



Contents lists available at ScienceDirect

Futures

journal homepage: [www.elsevier.com/locate/futures](http://www.elsevier.com/locate/futures)

# Was that capitalism? A future-oriented big data analysis of the English language area in the 19th and 20th century

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## ARTICLE INFO

### Keywords:

Social macro trends  
Capitalism  
Big data  
Google Ngram Viewer  
Culturomics

## ABSTRACT

As foresight and futures studies depend on the pertinence of our knowledge of the present and the past, this article tests whether the English language area may be adequately described as secularised and capitalist between 1800 and 2000. We are using the Google Ngram Viewer to chart and interpret time series plots of combined frequencies of pertinent keywords in the largest Internet book corpus, the Google Books corpus. The results suggest that the English language area is a secularised, politicised, scientificised, and ultimately also mediated language area which has never been dominated by the economy. We conclude that the sample period may not be characterised as capitalist if we associate capitalism with any form of over-average importance or even dominance of the economy and suggest that popular social macro trend statements be regularly turned from implicit assumptions into explicit research questions so as to reduce the risk that inadequate trend assumptions are projected into the future.

## 1. Introduction: a big data approach to social mega trends

Social science is naturally interested in the identification of large-scale social trends, many of which have been the object of extensive commentary and controversy. There is a broad agreement, for example, that the Western societies have been exhibiting the secularisation trend over the course of the recent centuries (Fuller, 1997; Hicks, 2000; Inayatullah, 2000; Introvigne, 2004). As early as in 1891, the last century has also been described as the *political century* (Bauer, 1891) and since then, not infrequently characterised by the *total* primacy of politics. Very common, too, are the diagnoses of the growing dominance of the economy (Boltanski & Chiapello, 2007; Castells, 1998; Cohen, 2003; Drucker, 1970; Esping-Andersen, 1990; Florida & Kenney, 1993; Fuchs & Dyer-Witheyford, 2013; Mathews, 2011; Marglin & Schor, 1960; Moulner-Boutang, 2011; Tyler, 2015). The rise of the information technologies has engendered a new wave of diagnoses pointing out the growing domination of society by (those who control) the (new) media (Schiller, 1996; Chomsky, 1997; Castells, 1998; Fuchs, 2015, 2016), “not to mention a myriad other social, religious, political and scientific grand theories” (Berthon & Katsikeas, 1998, p. 153).

While offering many useful insights, these and other investigations of large-scale social trends face at least two major challenges.

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<https://doi.org/10.1016/j.futures.2017.12.009>

Received 3 October 2017; Received in revised form 22 November 2017; Accepted 31 December 2017

Available online 02 January 2018

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First, in view of the observed coexistence and the often-perceived partial overlapping of some of these trends, it is difficult to see their comparative dynamics. Some trends may be more salient than others. A mere documentation of particular trends, therefore, does not allow establishing this variation. Second, and perhaps more crucial, the investigations of large-scale social trends probably entail their own performativity effects (Fuller and Loogma, 2009). True to the spirit of the Heisenberg principle, the scholarly identifications and discussions of these trends may reinforce them. The complexity of the performativity effects, however, may be observed to go beyond the Heisenberg principle and to touch upon the Foucauldian association between knowledge and power. The dominance of any particular function system, such as the economy, entrenches and reinforces a broad spectrum of cumulative advantages enjoying the positions of political power, legal privilege, favourable health state, or better access to the mass media. It does not seem far-fetched to conjecture that these vested interests will promote knowledges and discourses (re)affirming the identified domination patterns. Against this backdrop, it seems plausible that the question such as “Does capitalism have a future?” (Heilbroner, 1982; Streeck, Calhoun, Toynbee, Etzioni, & Heilbroner, 2016; Streeck et al., 2016; Wallerstein, 2013; Wallerstein, Collins, Mann, Derluigian, & Calhoun, 2013) invites not only lively discussions (Izak, Mansell, & Fuller, 2015), but also numerous practical efforts by those vested interests that seek to make sure that the answer will be positive.

