

Newspapers, Technology, and a Shared Western Identity. Overcoming the problem of geolocating of “The West”.

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(Byline): Is it possible to think of Technology as responsible for processes of Globalization in Western Societies, and as a trigger of cultural homogenization? Possibly yes. While trying to geolocate concepts like culture, national identity, or ideological constructions like “The West” is difficult, research shows that discourses related to technology seem to act as a unifying force of shared identity in Western societies.

1. Introduction. Research hypotheses.

This article explains the research findings of the EU-funded research project GLOTECH (Time, Technology, and Globalization. A study of the role of technology in processes of modernization and globalization using the Press, Big Data, and Computational Research Methodologies¹). The Principal Investigator, Elena Fernández Fernández, was a MSCA-IF grantee. The project took place between 2021-2023.

The aim of the project was to analyze the role of technology in processes of modernization and globalization using the press, big data and computational methods. It aimed to explore the role of technology as a factor of time standardizations in Western industrialized societies as well as a booster of cultural homogenization, and as a consequence, an agent of modernization and globalization. The analysis focused on the press in Spain, France, Germany, Switzerland, Italy, UK, Ireland, and The United States, over an observational time of approximately 200 years (1830-2018). The methodology included different computational

¹ **GLOTECH EU portal description:** [Time, Technology, and Globalization. A study of the role of technology in processes of modernization and globalization using the Press, Big Data, and Computational Research Methodologies \(GLOTECH\) | GLOTECH | Project | Fact Sheet | H2020 | CORDIS | European Commission](#)

research methodologies, contributing to significant advances in Digital Humanities and Computational Social Sciences. Deliverables include four peer reviewed articles², one unpublished conference paper³, and eight talks⁴.

GLOTECH was divided into two main thematic blocks:

- **Block 1. Computational Modelling of the Theory of Social Acceleration.** Proposed by Reinhart Koselleck, Social Acceleration is described as an increasing sensation of rush that walks hand in hand with incrementing rates of technology arriving to society, having as a consequence the possibility of doing more things in the same amount of time. If we think about improvements in communication systems, it is easy to understand that sending a letter two hundred years ago to a remote location took much longer than sending the same letter nowadays (not to mention the possibility of sending an email or a text message instead). The introduction of electric light into factories had a result the possibility of

² **Peer Review publications.** 1. Fernández Fernández, Elena, Jana Meier, and Simon Clematide. “Quantifying Information Density in World City Newspapers of Record and a Suburban Newspaper (1999–2018)”. DHNB2026. Lost in Abundance. Digital Humanities in the Nordic and Baltic Countries 10th Conference. 09-13 March, 2026. Aarhus, Denmark.

2. Denove, Emmanuelle, Elisa Michelet, Germans Savcisens, and Elena Fernández Fernández. “An Industrial West? A Mixed-Methods Analysis of Newspapers Discourses about Technology over One Hundred and Ten Years (1830-1940)”. The Journal of Data Mining and Digital Humanities, 2024.

3. Fernández Fernández, Elena, and Germans Savcisens. “Quantifying Western Discourses about Technology. An Analysis of Press Coverage using a Dataset of Multilingual Newspapers (1999-2018)”. DHNB2024. From Experimentations to Experience: Lessons learnt from the Intersections between Digital Humanities and Cultural Heritage. 27-31 May, 2024. Reykjavik, Iceland.

4. Fernández Fernández, Elena, and Germans Savcisens. “A Sustainable West? Analyzing Clusters of Public Opinion in Sustainability Western Discourses in a Collection of Multilingual Newspapers (1999-2018)”. DHNB2023. Sustainability, Environment, Community, Data. Online Conference. 8-10 March, 2023.

³ **Unpublished Conference Paper.** Fernández Fernández, Elena, Jana Meier, and Simon Clematide. “The Speed of the West? Measuring Social Acceleration in World Capitals using Newspapers and Quantitative Methods (1999-2018)”. DHNB 2025. Digital Humanities in the Nordic and Baltic Countries 9th Conference. Tartu. 05-03-2025, 07-03-2025. Unpublished Conference Paper.

⁴ **Talks.** 1. Fernández Fernández, Elena. “My Journey from English Philology to Data Science/De Filología Inglesa a Ciencia de Datos”. University of Salamanca, 2024.

