primary linear mixed-effects models. The OLS regression results generally align with the mixed-effects findings in terms of direction and magnitude of effects, though with reduced statistical power due to the smaller sample size (60 vs. 1494 observations).

Both approaches identify similar patterns: the electoral dimension (reference category) has the strongest association with "democracy"; other dimensions show significant negative coefficients relative to the Electoral dimension; and similar temporal trends emerge, particularly the positive interactions for time with either liberal or participatory dimensions. The journal effect is consistently positive and of similar magnitude (β around 0.020-0.021) across both methodological approaches.

Table 7. OLS Regression Models Alignment Scores Between Democracy-Authoritarian Dimension and Democratic Principle Dimensions

	1	2	3	4	5	6
Constant	0.060*** (.008)	0.058*** (.012)	0.062*** (.012)	0.058** (.018)	0.049 (.028)	0.045 (.031)
Journal	0.010 (.011)			0.008 (.025)		0.008 (.025)
Decade		0.002			0.004	0.004

		(.003)			(.007)	(.007)
Dimension[a]						
Liberal			0.013	0.014	0.010	0.011
			(.017)	(.025)	(.040)	(.044)
Deliberative			0.006	0.018	0.050	0.062
			(.017)	(.025)	(.040)	(.044)
Participatory			0.002	-0.003	-0.009	-0.014
			(.017)	(.025)	(.040)	(.044)
Egalitarian			-0.007	-0.021	-0.008	-0.022
			(.017)	(.025)	(.040)	(.044)
Interactions[b]						
Liberal x Journal				-0.003		-0.003
				(.035)		(.036)
Deliberative x Journal				-0.025		-0.025
				(.035)		(.036)
Participatory x Journal				0.010		0.010
				(.035)		(.036)
Egalitarian x Journal				0.028		0.028
				(.035)		(.036)
Liberal x Decade					0.001	0.001
					(.010)	(.010)
Deliberative x Decade					-0.013	-0.013
					(.010)	(.010)
Participatory x Decade					0.003	0.003
					(.010)	(.010)
Egalitarian x Decade					0.000	0.000
					(.010)	(.010)
Observations	60	60	60	60	60	60
Adj. R2	-0.002	-0.010	-0.046	-0.081	-0.077	-0.120
AIC	-201	-210	-205	-198	-199	-193
BIC	-206	-205	-194	-177	-178	-161

Note:Standard errors are in parentheses.
[a] The reference category is the pair of electoral dimension and democracy-authoritarian dimension.
[b] The reference category is the interaction of the pair of electoral and democracy-authoritarian dimension with both the journal and the decade variables.
***p < 0.001, **p < 0.01, p < 0.05.

For the democracy-authoritarian dimension, the OLS models suffer from critical limitations with larger standard errors, lack of statistical significance, and negative adjusted R-squared values indicating poor explanatory power. These limitations highlight the advantages of the mixed-effects modeling approach for this dataset, which maintains higher statistical power while accounting for the hierarchical structure of the data.

Discussion

This study tracked the semantic evolution of democracy across 1971-2024 within political science discourse to understand how its meaning has shifted over time. The results largely align with theoretical work on democratic conceptualization, confirming the expansion from electoral to multidimensional principles, the rise of erosion narratives during democratic decline, and journal-specific framing differences. However, new findings add nuance to prior perspectives, notably the decline in deliberative democracy's alignment with "democracy", the distinct normative priorities in how journals contrast democracy, and a pattern of fluctuation marked by periods of erosion followed by partial recovery. These insights enrich our understanding of the concept of democracy evolves in response to theoretical and empirical developments.

Expansion of Democracy's Meaning

The findings support the hypothesis that the conceptualization of "democracy" has widened from its historical electoral origins to cover liberal, deliberative, participatory, and egalitarian aspects. The evidence confirms that the electoral principle is still the original root of the meaning of democracy, consistent with Schumpeter's classic definition of democracy emphasizing competitive elections and procedural governance (Schumpeter, 2013). At the same time, the results of the study show that the concept of democracy has expanded significantly as it has evolved to include civil liberties, citizen engagement, and equity considerations. The multidimensional shift in democratic theory provides new evidence to Held's (2006) synthesis of democracy's evolution from minimalist to multifaceted models. Distributional-semantic work by Dahlberg, Axelssion, and Holmberg (2020) also shows increasing co-occurrence of "democracy" with terms like "rights" and "equality" in dozens of languages, consistent with patterns in political science journals in this research.

Narratives of Democratic Erosion

Despite this broadening, the decline of deliberative associations runs against expectations but aligns with scholarship on backsliding and polarization. Bermeo's (2016) typology of incremental institutional erosion, undermining the deliberative forums essential to deliberative democracy, provides a structural account for why deliberative ideals may lose ground in practice and discourse. This pattern resonates with McCoy and Somer's (2019) computational analysis demonstrating how affective polarization crowds out deliberative framing in

legislative debates, mirroring the observation of waning deliberative links in journal texts. The trend also supports the second hypothesis that academic discourse reflects narratives of democratic erosion during political decline, consistent with theories describing the gradual undermining of democratic norms through subtle, often legal means (Levitsky & Ziblatt, 2018). Historical evidence, including post-Cold War developments and recent populist surges, shows increased negative framing during democratic downturns (Bonikowski, 2017). However, the data also reveals a more complex pattern of resilience, in which scholarly attention to deliberation rebounds following crises (L. J. Diamond, 2019). These fluctuations suggest an adaptive quality within academic discourse not fully captured by backsliding models, highlighting the dynamic interplay between academic narratives and political developments while demonstrating how deliberative democracy, though normatively prized, remains particularly vulnerable to erosion in both scholarly discourse and political practice.

Journal-Specific Framing Differences

Finally, the study partly supports the third hypothesis that the British Journal of Political Science (BJPS) exhibits stronger overall associations between "democracy" and its underlying principles compared to the American Journal of Political Science (AJPS), but the story is more nuanced than predicted. AJPS shows the prominence of participatory and egalitarian themes and relies most heavily on deliberative dimensions to mark the democracy–authoritarian boundary. BJPS's tendency to elevate egalitarianism in contrastive framing mirrors a British tradition rooted in parliamentary sovereignty and historical-institutionalist inquiry, where narrative case studies and normative critique treat equality as the ultimate test of democratic legitimacy (Flinders, 2010). AJPS's emphasis on deliberation to distinguish democracy from authoritarianism aligns with an American procedural discourse that foregrounds the rules, stages, and formal procedures of public reasoning (Dahl, 1989). While AJPS remains anchored in formal institutions and electoral mechanics, the unexpected rise of participatory and egalitarian themes in AJPS, suggests that quantitative-procedural venues are increasingly open to richer normative concerns, especially when methodological advances (Marzagão, 2015) make it possible to measure participation and equality at scale, pulling these dimensions closer to the core semantic field of democracy in AJPS.

Practical Implications, Limitations and Future work

The methodological approach using academic journals as data sources advances theoretical understanding of how complex political concepts evolve. The peer-review and precise nature

of journal discussion provide an empirically robust basis for monitoring semantic change (Coppedge et al., 2011). This approach contributes to theoretical frameworks for understanding conceptual evolution by demonstrating how scholarly communities negotiate and transform meaning within specialized discourse. The major drawback is the temporal lag involved in journal publication. Journal publication often involves peer review and thereafter introduces a delay between carrying out research and publication. Therefore journal articles are not always reflective of contemporary political developments or immediate discourse change (Bonikowski, 2017). These delays may obscure semantic changes in contemporary periods of fast political transformation. Moreover, gaps in the early *British Journal of Political Science* (BJPS) coverage further constrain longitudinal work and may not reflect earlier trends or bias historical comparisons across journals.