The present paper contends that both of these challenges can be met, and features one of the first attempts to do so. The conceptual framework that enables a meaningful comparison between the apparently disparate social trends is provided by Niklas Luhmann’s (1977, 2013) theory of functional differentiation, i.e., the decomposition of the modern societies into function systems, such as the economy, law, politics, science, education and others (for a comprehensive account of further function systems see Roth & Schütz, 2015). Today, functional differentiation is widely regarded as the dominant form of social differentiation of modern societies (Beck, Bonss, & Lau, 2003; Bergthaller & Schinko, 2011; Kjaer, 2010; Leydesdorff, 2002; Luhmann, 1977; Luhmann, 2013; Roth, 2017a; Valentinov, 2015a, 2015b; Ward, 2006). According to Luhmann, function systems are incommensurable in terms of their operations, but none of them is more important or privileged than any other, such that the regime of functional differentiation can be taken to rest on their functional equality. Logically, the historical transition from the stratified society to the functionally differentiated society must have been associated with the rise to prominence of every function system, with the exception of religion, which has been losing traction over the course of modernisation. The notion of functional differentiation makes clear that the isolated observations of religious or economic trends do not suffice to prove or disprove that modern societies are adequately described as secularised or economy-biased. The observation of an increasing importance of the economy, for example, does not yet imply that the concerned society is actually dominated by the economy. In a similar way, the secularisation trend does not logically preclude that religion retains an important role. The question whether or not modern societies are on the whole characterised by overarching trends can only be decided through the overall comparison of the dynamics of all function systems.

In methodological terms, this sort of comprehensive and comparative analysis of the unfolding functional differentiation can be undertaken by using the Google Ngram Viewer to chart time series plots of annual word counts as found in the world’s largest online text corpus, the Google Books corpus. This is a huge data set permitting to test the plausibility of big narratives such as the secularisation, economisation, politicisation, and mediatisation of society, in the English language area between 1800 and 2000. It is clear that the application of the Google Ngram Viewer to the Google Books corpus does not provide any “objective” measure of the functional differentiation for at least two reasons. First, this measure is conceptually framed by the very notion of the functional differentiation which is imposed in a sense on the data being analysed. Second, the proposed analysis can only establish the proliferation of function systems in terms of “counting words” employed in the literary communication. Both of these reasons, however, make the analysis meaningful to begin with. First, it is only against the overall conceptual backdrop of functional differentiation that the comparison of the dynamics of particular function systems such as economy or religion becomes possible. Second, the Foucauldian power/knowledge nexus suggests that the literary discourse can be taken to reflect the evolving power configurations which are inextricably linked with vested interests benefiting from the rise of specific function systems. If performativity effects have ever been real, it is through discourse analysis that this reality can be ascertained.

The English language area covered by this analysis certainly includes heterogeneous countries and historical contexts that defy easy broad-brush generalisations. Nor are such generalisations attempted here. This does not preclude, however, the overarching interest of the present paper in the relative salience of the economisation trend, i.e., the trend of the overall dominance of the economic system. This interest is justified by the fact that the Anglo-Saxon countries, as a major constituent of the English language area, have been the premier site for the rise of liberal institutions often associated with the unabated capitalism relatively uncontrolled by the political system. The emerging hypothesis that the economic system could have “overshadowed” all other function systems gains particular significance in the context of the evolutionary governance theory, a multidisciplinary research programme addressing the way in which societies, markets and governance evolve (Beunen, van Assche, & Duineveld, p. 3) through the inquiry into path-, inter- and goal dependencies as reflections and enactments of the coevolution between actors, institutions, and discourses (Beunen et al., 2015, p. 28).

While path-dependencies refer to the unique historical legacies of the countries included into the English language area, inter-dependencies highlight the complementarities of the function systems each of which is critically dependent on the functioning of the other ones. Against the backdrop of interdependence, any form of unchecked expansion or totalisation of any function system, such as the economy, may adversely reverberate through the whole functionally differentiated society. Goal dependencies “include performative effects of policies and plans. They can become reality or shape reality in certain regards. If performative effects are observed, actors in governance will quickly ascribe these to the institution having ‘worked’, to the correctness of embedded predictions, assumptions, core concepts, narratives, steering mechanisms and management techniques” (Beunen et al., 2015, p. 29). It is goal-dependencies that ultimately motivate the present paper’s interest into the self-reinforcing and self-justifying diagnoses of the proliferating economisation of society. If these diagnoses cannot be empirically confirmed, it will be difficult to resist the impression of

the existence of vested interests looking for the desired performative effects.