2. Fernández Fernández, Elena. “Quantitative Analysis about Sustainability Discourses in Newspapers (1999 2018)”. European Environmental Agency, Copenhagen (Denmark). 23-08-2023.

3. Fernández Fernández, Elena. ““Time, Technology and Globalization. A study of the role of technology in processes of modernization and globalization using the Press, Big Data, and Computational Research Methodologies.” Copenhagen Center for Social Data Science (SODAS). 22-04-2022.

4. Fernández Fernández, Elena. ““Technology, Globalization and Newspapers: a Computational Analysis”. NULab for Texts, Maps, and Networks Annual Conference: “What Now?”. Northeastern University. Boston (USA). 01-04-2022.

5. Fernández Fernández, Elena. “Time, Technology and Globalization. A study of the role of technology in processes of modernization and globalization using the Press, Big Data, and Computational Research Methodologies. (GLOTECH)” The NULab for Texts, Maps, and Networks, Northeastern University. Boston (USA). 09-03-2022.

6. Fernández Fernández, Elena. “Time, Technology and Globalization. A study of the role of technology in processes of modernization and globalization using the Press, Big Data, and Computational Research Methodologies. (GLOTECH)”. Institute IMDEA Networks. Madrid (Spain). 02-12-2021.

7. Fernández Fernández, Elena. “Time, Technology and Globalization. A study of the role of technology in processes of modernization and globalization using the Press, Big Data, and Computational Research Methodologies. (GLOTECH)”. Artificial Intelligence Research Institute (IIIA), CSIC. Barcelona (Spain). 30 11-2021.

8. Fernández Fernández, Elena. “Time, Technology and Globalization. A study of the role of technology in processes of modernization and globalization using the Press, Big Data, and Computational Research Methodologies. (GLOTECH)”. Institute of Computational Linguistics, University of Zurich. Trogen (Switzerland). 06-12-2021.

increasing productivity during night shifts, with the constant advancement of technology permitting raising levels of speed and efficiency. Better transportation systems allowed to connect markets and move goods and people worldwide, creating a new global economy. Koselleck proposed that all these technological advances allowed humans to alter natural time (time rhythms given to us by nature, such as days and nights, or seasons), creating a new concept: the social construction of time (artificially created units of time thanks to technology such as hours, minutes, or seconds). **PRESSTECH** (*Time, Technology and the Press. A Study of Accelerations of Time Perceptions during the Industrial and Digital Revolutions*; a Marie Curie Co-found project, also having Elena Fernández Fernández as Principal Investigator), successfully operationalized The Theory of Social Acceleration in collaboration with a research team at the Technical University of Munich formed by Juergen Pfeffer and Mirco Schoenfeld. Defining triplets of Subject-Verb-Object (SVO) as narrative units, PRESSTECH showed how, using a Spanish Government Gazette (*Boletín Oficial del Estado*) over an observational time of thirty years (1988-2018), it was possible to detect a clear increment in unique SVO triplets per number of yearly tokens over time, therefore showcasing raising rates of human activity⁵. **GLOTECH, in collaboration with a research team at the Institute of Computational Linguistics at the University of Zurich, formed by Simon Clematide and Jana Meier**, further explored The Theory of Social Acceleration using the same computational pipeline as PRESSTECH did (quantifying numbers of SVO triplets over time) and a larger dataset of newspapers located in other Western societies. It aimed to detect whether it was possible to observe Social Acceleration in all of them, and by extension, inferring whether Western temporal synchronization (progressively similar numbers of SVO triplets across newspapers) may have walked hand-in-hand with processes of globalization. The selected observational time was 1999-2018. Due to bad quality OCR, it was not possible to analyze newspapers belonging to the Second Industrial Revolution (1867-1914).

- **Block 2. Computational Modelling of Western Discourses about Public Opinion of Science and Technology.** The idea that technology is a core property of Western societies has been proposed by many authors. The displacement of aristocracy at the aftermath of the French Revolution in Western societies by the new ruling class, the bourgeoisie, was only possible thanks to the social and economic transformations triggered by the Industrial Revolution (Hobsbawm). Supporters of theories of technological determinism argue that contemporary Western societies are the way they are simply due to the agency of technology (Marx and Smith). Therefore, it would be relevant to analyze how certain technological concepts that could be considered as “essential” for the historical development of the West appear depicted in the press of a variety of countries. Three key terms that represented technologies crucial during the Second Industrial Revolution were selected: gasoline, iron, and telephone. Following a similar line of reasoning, four indispensable ones for our contemporary Digital Revolution (1999-2018) were selected: automation, internet, oil, and nuclear. Furthermore, the increasing undeniable effects of climate change acted as a motivation to also think about sustainability as a new element to consider in conversations about technological determinism. Therefore, four key terms (sustainable development, pollution, climate change, and environment), were selected. In collaboration with a research team at the Technical University of Denmark (Germans Savcicens), as well as a research team located at EPFL (Elisa Michelet and Emmanuelle Denove), a computational pipeline consisting of topic modelling and network analysis was applied to the filtered dataset with all the selected key terms.