The building of semantic dimensions along the Varieties of Democracy (V-Dem) framework extends theoretical research on democracy by providing quantifiable indicators for previously abstract concepts. By operationalizing electoral, liberal, deliberative, participatory, and egalitarian dimensions, this research enables more precise theoretical discussions of democratic evolution. This dimensional framework potentially transforms how researchers conceptualize and measure democratic discourse across disciplines. Nevertheless, the inherent subjectivity in anchor word selection reveals theoretical tensions in how democracy is conceptualized across different scholarly traditions. This limitation highlights the contestable nature of political concepts and suggests that theoretical pluralism is necessary when studying ideologically charged concepts (Mikolov et al., 2013a). Likewise, the technical challenges in the representation of nuanced concepts by word embeddings imply theoretical hurdles in computationally representing complicated ideas.

The usage of diachronic word embeddings together with the bootstrapping process is a computationally effective approach to model semantic evolution across time. With bootstrapping, the study mitigates the instability particularly in smaller corpora (Antoniak & Mimno, 2018). Nevertheless, the unaligned temporal factor across embedding spaces may constrain the cross-decade semantic dimensions comparability.

The regression model developed enables practical analysis of variation across publications and time periods, giving researchers tools to discover patterns and forecast trends in conceptual change. These methodological improvements may be applied to concepts beyond democracy, increasing the applied toolset in semantic analysis in political science and

neighboring fields. Although this method improves semantic quantification, word embeddings are neutral regarding causal mechanisms behind conceptual change. This shortcoming emphasizes the importance of incorporated explanatory frameworks that are hybrid in nature and integrate computational and interpretative methods to account not only for how concepts evolve, but also why concepts develop in certain directions.

To enhance practical applications, future research should supplement journal-based analysis with contemporaneous data sources like speeches or policy reports (Rheault & Cochrane, 2020). This multi-data source strategy would offer more complete and dynamic insights into conceptual change between various discourse communities. Addressing subjectivity in anchor word selection could be achieved by expert panels or crowdsourcing approaches, so that broader agreement and cultural appropriateness in dimension construction is ensured (Kozlowski et al., 2019). Application of sophisticated natural language processing methods like the transformer-based (e.g., BERT) or dynamic word embeddings, would enable researchers to better account for intricate multi-word phrases and improve longitudinal constancy that existing methods may obscure. Cross-validation with external data sources, such as survey data or empirical democratic performance metrics, would strengthen connections between scholarly discourse and real-world democratic trends (Coppedge, 2012). This validation would enhance the practical relevance of semantic analyses for policy applications by confirming whether scholarly semantic shifts align with public perceptions or institutional changes. Complementary qualitative or experimental approaches are also needed to explore causal mechanisms behind observed semantic shifts, providing practical explanations for why differences in discourse occur across journals, time periods, or theoretical traditions.

Conclusion

This study addresses calls for quantitative measurement of cultural meanings and their interplay with political and social structures (Mohr, 1998). Cultural sociologists highlight the dynamic and contested nature of concepts like "democracy", yet systematic quantification of these shifts remains rare (Bail, 2014; Glynn, 2023). Word embeddings have been demonstrated in recent scholarship to be effective in reflecting the semantic change of cultural concepts (Boutyline et al., 2023; Kozlowski et al., 2019). However, these studies tend to isolate meaning as an independent domain, investigating conceptual change without linking it to external institutional or temporal factors. This analysis extends this approach by applying semantic scores within traditional social science frameworks, using regression models to investigate how the meaning of democracy evolves across time, scholarly venues, and democratic principles.

With reference to the semantic path of democracy in political science discussion, this research has wider implications in tracing conceptual change in varied contexts. The research shows that in political science journals, conceptual developments in democracy have extended from a narrow election emphasis to liberal, participatory, and egalitarian values. Yet it also reflects periods of erosion in deliberative ideals during times of democratic decline. These variations are echoed in how academic discourse evolves in responding to global political issues, including polarization and institutional decay, while the computational method sheds light on subtleties in semantic patterns that are relevant in addressing contested concepts in other fields. These patterns which are obscured in single-case or qualitative studies, underscore the value of large-scale, computational approaches to conceptual analysis. The analysis further indicates that cultural meanings in academic discourse are shaped by external political realities, such as democratic backsliding, and distinct scholarly cultures, as evidenced by differing emphases in the *British Journal of Political Science* and the *American Journal of Political Science*.

While this study advances the measurement of conceptual change, the entrenched challenges of capturing nuanced meanings through computational methods and the temporal lag in journal publications remind us that some cultural shifts remain resistant to detection. Future research integrating real-time data sources, advanced NLP techniques, and qualitative approaches can further illuminate the causal mechanisms driving these semantic transformations, offering a more comprehensive understanding of how democracy's

conceptualization in academic literature evolves in response to both scholarly debates and global political trends.

Appendix

Evaluation Metrics (Precision, Recall, F1-Score) Across Bigram Model Parameter Settings

Table I. Precision, Recall, and F1-score results for Bigram Model Parameter Combinations

Min_count	Threshold	Precision	Recall	F1-score
10	5	0.108	0.012	0.022
10	8	0.097	0.011	0.019
10	10	0.091	0.010	0.018
10	12	0.086	0.009	0.017
10	15	0.081	0.009	0.016
20	5	0.051	0.005	0.010
20	8	0.046	0.005	0.008
20	10	0.043	0.004	0.008
20	12	0.041	0.004	0.007
20	15	0.038	0.004	0.007
30	5	0.031	0.003	0.006
30	8	0.028	0.003	0.005
30	10	0.026	0.003	0.005
30	12	0.025	0.002	0.004
30	15	0.023	0.002	0.004
40	5	0.021	0.002	0.004
40	8	0.019	0.002	0.003
40	10	0.018	0.002	0.003
40	12	0.017	0.002	0.003
40	15	0.016	0.002	0.003