## 2. Time series over hundreds of billions of words: the Google Ngram Viewer as culturomic research tool

In our research, we are using the Internet to observe the Internet. This procedure is adequate insofar as the Internet is a preferred field of big data research. Against the background of our research question, however, using the Internet seems inappropriate as the Internet is much younger than the examined trends are assumed to be. Our research therefore focuses on specific interfaces of the Internet and earlier dissemination media such as printing and writing, which, fortunately, are present in the form of the Google Books Project and the Google Ngram Viewer.

Since its official launch in 2004, the Google Books Project has scanned and digitalised more than 25 million out of the estimated total of 130 million books ever published. In 2007, a Harvard research team (Michel et al., 2011) recognized the project's research potential, performed considerable quality checks, and finally compiled a representative word corpus of over five million books or 500 billion words covering initially seven language areas and a time span of 600 years. This corpus was later updated to version 2, issued in July 2012, which covered even more books and added an eighth language. Today, the consolidated corpus comprises more than eight million books in English, Chinese, Spanish, Russian, French, German, Italian, and Hebrew language.<sup>1</sup> The team also developed a prototype of the later Google Ngram Viewer, a graphing tool that scans the Google Book corpus and plots time series of search term frequencies as found in any of the above language areas.

The great potential of the Google Ngram Viewer (Alwin, 2013, p. 30) was soon discovered by further pioneers of *culturomics*, “the application of high-throughput data collection and analysis to the study of human culture” (Michel et al., 2011, p. 181), for research in the classical fields of digital humanities such as linguistics, history, and cultural studies (Gibbs & Cohen, 2011; Johnson, 2010; Nicholson, 2012; Ophir, 2010; Sparavigna & Marazzato, 2015). An early indication of the importance of culturomics for the social sciences in general and economics in particular is present in Murrell (2011). Since then, culturomic approaches have also been used for social research such as a retroactive forecasting of the emergence of the Arab Spring (Leetaru, 2011), analyses of knowledge production in research networks (Kharzee & Gasson, 2015) or the impact of economic theories, schools, and paradigms (Hamilton & Shin, 2015; Westley, 2014), or popularity checks of sociological scholars, research topics, methodologies, and theories (Chen & Yan, 2016; Guggenheim, 2014; Possamai, 2015; Schwarz, 2016).

As per all these approaches, word frequency may be considered to be the “simplest and most impartial gauge of word importance” (Kloumann, Danforth, Harris, Bliss, & Dodds, 2012, p. 1) or the corresponding popularity of concepts, objects, or persons (Bohannon, 2011; Ophir, 2010); and in this sense, the Google Ngram Viewer may indeed be used to track and trace terminological, conceptual, or personal careers (see Fig. 1).

Even though the tracing of individual careers is definitely instructive already, in this article we assume that individual search strings might not suffice to capture the importance of complex concepts such as religion or economy. The proper selection of pertinent keywords hence is a critical challenge, which is further complicated by the circumstance that even combined performances of larger clusters of religious or economic keywords do not yet indicate the relative importance of religion or economy within the investigated language area. In this sense; it is simply not enough to look for religion or economy if we are interested in finding secularisation or economisation.

## 3. Capitalism, functional differentiation and a python programme

The concept of capitalism entertains a special relation to the concept of functional differentiation. Capitalism can be understood as a characteristic of the economic system which is just one function system of the modern society (Izak, Mansell, & Fuller, 2015). Capitalism may likewise be understood as a description of the whole modern society. Indeed, this term may have gained so much popularity because it successfully combines, blends, and occasionally confounds these two meanings which are radically distinct as such (see, e.g., Arnason, 2015; Fuchs, 2010, 2017; Hamilton & Shin, 2015; Schimank, 2015; Valentinov, Hielscher, & Pies, 2015). It is therefore quite natural that economists theorizing capitalism as an economic phenomenon could have claimed the discovery of the general laws of societal evolution (Marx, 1867, 1885, 1894). Deliberately or not, these claims underscore the universalistic ambitions of the economic science to be the science of the whole modern society.