⁵ **PRESSTECH peer reviewed article:** Fernández Fernández, Elena, Mirco Schoenfeld, Juergen Pfeffer. “Measuring the Acceleration of the Social Construction of Time using the BOE (Boletín Oficial del Estado)”. CHR 2020: Workshop on Computational Humanities Research, November 18-20, Amsterdam, The Netherlands.

And, as frequently happens in research projects, findings not only did answer the original research question, but opened many new ones.

2. Development. Research surprises.

As mentioned, a multilingual dataset of newspapers of record belonging to eight Western societies (Spain, France, Italy, Germany, Switzerland, UK, Ireland, and The United States) was selected. The chosen news outlets included eight newspapers located in world capitals for the contemporary period of time (1999-2018): *The Times* (London), *The New York Times International* (New York), *The Irish Times* (Dublin), *NZZ* (Zurich), *Die Welt* (Berlin), *Le Figaro* (Paris), *La Stampa* (Turin), and *El País* (Madrid), as well as a suburban newspaper: *Chicago Daily Herald*. For the period of time (1830-1950) analyzing the Second Industrial Revolution, a similar dataset consisting of newspapers located at world cities was selected: *Le Figaro* (Paris), *The New York Herald* (New York), *El Imparcial* (Madrid), *Neuer Hamburger Zeitung* (Hamburg) and *La Stampa* (Turin),

Research outputs of both thematic blocks (Social Acceleration and Technological and Sustainability Discourses) showed non-trivial trends of information homogeneity. Technology, whether implicitly (referring to The Theory of Social Acceleration by showing incrementing rates of SVO triplets over time), or explicitly (appearing depicted very similarly in all the selected key terms in all newspapers over time), appears to signal a shared Western voice that seems to mostly agree on technological related discourses.

Let’s start exploring the implicit agency of technology as a trigger of cultural homogenization (block one). Findings belonging to Research Block One (Social Acceleration) showed a trend of a conservative increment of SVO triplets over time in the seven newspapers located at world capitals. Simultaneously, it exposes a very clear decrement of SVO triplets over time in the suburban newspaper. Figure one shows the yearly averages of unique SVO triplets per token at the article level (so, selecting individual articles as a control unit) over twenty years (1999–2018).