Anchor Word Frequencies by Democratic Dimension Across Journals and Time

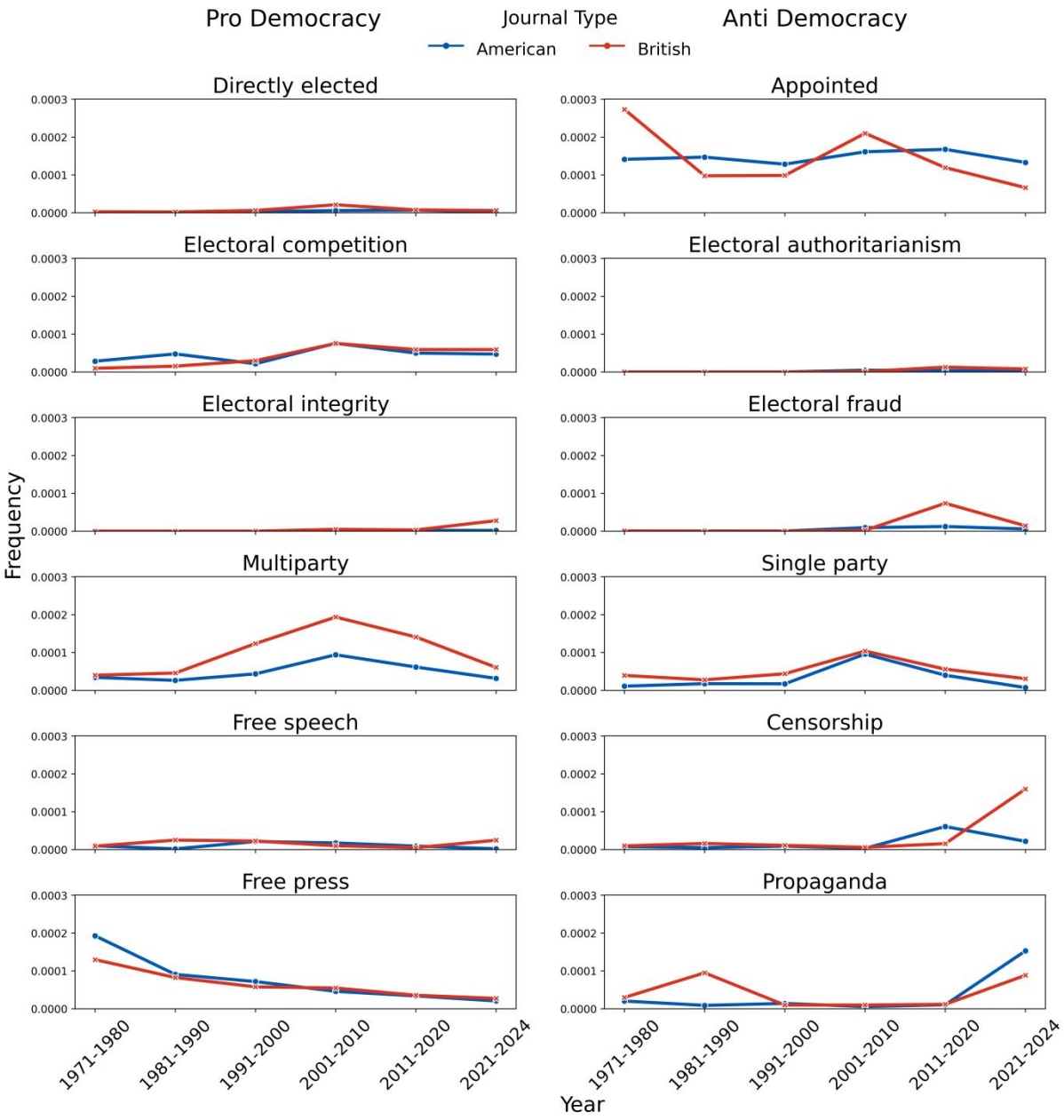

Figure I Anchor words of Electoral Dimension

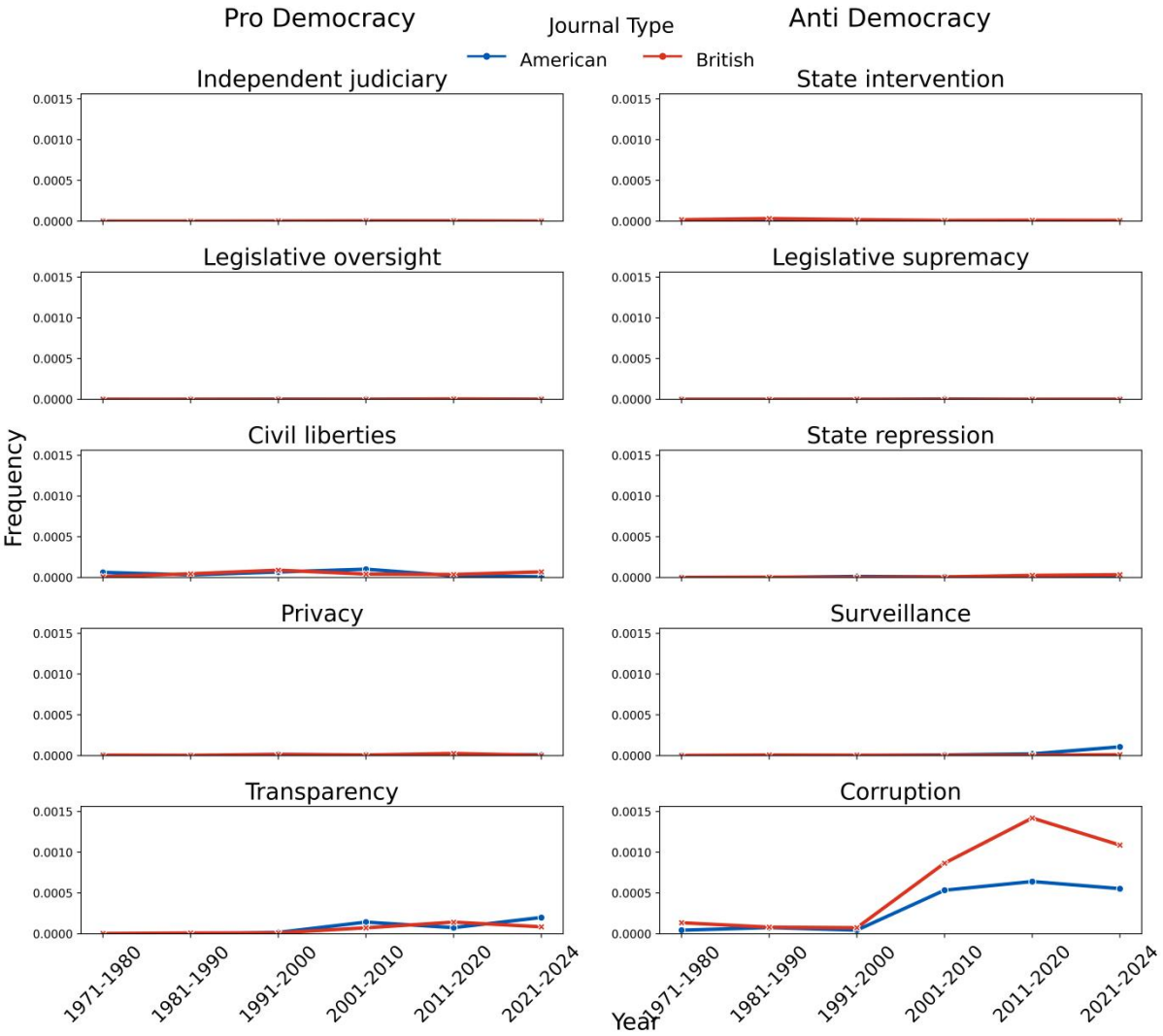

Figure II Anchor Words of Liberal Dimension

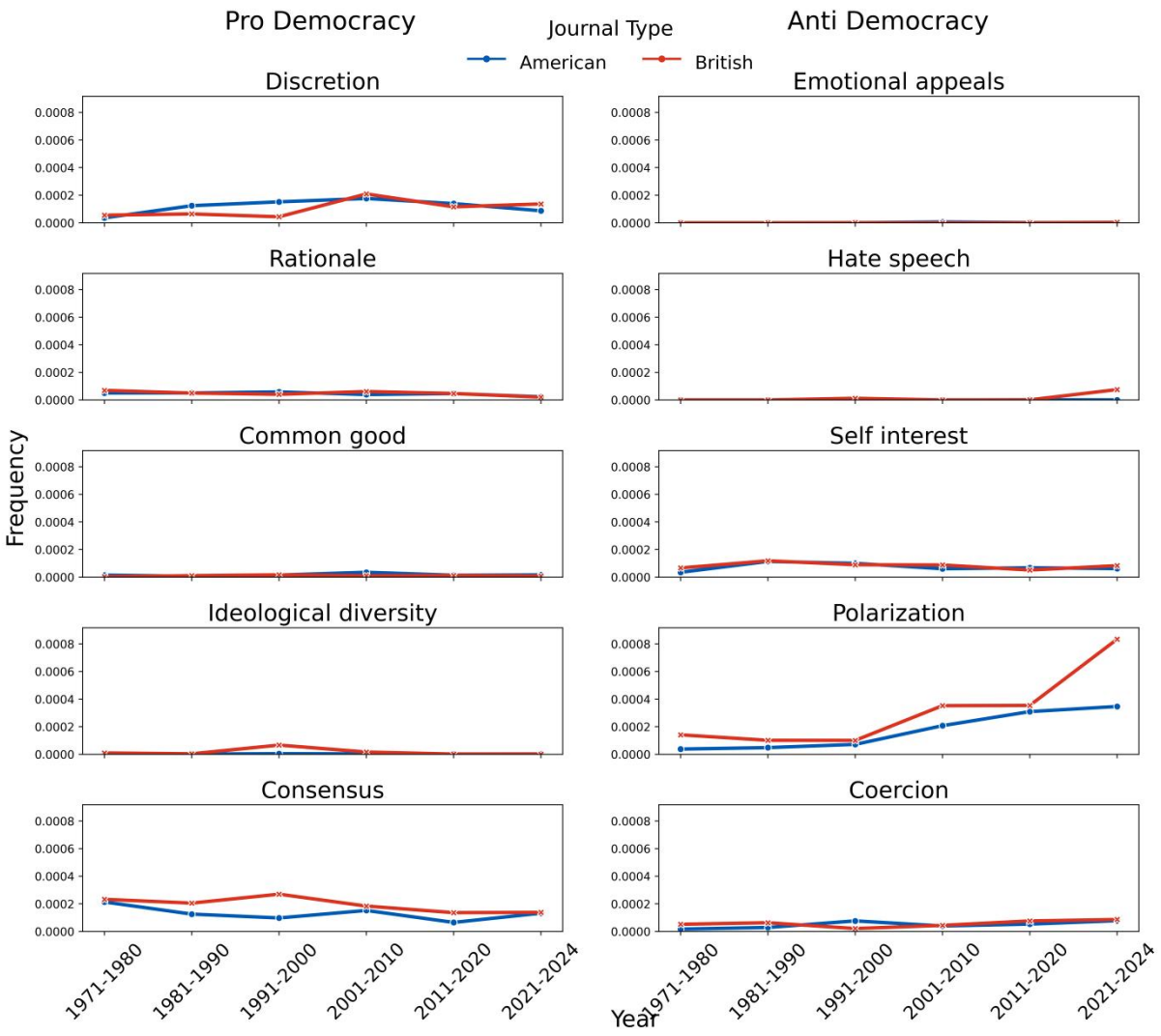

Figure III Anchor Words of Deliberative Dimension

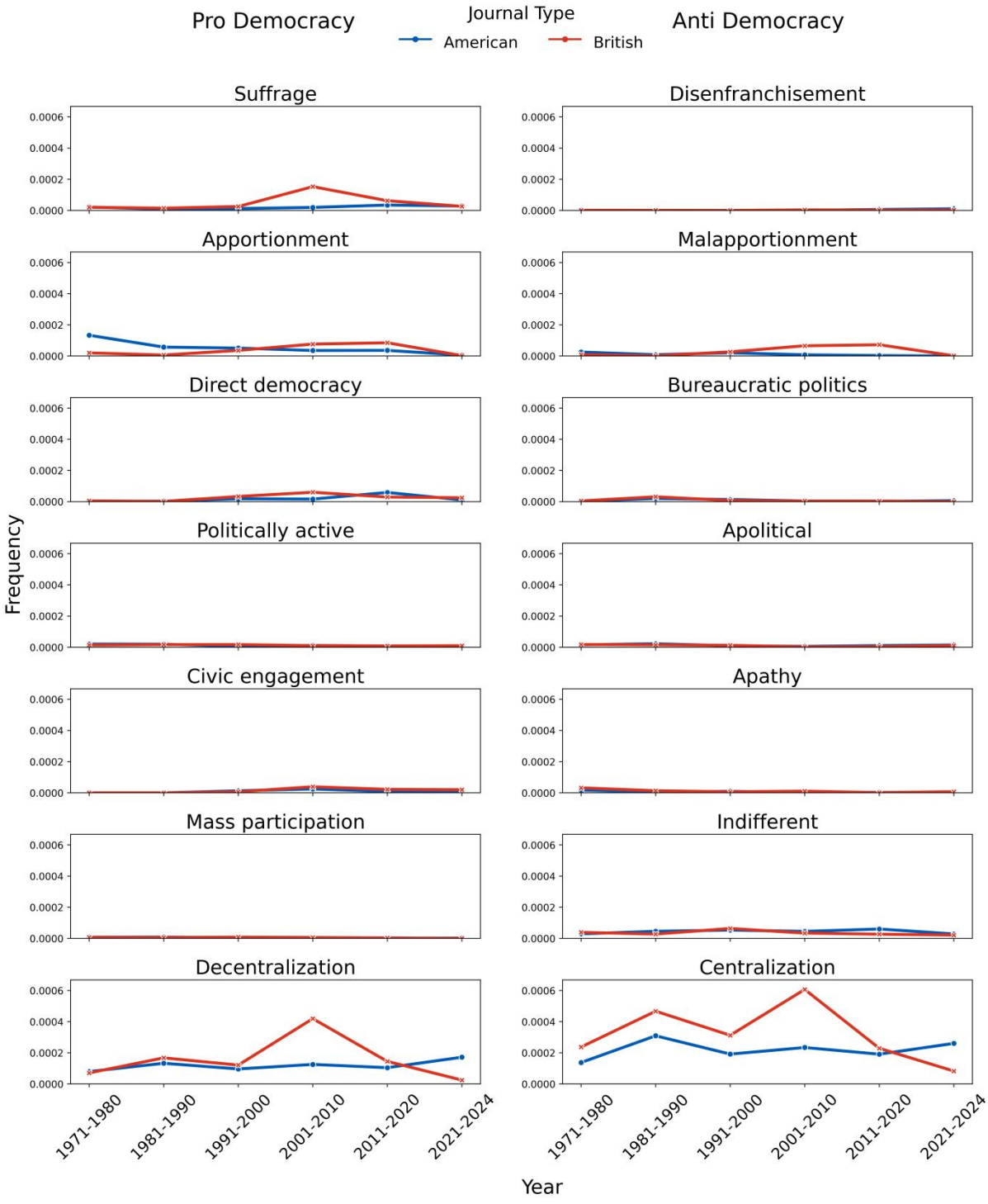

Figure IV Anchor Words of Participatory Dimension

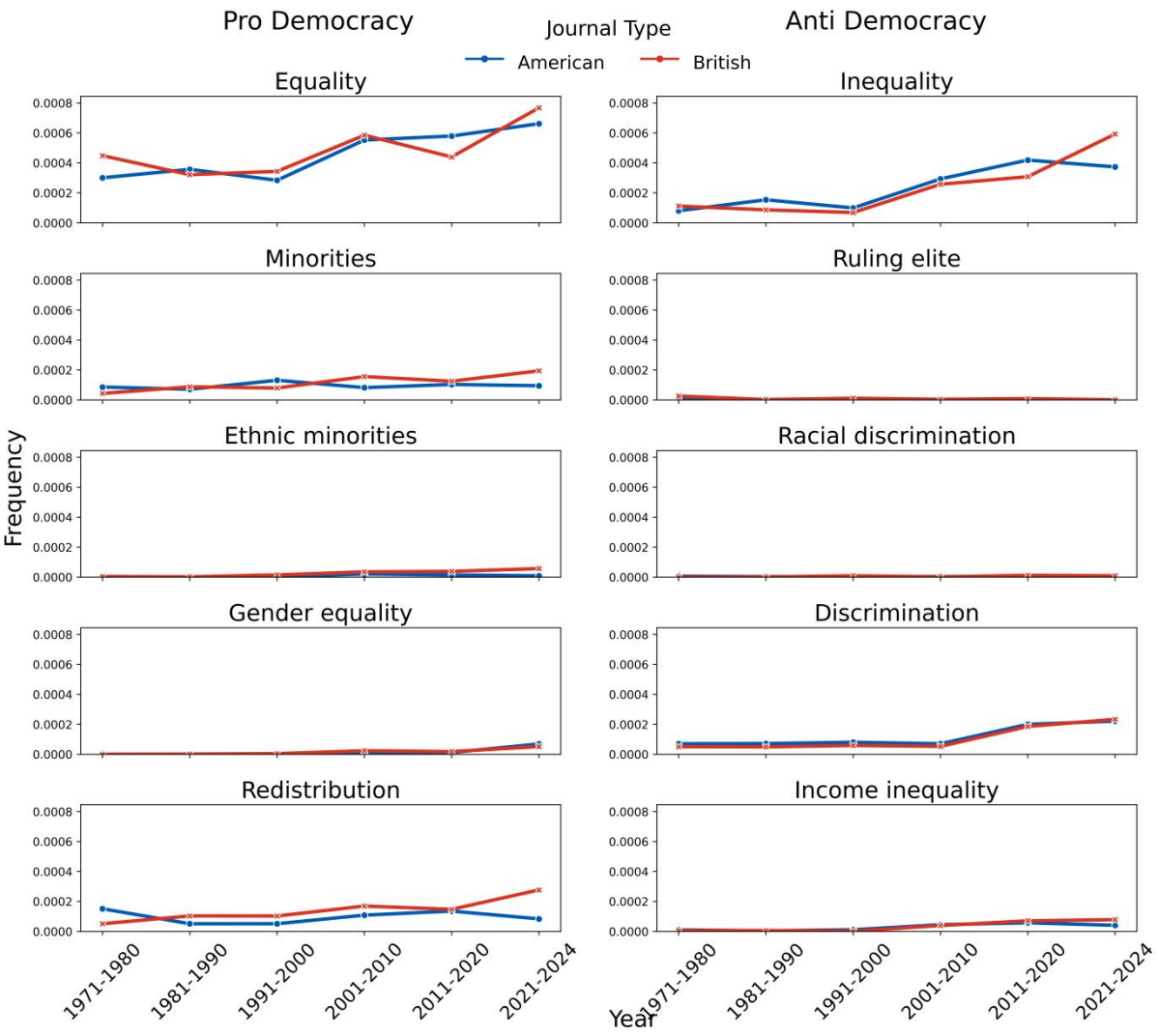