These universalistic ambitions notwithstanding, the economic science remains, in the words of Luhmann (2013), a “reflection theory” of the function system of the economy. The incommensurability of the function systems inevitably poses a challenge to any universalistic ambitions of any “reflection theory”. Just as no function system can ever process or codify the infinite range of the environmental happenings, no reflection theory of any function system can ever do justice to the polycontextuality and overwhelming complexity of the functionally differentiated society as a whole. In this sense, the concept of functional differentiation is bound to run up against the limits of the “absorption capacity” of the economic science. This is not to deny the laudable efforts of institutional economists who drive home the point that a satisfactory conceptualisation of capitalism must include political, legal and further institutions (cf. Hodgson, 2015). This standpoint is tantamount to emphasizing the radical interdependence and complementarity of the function systems of the economy, law, and politics (cf. Amable, 2016). This is indeed what the concept of

<sup>1</sup> A tabulation of book and word counts per language area is available in Lin et al. (2012, p. 170). Strictly speaking, the elements of the corpus are not words but n-grams, that is sequences of letters, figures, or signs, including apparently meaningless expressions and misspellings; thus the designation Google *Ngram* Viewer. We nonetheless use the term word for the sake of readability.

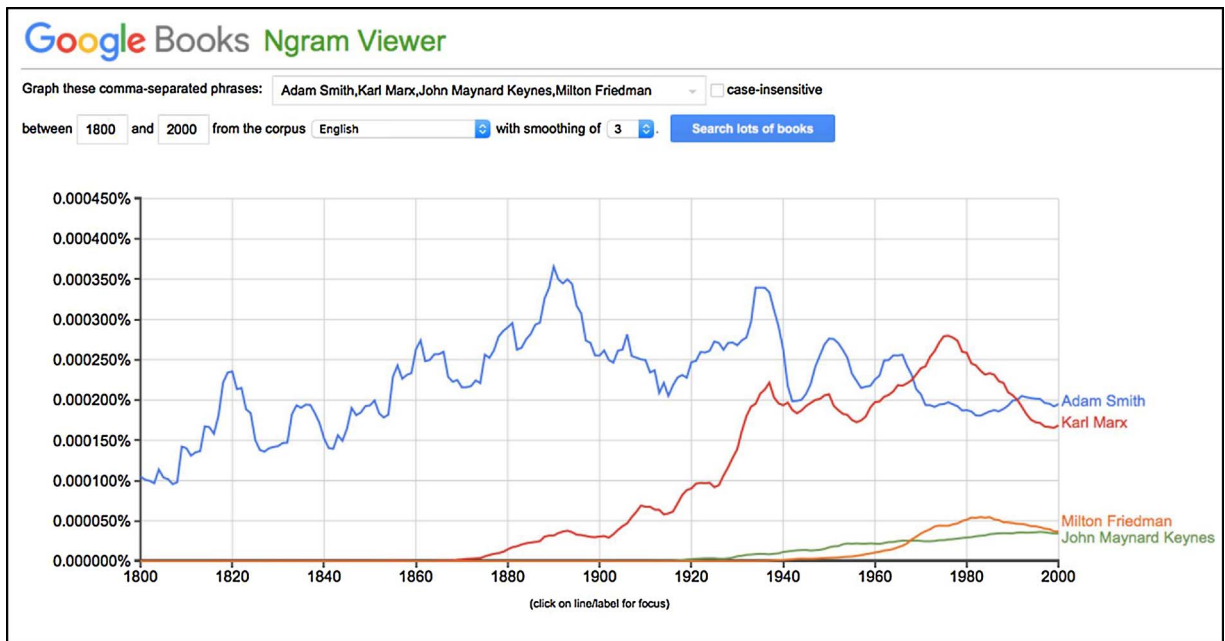


Fig. 1. The careers of Adam Smith, Karl Marx, Milton Friedman, and John Maynard Keynes in the English language area (1800–2000).

functional differentiation implies, thereby offering a novel and reasonable response to the question how we actually distinguish economy from religion or science from art. This is how we are able to identify transgressions of borders such as in the case of corruption, which can be thought of as an illegitimate fusion of the economic and political systems e.g. in the case of the buying of political votes.