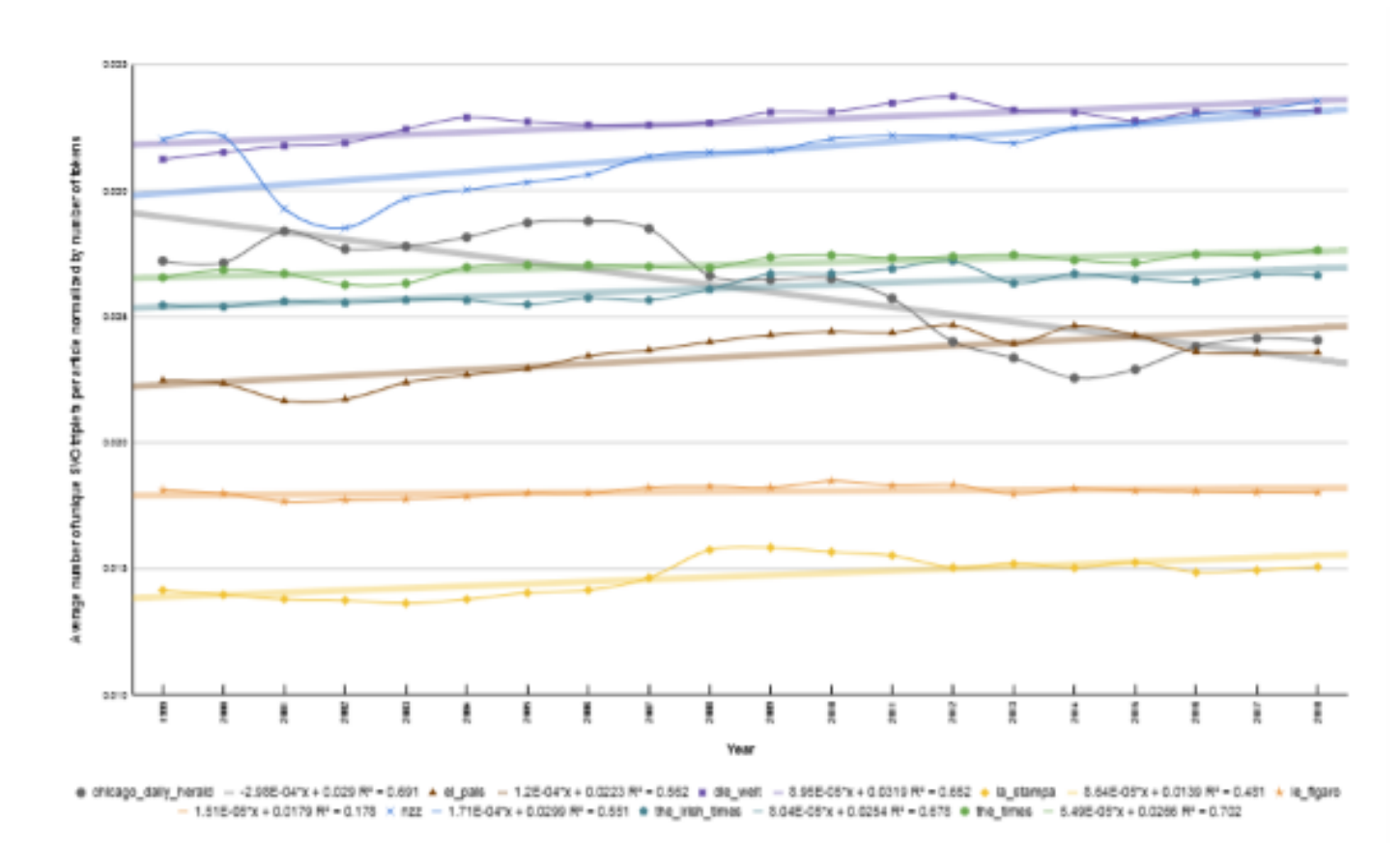


Figure One. Yearly averages of unique SVO triplets per token at the article level (1999–2018). The x-axis shows publication years; the y-axis shows normalized counts of unique triplets per token. Dots represent yearly averages for each newspaper; colored regression lines indicate long-term trends. Higher values correspond to greater information density.

Furthermore, other data experiments carried on by the authors show a similar picture. Intrigued by what seemed to be an increasing presence of duplicated newspapers titles and bylines observed qualitatively during the data analysis process (for example, a breaking news article about Brexit would now appear three or four times in the same newspaper in a short period of time simply adding a few new lines in every iteration), GLOTECH authors decided to not only quantify SVO triplets at the article level, but also unique SVO triplets at the yearly level. Consequently, the authors extracted all SVO triplets yearly, removed duplicated ones (to control for repeated content across different articles), and quantified unique ones over number of total tokens. Results, as shown in figure two, indicate a conservative trend of less unique content over time in the seven newspapers located in world cities (again, less unique SVO triplets means that newspapers are increasingly repeating the same SVO triplets, which points to repeating more and more content over time), and a very aggressive decrement in the suburban newspaper.