Figure V Anchor Words of Egalitarian Dimension

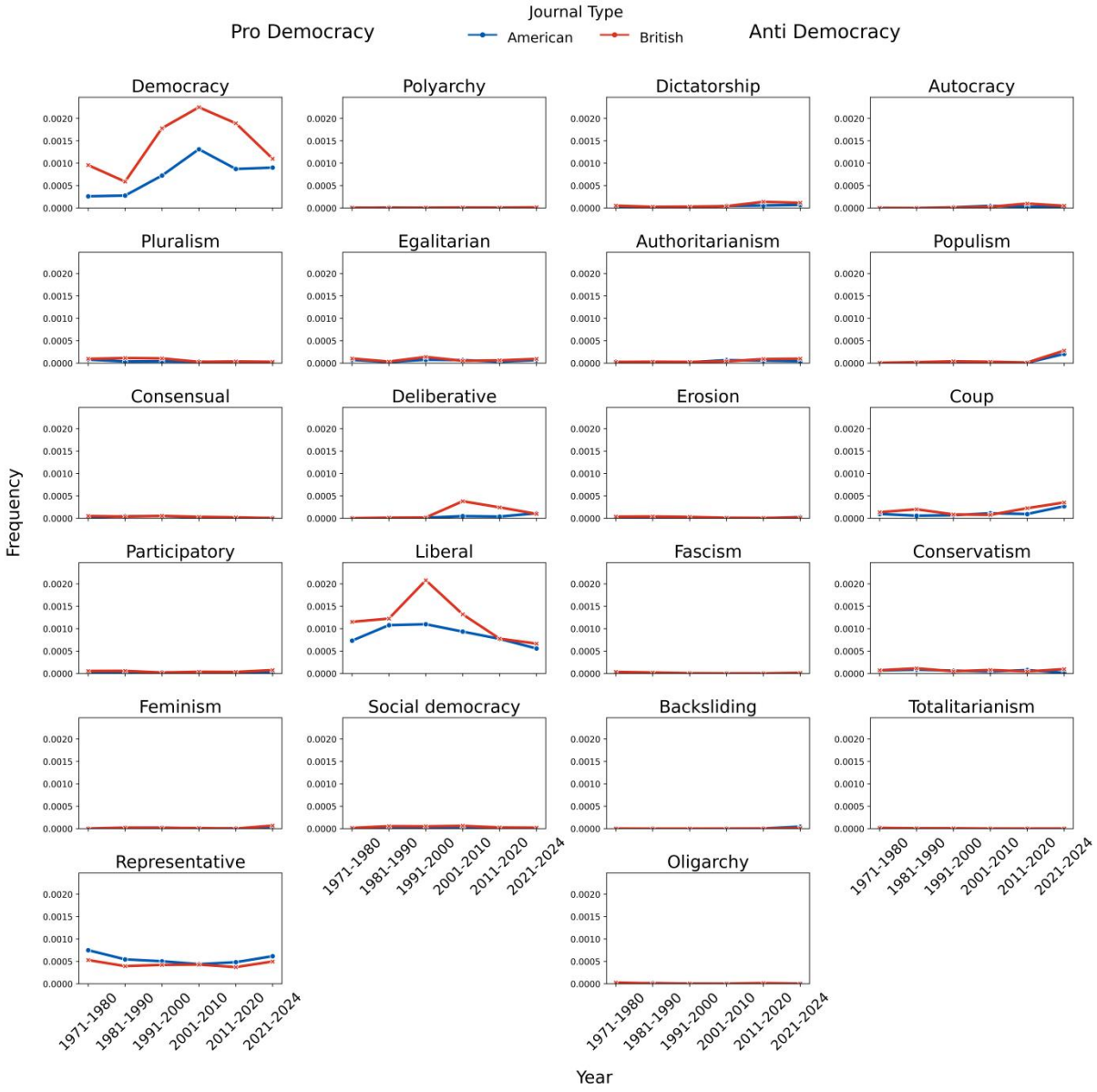

Figure VI Anchor Words of Democracy-Authoritarian Dimension

Validation for dimensions

Table II. Classification Accuracy of Anchor Words Across Subcorpus

Subcorpus	Train Accuracy (Mean)	Test Accuracy (Mean)
1971-1980 American Journal of Political Science	1.000	0.683
1971-1980 British Journal of Political Science	1.000	0.456
1981-1990 American Journal of Political Science	1.000	0.820
1981-1990 British Journal of Political Science	0.999	0.727
1991-2000 American Journal of Political Science	1.000	0.672
1991-2000 British Journal of Political Science	1.000	0.629
2001-2010 American Journal of Political Science	1.000	0.696
2001-2010 British Journal of Political Science	1.000	0.696
2011-2020 American Journal of Political Science	1.000	0.736
2011-2020 British Journal of Political Science	1.000	0.730
2021-2024 American Journal of Political Science	1.000	0.690
2021-2024 British Journal of Political Science	1.000	0.722