Yet, the institutional economics argument that capitalism cannot be understood without taking into account the whole gamut of institutions associated with the political, legal, and other function systems implicitly installs capitalism as a frame of reference. This circularity comes down to a subtle performativity effect reaffirming the universalistic ambitions of the economic science. The circularity can be overcome by acknowledging that the concepts of functional differentiation and capitalism do not need to be identified, and that functional differentiation is interesting for its own sake, not just for the sake of understanding capitalism. Accepting this premise opens the door to the direct scholarly engagement with the function systems independently of their association with capitalism.

Following the Luhmannian vision of functional differentiation, Roth and Schütz (2015) distinguish ten function systems: *political system, economy, science, art, religion, legal system, sport, health, education, and mass media*. The emerging methodological challenge is to match each of these systems with a consistent set of unambiguous keywords allowing for the monitoring of these systems' careers in the English language area from 1800 to 2000.<sup>2</sup> Whereas the original version of the Google Ngram Viewer allowed only for input of individual, comma-separated ngrams, it is now also possible to enter combinations of ngrams using brackets and plus-signs. The tool's intake capacity nevertheless remains limited to less than 30 ngrams per query. In order to nonetheless compile sufficiently informative charts, we needed to confine ourselves to the five most frequent keywords per system, which we identified using a *Python* programme coded by Jan Berkel (see Annex 3) allowing to extract period and area specific word frequency lists from the Google Books corpus. In a second step, we screened the word frequency list for terms that clearly refer to one and only one of the function systems. For instance, money or God make examples of such unambiguous keywords, whereas we omitted the term university as it refers to both education and science. As a result, we compiled the subsequent list of search strings (see Table 1).

In entering these search strings into the Google Ngram Viewer, we are not pursuing a classical quantitative research programme although we could argue that the function systems are undoubtedly incommensurable, which is why we actually could proceed from the null hypothesis that the keyword clusters be uniformly distributed in the sample area and period. Yet, in looking at our results, we are aware that they combine a scientific grounding with the need for interpretive judgment in a way that is reminiscent of the visually similar electroencephalograms, which likewise require inputs of both experience-based knowledge and interpretation before they become practically useful. It is hence not our ambition to test alternative hypotheses such as the increasing insignificance of religion or the growing importance of economy in a strictly deductive sense. Rather, we just venture the expectation that the frequency of the combined keywords as per function system be both unevenly distributed and subject to change in time, and that the commonly implied loss of significance of religion as well as the turn to a capitalist society be somehow reflected in the English language subset of the largest online text corpus worldwide.

<sup>2</sup> We have opted for this sample period because the data is said to be particularly reliable for this period and because the period also corresponds well with our research question.

**Table 1**  
Top five keywords plus ranked combined keyword frequencies per function system in the English language Google Books sub-corpus (1800–2000).

System	English	Frequencies/chunk
Political	(power + government + States + political + war)	545937001
Science	(system + method + theory + research + analysis)	346647669
Mass Media	(information + pp. + book + Press + published)	315167212
Religion	(God + St. + Church + church + religious)	300982802
Economy	(business + economic + money + company + cost)	300208287
Legal	(law + property + Court + rights + laws)	266353906
Education	(school + education + students + schools + learning)	242819722
Health	(health + disease + patients + medical + Health)	154036473
Art	(art + music + style + beautiful + Art)	143214993
Sport	(success + failure + successful + failed + game)	119162189

#### 4. Much politics, little economy. Functional encephalograms of the English language area

In looking at the results, we find religion to be the most dominant system in the 19th century, whereas the political system is dominating the 20th century (see Fig. 2).