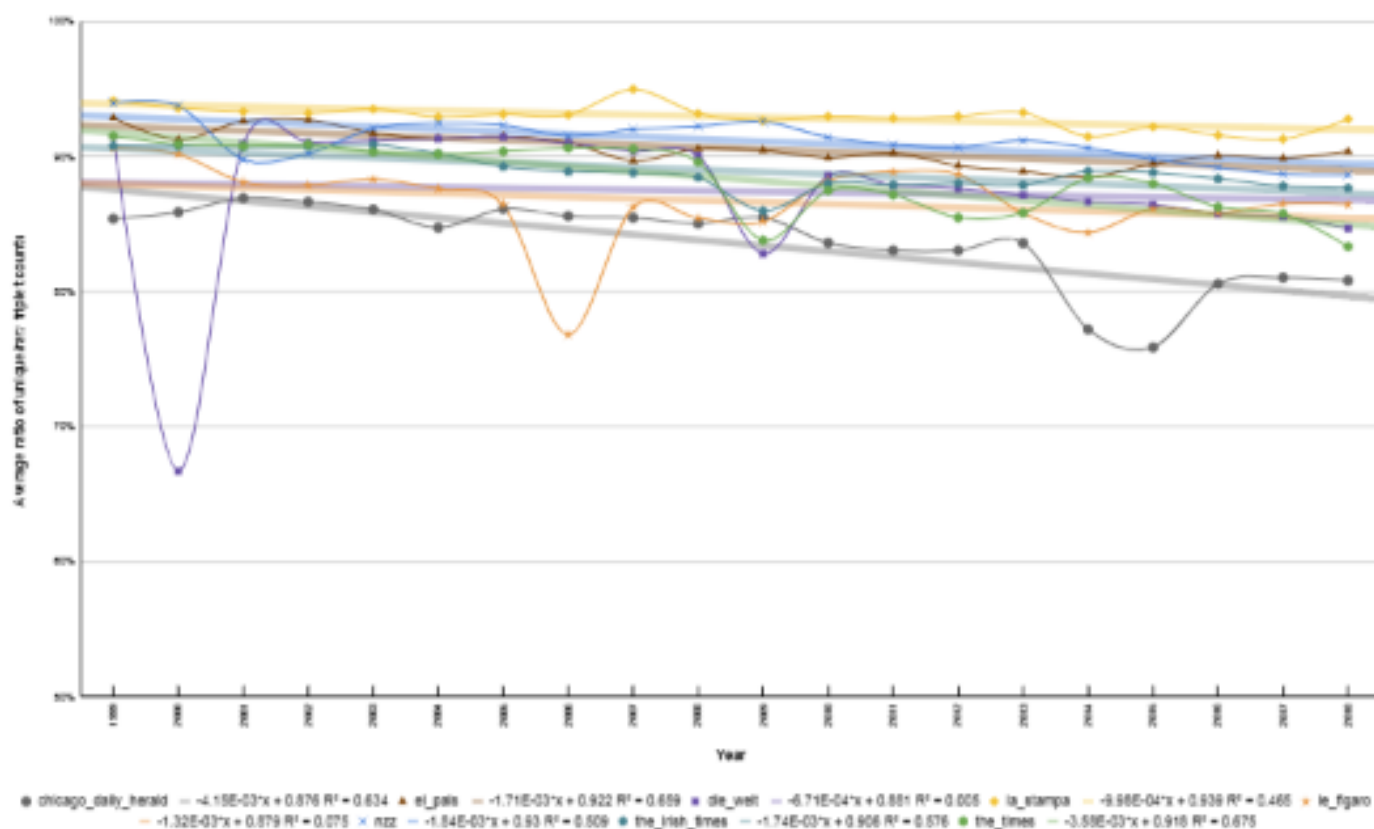


Figure Two. Yearly averages of the percentage of unique SVO triplets within articles (1999–2018). The y-axis expresses the ratio of unique to raw triplets as a percentage ($100 \times \text{unique}/\text{raw}$). Dots show yearly averages; colored regression lines indicate trends by newspaper. Lower values indicate greater redundancy due to repeated triplets within articles.

These research outputs reveal another finding: **it is possible to observe similar editorial practices in newspapers of record located at world cities and different ones in the suburban newspaper.** And, upon a qualitative analysis of newspapers sections, the authors note how newspapers sections in newspapers of record are remarkably similar and significantly different in the selected suburban newspaper. So, in essence, **newspapers of record located at world capitals are “Birds of the same flock” that “fly together”.** Readers

of these newspapers worldwide have a very similar shared experience, at least from the point of view of editorial policies.

Is it possible then to argue that newspapers of record located at world cities have some sort of supra-national power to fabricate the concept of “The West”? Benedict Anderson proposes the idea that artificially created cultural devices such as flags, anthems, newspapers of record, or even national literature, have the agency of fabricating national identities by creating a sense of community among citizens of countries that would otherwise have nothing in common. Is it possible to extend this idea to a supranational space called “The West” formed by world capitals located in Western countries? (GLOTECH only analyzed Western societies, so it is not possible to enquire if this is a global phenomenon or just a Western one).