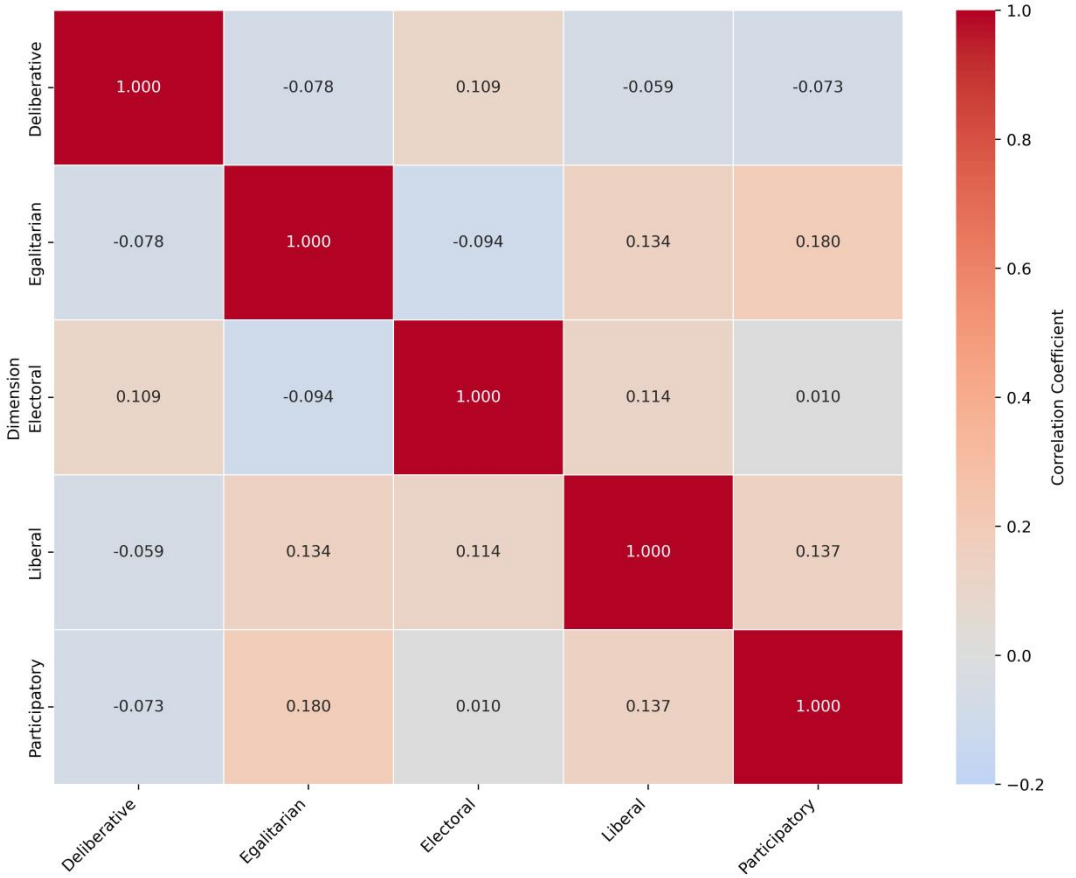

Figure VII Pearson Correlation Coefficients between Dimensions for Model Set

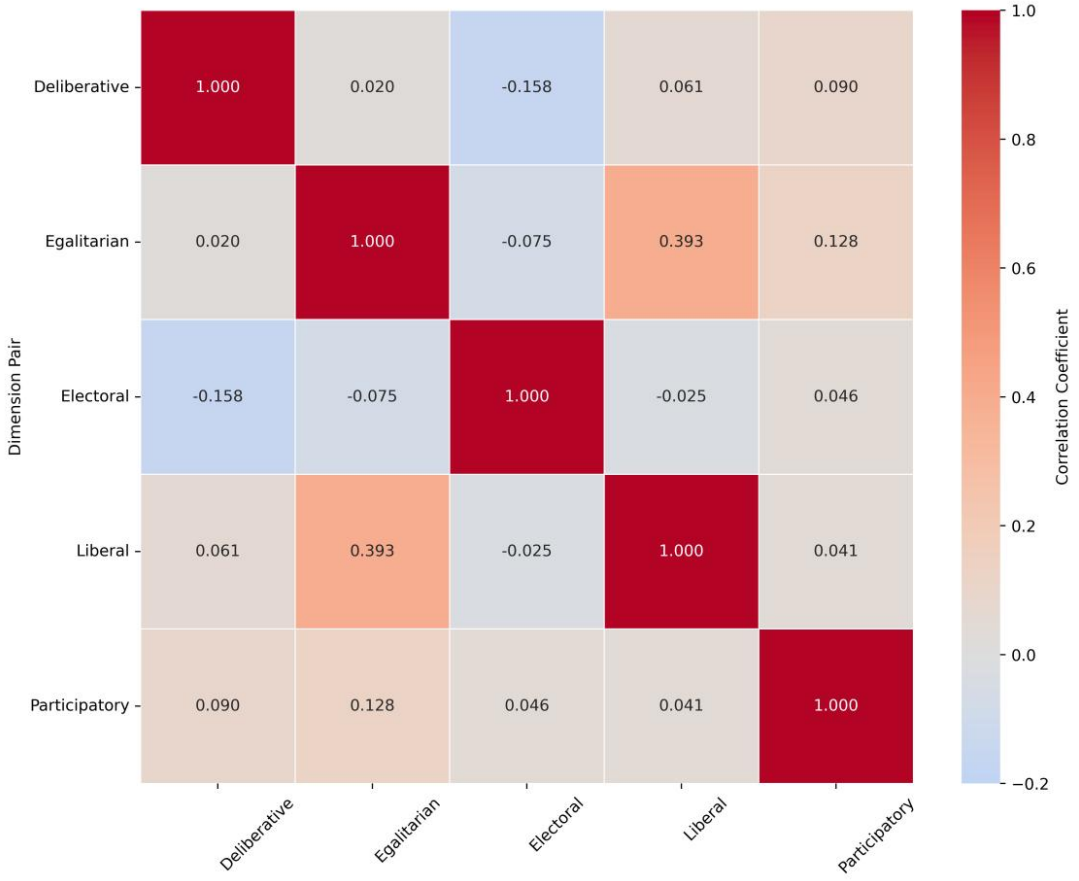

Figure VIII Pearson Correlation Coefficients between Dimensions for Model Set 2

Code

All code for data analysis was written in Python and can be downloaded from this Google Drive link: https://drive.google.com/drive/folders/18CfZ8te0gI_3TYnfa-pC-mMt5hpSDf_3?usp=share_link

References

Anderson, E. S. (1999). What is the point of equality? Ethics, 109(2), 287–337. https://doi.org/10.1086/233897

Antoniak, M., & Mimno, D. (2018). Evaluating the stability of embedding-based word similarities. Transactions of the Association for Computational Linguistics, 6, 107–119. https://doi.org/10.1162/tacl_a_00008

Arnstein, S. R. (1969). A ladder of citizen participation. Journal of the American Institute of Planners, 35(4), 216–224. https://doi.org/10.1080/01944366908977225

Bail, C. A. (2014). The cultural environment: Measuring culture with big data. Theory and Society, 43(3–4), 465–482. https://doi.org/10.1007/s11186-014-9216-5

Barber, B. R. (2009). Strong democracy: Participatory politics for a new age (20. anniversary ed., with a new preface). University of California Press.

Baron, H., Blair, R. A., Gottlieb, J., & Paler, L. (2024). An Events-Based Approach to Understanding Democratic Erosion. PS: Political Science & Politics, 57(2), 208–215. https://doi.org/10.1017/S1049096523001026

Bartels, L. M. (2024). The Populist Phantom: Threats to Democracy Start at the Top. Foreign Affairs, 103, 108.

Beetham, D. (1999). Democracy and human rights. Polity Press ; Blackwell Publishers.

Berger, P. L., & Luckmann, T. (1991). The social construction of reality: A treatise in the sociology of knowledge (Repr. in Penguin Books). Penguin Books.

Bermeo, N. (2016). On democratic backsliding. Journal of Democracy, 27(1), 5–19. https://doi.org/10.1353/jod.2016.0012

Best, R. K., & Arseniev-Koehler, A. (2023). The Stigma of Diseases: Unequal Burden, Uneven Decline. American Sociological Review, 88(5), 938–969.