Starting soon after 1840, there is a dramatic decline of religion, which did not stop before World War I. The political system is dominant in the English language area as of about 1880; the two World Wars may be observed to have had significant influence on the performance of the political system. Another smaller peak appears in the 1960s. Science became increasingly popular in the 20th century, particularly in times of the Cold War; in 2000, science was the second most important systems in the English language area, followed by mass media, economy, and education. Initially more important than science, economy featured an uptrend particularly during and in between the World Wars, but was overtaken by science roughly around 1950. There is also a modest rise of the information age, the starting point of which may be traced back to 1920 with the curve getting steeper since the late 1960s (Fig. 3).

Yet another significant trend is the considerable rise of education since the early 20th century. At the end of the sample period, education ranks 5th after the political system, science, mass media, and economy. There is a smaller rise of health since the 1960s, too. The system is seventh after the legal system in 2000. Art and sport remain relatively unimportant between throughout the two centuries.

##### 4.1. Where has capitalism been? Expert knowledge meets surprising data

Our Google Ngram Analysis of social mega trends show that the function systems feature significant differences in significance, which are furthermore subject to change in time. Starting in the middle of the 19th century, the downtrend of religion may be interpreted as clear indicator of secularisation, which, in line with observations of a certain return to prominence of religion (Introvigne, 2004), seems to have been stopped or moderated by the early 20th century. By the end of the sample period, the initially dominant religion is an only averagely important function system. It is hence safe to say that the English language area has been secularised.

Regarding economy, the data is similarly clear: There has never been a time within the sample period when economy was the most dominant function system of the English language area. Economy has been relatively prominent only in the context of the two World Wars ranking second during that period, where it ranks 2nd to 4th often going head to head with the legal system and

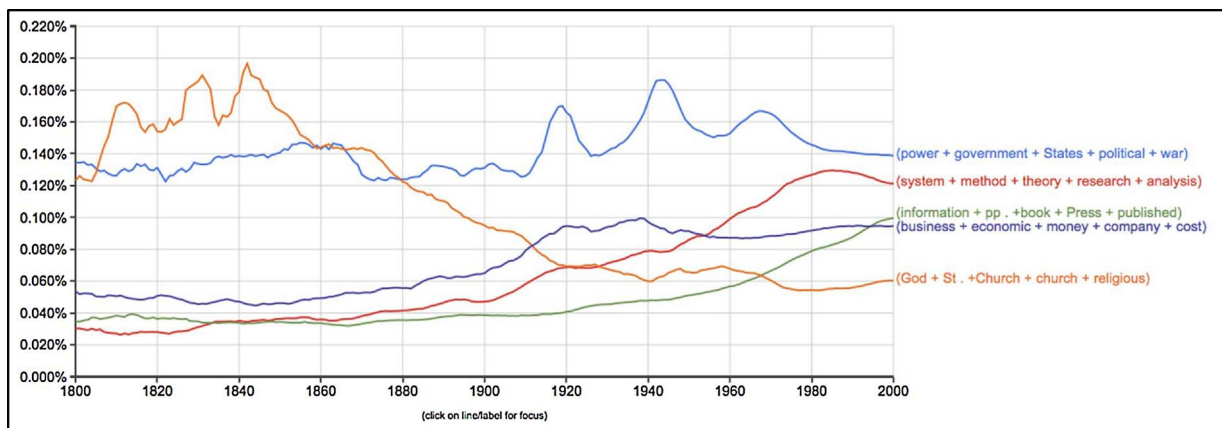


Fig. 2. Combined occurrence frequencies of the five most frequent keywords for political system (blue), economy (violet), religion (orange), mass media (green), and science (red) in the English language Google Books corpus (1800–2000). (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