At this point, it is nothing but natural to ask a series of very relevant question: where is “The West”? Is it possible to geolocate concepts such as culture, or national identity? For example: where is “France”? Is it in Paris, or in *provence*? And what happens with newspapers? Can we pin down “national information” in specific newspapers that may act as proxies of entire countries? If so: which ones? And: where are they located? In the capital, in the suburbs of the capital, in major regions, or in the deep countryside?

The world city theory provides answers to some of these questions from a geographic perspective. Proposed by authors like Saskia Sassen or Manuel Castells, it argues that world cities have progressively become an ecosystem of their own increasingly detached from their respective countries. So, according to this theory, Tokyo and London would be more like each other than Tokyo is to Japan or London is to the UK. World cities have also been identified as the first place where innovation takes place (Rozenblat et al.).

The definition of **newspapers of record** also provides some answers from those questions but from an information perspective. Newspapers of record are defined as independent news outlets uncontrolled by governments that are considered as reliable sources for sharing, recording, and preserving information (Hansen and Paul, Hansen and Martin).

So, according to this sequence of ideas, at this point, GLOTECH’s research findings show that processes of globalization mediated by technology and as recorded in newspapers are not as geographically uniform as one could think, showcasing different and unexpected layers: world capitals, suburban areas within world capitals, major cities, and the countryside.

3. More development. Technology and The West

The first research block identifies different geographic regions in terms of editorial practices, leaving aside the content of newspapers and analyzing discourses about technology. That is why research block two, discourses about technology, is a perfect complement to research block one. And **findings now tell a different story**. All key terms selected across all observational times (1830-1940: gasoline, iron, and telephone; 1998-2019: nuclear, oil, internet, automation, and sustainable development, environment, pollution, climate change) show a remarkable homogeneity over the whole observational time showcasing that Western societies, generally speaking, tend to significantly agree in discourses related to technology. A four-step computational pipeline that consisted of 1) Topic Modelling (and specifically, the algorithm Pachinko Allocation), 2) word embeddings, 3) Ward’s hierarchical cluster analysis, and 4) network analysis, was implemented.

To illustrate how the pipeline works, let’s use the example of “**Pollution**” (Fernández Fernández and Savcicens, 2023). **Figure three** shows how similarly colored boxes (each box representing a global topic that gathers multilingual words calculated both by topic models and word embeddings) include a same semantic field shared by newspapers over time (labels were manually selected by the authors). Colored squares located in those colored boxes show the newspapers that share the same discourse.

So: for example, in 1999-2003, it is possible to see the topic “Energy” in a green box that contains a green square (*The New York Times*), a red square (*Chicago Daily Herald*), a yellow one (*The Times*), and a purple one (*The Irish Times*). That means that our computational pipeline is detecting that those two newspapers are talking about energy very similarly in 1993-2003. We can see that, over the last twenty years, there is a lot of information homogeneity, as there are only six overall semantic fields: green (climate change), red (politics), forest green (environment), yellow (car industry), and blue (transportation). And there is also progressive agreement as we reach contemporary times: we can see less boxes (i.e. global topics), and more colored squares per box, which means that more newspapers are talking about the same topic similarly.