Boese, V. A., Gates, S., Knutsen, C. H., Nygård, H. M., & Strand, H. (2022). Patterns of

Democracy over Space and Time. International Studies Quarterly, 66(3), sqac041. https://doi.org/10.1093/isq/sqac041

Bogdanor, V. (2009). The new British constitution. Hart publishing.

Bohman, J. (1999). Democracy as inquiry, inquiry as democratic: Pragmatism, social science, and the cognitive division of labor. American Journal of Political Science, 43(2), 590. https://doi.org/10.2307/2991808

Bohman, J., & Rehg, W. (Eds.). (1997). Deliberative democracy: Essays on reason and politics. MIT Press.

Bonikowski, B. (2017). Ethno-nationalist populism and the mobilization of collective resentment. The British Journal of Sociology, 68(S1). https://doi.org/10.1111/1468-4446.12325

Boutyline, A., Arseniev-Koehler, A., & Cornell, D. J. (2023). School, studying, and smarts: Gender stereotypes and education across 80 years of american print media, 1930–2009. Social Forces, 102(1), 263–286. https://doi.org/10.1093/sf/soac148

Burkov, A. (2019). The hundred-page machine learning book. Andriy Burkov.

Cohen, J. (2003). Deliberation and democratic legitimacy. In Debates in Contemporary Political Philosophy. Routledge.

Collier, D., & Levitsky, S. (1997). Democracy with adjectives: Conceptual innovation in comparative research. World Politics, 49(3), 430–451. https://doi.org/10.1353/wp.1997.0009

Coppedge, M. (2012). Democratization and research methods. Cambridge University Press.

Coppedge, M., Gerring, J., Altman, D., Bernhard, M., Fish, S., Hicken, A., Kroenig, M., Lindberg, S. I., McMann, K., Paxton, P., Semetko, H. A., Skaaning, S.-E., Staton, J., & Teorell, J. (2011). Conceptualizing and measuring democracy: A new approach.

Perspectives on Politics, 9(2), 247–267. https://doi.org/10.1017/S1537592711000880

Coppedge, M., Gerring, J., Knutsen, C. H., Krusell, J., Medzihorsky, J., Pernes, J., Skaaning, S.-E., Stepanova, N., Teorell, J., Tzelgov, E., Wilson, S. L., & Lindberg, S. I. (2019). The Methodology of "Varieties of Democracy" (V-Dem)1. Bulletin of Sociological Methodology/Bulletin de Méthodologie Sociologique, 143(1), 107–133. https://doi.org/10.1177/0759106319854989

Cox, G. W., & McCubbins, M. D. (2005). Setting the agenda: Responsible party government in the u. S. House of representatives. Cambridge University Press.

Dahl, R. A. (1989). Democracy and its critics (Nachdr.). Yale University Press.

Dahl, R. A. (2008). Polyarchy: Participation and opposition. Yale University Press.

Dahlberg, S., Axelsson, S., & Holmberg, S. (2020). Democracy in context: Using a distributional semantic model to study differences in the usage of democracy across languages and countries. Zeitschrift Für Vergleichende Politikwissenschaft, 14(4), 425–459. https://doi.org/10.1007/s12286-020-00472-3

Dari-Mattiacci, G., & Kehoe, D. P. (2020). Roman Law and Economics: Institutions and Organizations Volume I. Oxford University Press.

Della Porta, D. (2012). Critical trust: Social movements and democracy in times of crisis. Cambio : Rivista Sulle Trasformazioni Sociali : 4, 2, 2012, 33–43. https://doi.org/10.1400/205655

Diamond, L. (1999). Developing democracy: Toward consolidation. Johns Hopkins University Press.

Diamond, L. J. (2019). Ill winds: Saving democracy from russian rage, chinese ambition, and american complacency. Penguin Press.

Diamond, L., & Morlino, L. (2004). The quality of democracy: An overview. Journal of Democracy, 15(4), 20–31. https://doi.org/10.1353/jod.2004.0060

DiMaggio, Paul. J., & Powell, Wlater. W. (1983). The Iron Cage Revisited: Institutional Isomorphism and Collective Rationality in Organizational Fields. American Sociological Review, 48(2), 147–160.

Dryzek, J. S. (2000). Deliberative democracy and beyond: Liberals, critics, contestations. Oxford University Press.

Faris, R., Roberts, H., Etling, B., Bourassa, N., Zuckerman, E., & Benkler, Y. (2017). Partisanship, Propaganda, and Disinformation: Online Media and the 2016 U.S. Presidential Election (SSRN Scholarly Paper 3019414). https://papers.ssrn.com/abstract=3019414

Flinders, M. V. (2010). Democratic drift: Majoritarian modification and democratic anomie in the United Kingdom. Oxford university press.

Fraser, N. (2010). Scales of justice: Reimagining political space in a globalizing world (Paperback ed). Columbia Univ. Press.

Fung, A. (2006). Varieties of participation in complex governance. Public Administration Review, 66(s1), 66–75. https://doi.org/10.1111/j.1540-6210.2006.00667.x

Funke, M., Schularick, M., & Trebesch, C. (2016). Going to extremes: Politics after financial crises, 1870–2014. European Economic Review, 88, 227–260. https://doi.org/10.1016/j.euroecorev.2016.03.006

Gelman, A. (2009). Red state, blue state, rich state, poor state: Why americans vote the way they do. Princeton University Press.

Glynn, M. A. (2023). John w. Mohr, christopher a. Bail, margaret frye, jennifer c. Lena, omar lizardo, terence e. Mcdonnell, ann mische, iddo tavory, and frederick f. Wherry. Measuring culture. Administrative Science Quarterly, 68(1), NP12–NP14. https://doi.org/10.1177/00018392221110442

Goldberg, A. (2011). Mapping Shared Understandings Using Relational Class Analysis:

The Case of the Cultural Omnivore Reexamined. American Journal of Sociology, 116(5), 1397–1436. https://doi.org/10.1086/657976

Goldberg, A., & Singell, M. H. (2023). The Sociology of Interpretation. Annual Review of Sociology, 50.

Grimmer, J., & Stewart, B. M. (2013). Text as data: The promise and pitfalls of automatic content analysis methods for political texts. Political Analysis, 21(3), 267–297. https://doi.org/10.1093/pan/mps028

Gutmann, A., & Thompson, D. F. (1996). Democracy and disagreement. Belknap Press of Harvard University Press.

Habermas, J., & Habermas, J. (1999). Between facts and norms: Contributions to a discourse theory of law and democracy (1. MIT Press paperback ed., 3. print). MIT Press.

Hamilton, W. L., Leskovec, J., & Jurafsky, D. (2016). Diachronic Word Embeddings Reveal Statistical Laws of Semantic Change. In K. Erk & N. A. Smith (Eds.), Proceedings of the 54th Annual Meeting of the Association for Computational Linguistics (Volume 1: Long Papers) (pp. 1489–1501). Association for Computational Linguistics. https://doi.org/10.18653/v1/P16-1141

Hansen, M. H. (1999). The athenian democracy in the age of demosthenes: Structure, principles, and ideology. University of Oklahoma Press.

Held, D. (2006). Models of democracy (3. ed). Stanford Univ. Press.