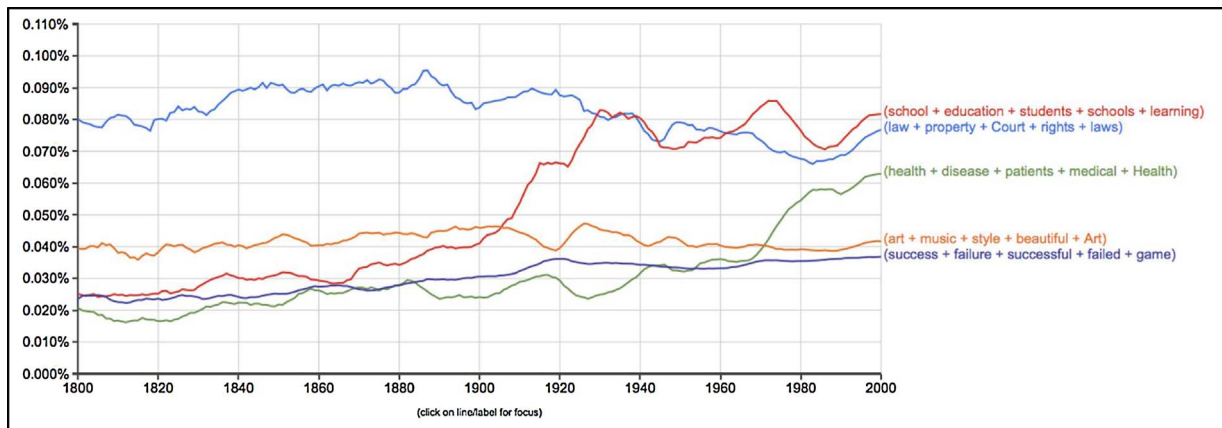


Fig. 3. Combined occurrence frequencies of the five most frequent keywords for the legal system (blue), sport (violet), art (orange), health (green), and education (red) in the English language Google Books corpus (1800–2000). (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

education. Since 1940, economy does not display any further rise and the system is outperformed by science by the end of the 1950s and by the mass media by the end of the 1990s. Despite a certain increase in importance, it remains hard to ignore that

- a) The – only moderate – uptrend of economy does not take place during the assumed golden ages of capitalism,
- b) The political system and not the economy is the most important function system of the English language area,
- c) Science and eventually also the mass media must appear to be more important than the economy by the end of the sample period.

We may hence conclude that the English language area is not primarily economised, but rather politicised. Strong definitions of capitalism as society in which the economy is dominating social life therefore appear as inadequate to describe the English language area. Moreover, even the idea of a capitalism as a “political economy” seems to be, if at all, an adequate description of the English language area only during a brief period in the first half of the 20th century, whereas the 19th century is clearly dominated by religion and politics and the second half of the 20th century by politics, science, and eventually mass media. In this sense, medially informed critical theory seems to be more adequate to describe contemporary English-language societies than traditional economic and social theories which contingently stress the importance of an actually subordinate system such as the economy.<sup>3</sup> This observation is even more momentous as a view across the language borders confirms that the economy is not dominant in the Spanish, Russian, French, German, and Italian language areas either, with the best economic performances being a second rank in the French and a third rank in the German language area by the year 2000, whereas the system ranks fourth or fifth in the Spanish, Russian, or Italian area.

As our results contradict the familiar idea that we are living in capitalist or economy-dominated societies for several generations now, it is fair to engage in criticism of our research method. Yet, as justified as this criticism may be, so too it must address the question why a method that works perfectly well in capturing the 19th secularisation should fail to also capture the “true” significance of the economy.

## 5. Outlook: big data and the future of socio-economic theories

The remarkable result of the proposed comparative analysis of functional differentiation is that terms and topoi such as capitalism or economisation of society do not provide exact descriptions of the most important trends of the 19th and 20th century in the English language area. Nor do the concepts of capitalism and economisation fare any better in the Spanish, Russian, German or Italian language areas as well. It appears that the language area that is most closely approximating the economisation topos is the French one, where the economy is second to the clearly dominating political system. Interestingly, recent reassessments of the legacy of Karl Polanyi come to the conclusion that market economy presents “a political project” (Bugra & Agartan, 2007). The findings of this paper lend support to at least the political aspect of this conclusion and illuminate its new meaning. As a political project, the perceived dominance of the economy could be a sheer discursive artefact orchestrated not only by mainstream economics and its pro-capitalist stakeholders as suggested by Callon (2007), but also, inadvertently, by the corresponding anti-capitalist struggles (Neocosmos, 2016). In short, the political project in question likely includes the performativity effects.