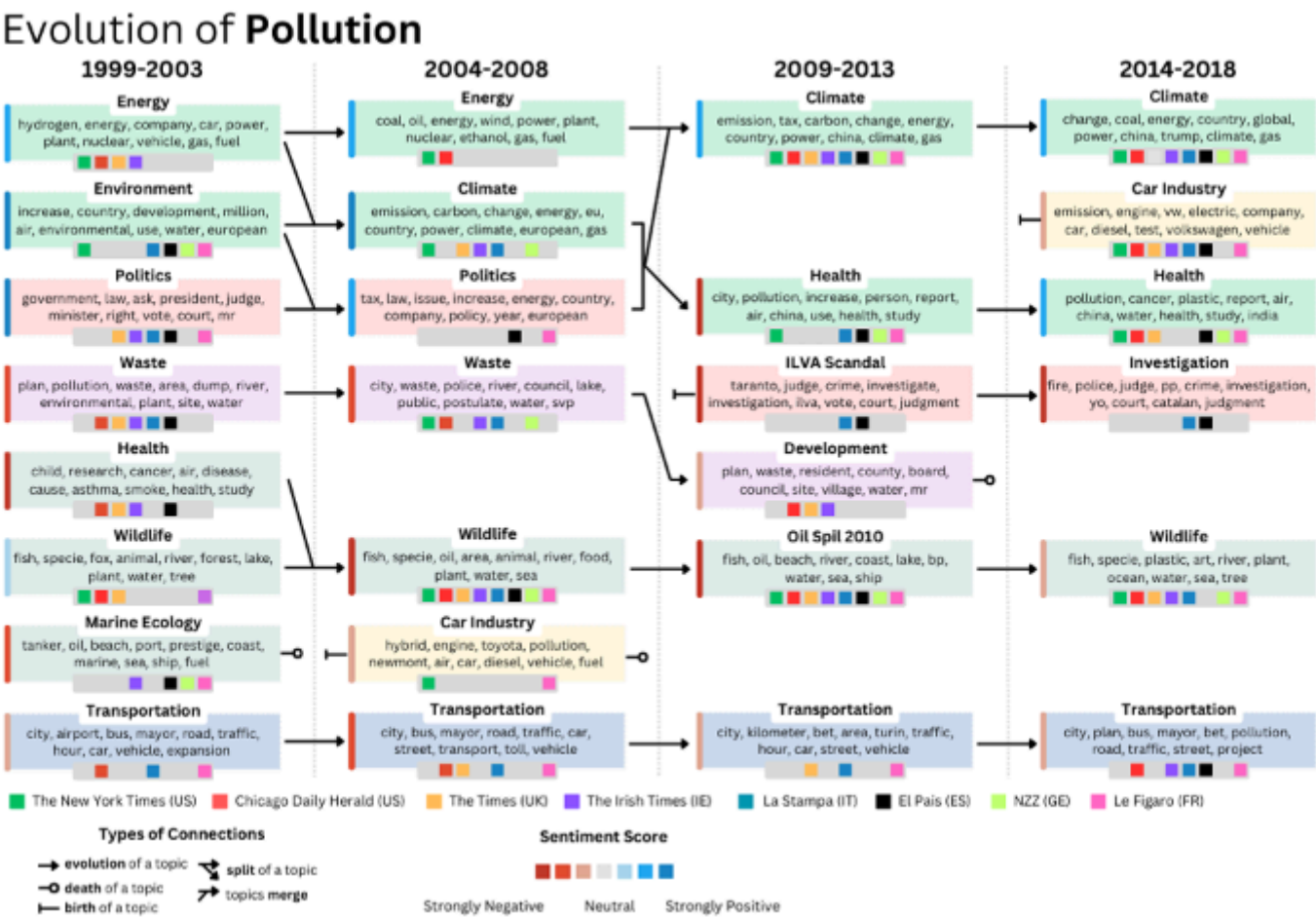


Figure Three. Evolution of the key term “Pollution” over an observational time of 20 years (1999-2018), using a five step computational pipeline consisting of Topic Modelling (Pachinko Allocation), word embeddings, Ward’s hierarchical cluster analysis, and network analysis.

Research outputs of all key terms over the whole observational time (1830-2018) are very similar. They all show very similar semantic fields and a progressive simplification of discourses hand in hand with increasing agreement across newspapers. This is defined by the authors as **information stability**, defined as low levels of semantic diversity in data outcomes over time at the individual key term level. However, a very interesting difference can be observed in contemporary discourses about technology (as opposed to sustainability ones). Information stability appears, but also something that the authors call **information homogeneity**, explained as low levels of semantic diversity in data outcomes across the key terms selection. While it is stronger in the second cluster of time (1990-2018), it nevertheless is already present in the first one (1830-1950). Sustainability related discourses show how each key term has very niche overall semantic categories (that, as mentioned before, are manually labeled topics that fall into the same semantic fields) that are therefore very different

among key terms. Nevertheless, contemporary technologically related discourses show an almost identical distribution of overall semantic categories that could be defined as essential pillars of contemporary societies: finance, politics, and education. Figure four shows the number of newspapers (out of a corpus of eight) that have very similar wording in those semantic categories.