Huntington, S. P. (1991). Democracy's third wave. Journal of Democracy, 2(2), 12–34. https://doi.org/10.1353/jod.1991.0016

Huq, A. Z., & Ginsburg, T. (2017). How to lose a constitutional democracy. SSRN Electronic Journal. https://doi.org/10.2139/ssrn.2901776

Inglehart, R. F., & Norris, P. (2016). Trump, Brexit, and the Rise of Populism: Economic

Have-Nots and Cultural Backlash (SSRN Scholarly Paper 2818659). https://doi.org/10.2139/ssrn.2818659

King, G., Pan, J., & Roberts, M. E. (2013). How Censorship in China Allows Government Criticism but Silences Collective Expression. American Political Science Review, 107(2), 326–343. https://doi.org/10.1017/S0003055413000014

Kozlowski, A. C., Taddy, M., & Evans, J. A. (2019). The Geometry of Culture: Analyzing the Meanings of Class through Word Embeddings. American Sociological Review, 84(5), 905–949. https://doi.org/10.1177/0003122419877135

Kulkarni, V., Al-Rfou, R., Perozzi, B., & Skiena, S. (2015). Statistically significant detection of linguistic change. Proceedings of the 24th International Conference on World Wide Web, 625–635. https://doi.org/10.1145/2736277.2741627

Kutuzov, A., Øvrelid, L., Szymanski, T., & Velldal, E. (2018). Diachronic word embeddings and semantic shifts: A survey. https://doi.org/10.48550/ARXIV.1806.03537

Levitsky, S., & Ziblatt, D. (2018). How democracies die (First edition). Crown.

Lijphart, A. (2012). Patterns of Democracy. Yale University Press. https://www.jstor.org/stable/j.ctt32bg23

Lührmann, A., Marquardt, K. L., & Mechkova, V. (2020). Constraining governments: New indices of vertical, horizontal, and diagonal accountability. American Political Science Review, 114(3), 811–820. https://doi.org/10.1017/S0003055420000222

Manin, B. (1997). The principles of representative government. Cambridge University Press.

Mansbridge, J. (2011). Clarifying the concept of representation. American Political Science Review, 105(3), 621–630. https://doi.org/10.1017/S0003055411000189

Marzagão, T. (2015). Using NLP to measure democracy (arXiv:1502.06161). arXiv.

https://doi.org/10.48550/arXiv.1502.06161

McCoy, J., & Somer, M. (2019). Toward a theory of pernicious polarization and how it harms democracies: Comparative evidence and possible remedies. The ANNALS of the American Academy of Political and Social Science, 681(1), 234–271. https://doi.org/10.1177/0002716218818782

Mikolov, T., Chen, K., Corrado, G., & Dean, J. (2013b). Efficient estimation of word representations in vector space. arXiv preprint arXiv:1301.3781.

Mikolov, T., Sutskever, I., Chen, K., Corrado, G. S., & Dean, J. (2013a). Distributed Representations of Words and Phrases and their Compositionality. Advances in Neural Information Processing Systems, 26. https://proceedings.neurips.cc/paper/2013/hash/9aa42b31882ec039965f3c4923ce901b-Abstract.html

Miller, F. (1998). Aristotle's Political Theory. In E. N. Zalta (Ed.), The Stanford Encyclopedia of Philosophy (Fall 2017 Edition). https://plato.stanford.edu/archives/fall2017/entries/aristotle-politics/

Mohr, J. W. (1998). Measuring Meaning Structures. Annual Review of Sociology, 24(Volume 24, 1998), 345–370. https://doi.org/10.1146/annurev.soc.24.1.345

Monroe, B. L., Colaresi, M. P., & Quinn, K. M. (2008). Fightin' words: Lexical feature selection and evaluation for identifying the content of political conflict. Political Analysis, 16(4), 372–403. https://doi.org/10.1093/pan/mpn018

Morlino, L. (2004). What is a 'good' democracy? Democratization, 11(5), 10–32. https://doi.org/10.1080/13510340412331304589

Morlino, L. (2011). Changes for democracyactors, structures, processes. Oxford University Press. https://academic.oup.com/book/34594

Mudde, C. (2004). The Populist Zeitgeist. Government and Opposition, 39(4), 541–563.

https://doi.org/10.1111/j.1477-7053.2004.00135.x

Munck, G. L. (2009). Measuring democracy: A bridge between scholarship and politics. Johns Hopkins University Press.

Muradoglu, M., Cimpian, J. R., & Cimpian, A. (2023). Mixed-effects models for cognitive development researchers. Journal of Cognition and Development, 24(3), 307–340. https://doi.org/10.1080/15248372.2023.2176856

O'Connor, C., & Weatherall, J. O. (2019). The Misinformation Age: How False Beliefs Spread. Yale University Press.

O'Donnell, G. A., & Schmitter, P. C. (2005). Transitions from authoritarian rule. Tentative conclusions about uncertain democracies / Guillermo O'Donnell and Philippe C. Schmitter (Repr.). Johns Hopkins Univ. Press.

Orhan, Y. E. (2022). The relationship between affective polarization and democratic backsliding: Comparative evidence. Democratization, 29(4), 714–735. https://doi.org/10.1080/13510347.2021.2008912

Pachucki, M. A., & Breiger, R. L. (2010). Cultural Holes: Beyond Relationality in Social Networks and Culture. Annual Review of Sociology, 36(1), 205–224. https://doi.org/10.1146/annurev.soc.012809.102615

Řehůřek, R., & Sojka, P. (2010). Software framework for topic modelling with large corpora. University of Malta. https://repozitar.cz/publication/15725/cs/Software-Framework-for-Topic-Modelling-with-Large-Corpora/Rehurek-Sojka

Rheault, L., & Cochrane, C. (2020). Word embeddings for the analysis of ideological placement in parliamentary corpora. Political Analysis, 28(1), 112–133. https://doi.org/10.1017/pan.2019.26

Rhodes, R. A. W. (2003). Understanding governance: Policy networks, governance, reflexivity and accountability (Reprinted). Open Univ. Press.

Robertson, J. (2015). The Enlightenment: A Very Short Introduction. OUP Oxford.

Rodman, E. (2020). A timely intervention: Tracking the changing meanings of political concepts with word vectors. Political Analysis, 28(1), 87–111. https://doi.org/10.1017/pan.2019.23

Rodriguez, P. L., & Spirling, A. (2022). Word embeddings: What works, what doesn't, and how to tell the difference for applied research. The Journal of Politics, 84(1), 101–115. https://doi.org/10.1086/715162

Sartori, G. (2016). 36. The Theory of Democracy Revisited. In Democracy (pp. 192–196). Columbia University Press. https://www.degruyterbrill.com/document/doi/10.7312/blau17412-044/html

Schumpeter, J. A. (2013). Capitalism, socialism and democracy (5th ed.). Routledge. https://www.taylorfrancis.com/books/9780203202050

Shapiro, I., & Hacker-Cordón, C. (1999). Democracy's Values. Cambridge University Press.

Sigelman, L. (2006). The American Political Science Review Citation Classics. American Political Science Review, 100(4), 667–669. https://doi.org/10.1017/S0003055406212565

Stasavage, D. (2016). Representation and Consent: Why They Arose in Europe and Not Elsewhere. Annual Review of Political Science, 19(Volume 19, 2016), 145–162. https://doi.org/10.1146/annurev-polisci-043014-105648

Waldner, D., & Lust, E. (2018). Unwelcome Change: Coming to Terms with Democratic Backsliding. Annual Review of Political Science, 21(1), 93–113. https://doi.org/10.1146/annurev-polisci-050517-114628

Warren, M. E. (2017, June 1). The all affected interests principle in democratic theory and practice [IHS Series]. https://irihs.ihs.ac.at/id/eprint/4306/

Wevers, M., & Koolen, M. (2020). Digital begriffsgeschichte: Tracing semantic change using word embeddings. Historical Methods: A Journal of Quantitative and Interdisciplinary History, 53(4), 226–243. https://doi.org/10.1080/01615440.2020.1760157

Young, I. M. (2002). Inclusion and democracy (1st ed.). Oxford University PressOxford. https://academic.oup.com/book/3941