These effects are important in view of the fact that the interdependence of function systems by no means translates into their orderly and harmonious co-existence, a point well established by Luhmann. As van Assche, Beunen, and Duineveld (2015, p. 28) put

<sup>3</sup> For sociologists, it may be interesting to see how Durkheim was right to observe religion as the declining dominant system for the 19th century. A Marxist or Weberian (political) economy focus, however, does not correspond to the pre-1920 as well as the post-1950 data and corresponds only partially to the short period in-between. Dominant observational biases to politics and economy may therefore be problematized (see, for instance, Roth & Kaivo-oja, 2016).

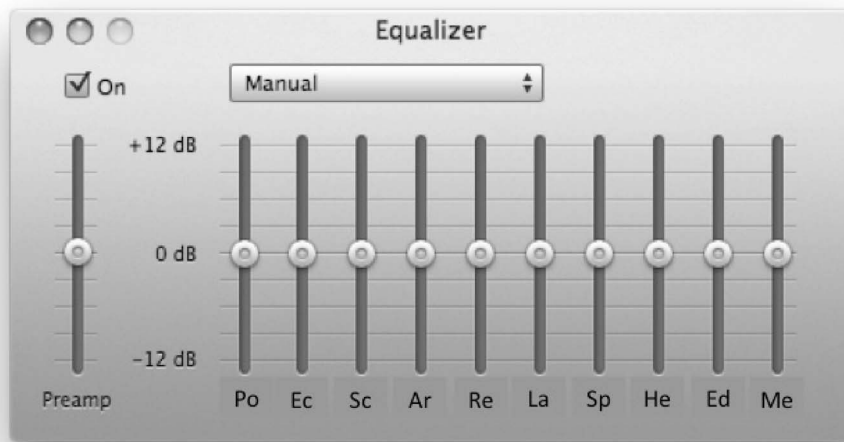


Fig. 4. The function system equalizer (modified version of a screenshot of the OS X Mountain Lion equalizer gadget by Apple Inc).

it, “the evolution of governance never stops since the ongoing competition between discourses will never lead to unifying discourse that fully represents the whole community (...). Institutions (...) appear as temporary conceptual structures that not only coordinate actors, but also the configurations of power/knowledge”. This means that the quality of the evolving governance of the functionally differentiated depends on the balance of discourses carried out within the interdependent systems. Russia, for example, was communist rule for a significant part of the period under investigation here. The period of the communist was marked by the dominant role of the political discourse which was in turn associated with a subordinate role of the economic system. It seems clear that the asymmetric relations between competing discourses are reflective of the presence of strong vested interests which are likely opposed to the broad participatory engagement of communities into the evolving governance.

Whereas van Assche, Djanibekov, Hornidge, Shtaltovna, and Verschraegen (2014, p. 76) correctly point out that “tradition can create dependence on the future”, it does follow that our capitalist future could be a matter of performativity effects of our traditions. In fact, the big data analysis in the present paper does not exclude the possibility that capitalism is largely a discursive artefact in the language areas of the world (see also Fuller and Loogma 2009), and that this potentially “imaginary” capitalism ironically benefits from the performativity effected by those who actually criticise it (see Roth, 2015; 2017b). In this sense, the paper may be read as an invitation to a greater sceptical distance, theoretical irony, and methodological lucidity. If we imagine the ultimately incommensurable function systems as arranged on an equalizer (see Fig. 4), then the socio-critical ambitions that focus predominantly on the level settings of only one system (such as the economic or political one) appear to be contingently mono-dimensional.

By highlighting the eventful history of the function systems and their changing popularity, our results do not warrant the assumption that it is always the assumed political-economic baseline that deserves the most attention. Rather, we must raise the concern that an ultimately contingent focus on the political system and the economy might itself result in precisely those distortions that we seek to counteract by an even stronger discursive focus on these systems (Roth, 2017b). The paradox involved in this constellation confirms that social theory and the corresponding social and institutional divisions are not becoming redundant but only fundamentally challenged in the age of big data, with the major challenge being in the development of self-transparent theories well-capable of reflecting their own performance and performativity. This is likely a basic requirement for all theories with the ambition to not only co-perform but rather adequately describe, change, or anticipate major social trends.

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