Automation	Nuclear	Internet	Oil	Sustainable Development	Pollution	Environment	Climate Change
Finance (8/8) Finance (8/8) Tech Industry (8/8)	Politics (8/8) Politics (7/8) Energy (8/8) Energy (8/8)	Politics (8/8) Finance (8/8) Finance (8/8) Education (7/8)	Energy (7/8) Green Energy (7/8) Company (6/8) Finance (6/8)	Education (8/8) Education (8/8) Environment (8/8) Environment (8/8)	Climate (8/8) Oil spill 2010 (8/8)	Wildlife (8/8) Energy (8/8)	Politics (8/8) Energy (8/8) Leisure (8/8) Global warming (8/8)

Figure four. This table lists the topics that show a high number of newspapers (colored red squares in Figure one). For example, in Automation, two Finance-related topics have all eight newspapers attached to a topic.

What is the story that these research results are telling? Before answering that question, it is important to explain something about the research methodology. Topic modelling, combined with word embeddings, has the capacity to detect overlapping discourses of semantic similarity across multilingual newspapers. But, Ward Hierarchical Clustering discriminates discourses that are not shared by most newspapers. What does that mean?

The intention of the authors of the research articles in this block was to detect the most popular discourses across newspaper, seeking to track general trends of agreement in technological and sustainability related discourses. That means that **more fine-grained semantic nuances across discourses (i.e. degree of agreement or disagreement) that other algorithms could capture are not present in this study**. What the three peer-reviewed research articles are showing is that newspapers of record located at world cities and the selected suburban newspaper (*Chicago Daily Herald*) show very similar information behavior (stability and homogeneity) when it comes to discourses about science and technology. So, while it could be argued that this method is intentionally only focusing on discourse similarity (i.e. agreement), the fact that research outputs confirm high levels of information stability and homogeneity do confirm that indeed the majority of newspapers, regardless of geolocation, agree on scientific related discourses.

And, when a discourse becomes distinctive enough (for example, the ILVA Scandal, an environmental crisis caused by the discovery of cancer related pollutants by a steel plant in Italy), the method does detect it. Other examples of information singularity (as opposed to more general topics such as education, politics, or environment) flagged by the pipeline include The Bird Flu of 2005, the Oil Spill of 2010, The Kyoto Protocol, Chernobyl, Fukushima, or the Prestige Oil Spill. So, while other semantic similarity algorithms could indeed fine-grain trends and observe more nuanced levels of discourse similarity or dissimilarity (and therefore, of newspapers agreement or disagreement), **GLOTECH research outputs paint a clear picture of agreement (broadly speaking) in scientific discourses (information stability) across the selected dataset regardless of newspaper geolocation (world city, the suburbs). And further than that, they show very relevant patterns of information homogeneity: how some technologies that could be considered “essential” for Western society (automation, nuclear, internet, and oil) permeate into very similar semantic categories (finance and politics) that are the backbone of contemporary Western societies.**

4. Conclusion

The possibility of identifying a shared “Western Voice” about technology that overcomes editorial differences between newspapers of record and other outlets (editorial differences that mirror cultural, economic, and urban differences between the space of world cities and other locations within nations) is GLOTECH’s main research contribution. Increasing levels of information stability over time confirm the

idea that, as we approach contemporary times, newspapers (both or record and the selected suburban newspaper), it is possible to observe an increasingly streamed Western voice about technological discourses. The observed patterns of information homogeneity also show a similar discourse interference across all news outlets. Technology could be considered as a trigger for processes of cultural homogenization, and also as an agent of globalization.

GLOTECH also opens many new research questions, consequently signaling the high impact of the action and its ability to foster knowledge discovery. In terms of computational methods, and as explained, the selected pipelines have limitations. Other semantic similarity algorithms capable of tracking with more granularity degrees of similarity or difference across newspapers sharing a same discourse could provide more information about routes of public opinion in technological related discourse.

In terms of data, GLOTECH uses an overwhelming number of newspapers of record located in world cities (eight) and only one news outlet located in a suburban area (*Chicago Daily Herald*). Expanding these research questions to more newspapers located at more suburban locations, major cities and regions, could provide very interesting research findings about the inner workings of information flows in Western societies. Furthermore, expanding the analysis to non-Western countries could also shed light on the role of technology as an agent of globalization worldwide.

While technology seems to be a force of cohesion across Western societies, closely examining how other semantic categories act as points of rupture or contact would contribute to better understand the quite underexplored concept of “The West”, frequently defined as a homogeneous cultural entity without further complicating its many layers and complicated historical development.

Predating the commercialization of Generative Artificial Intelligence models in 2022, GLOTECH’s research findings are particularly relevant to our contemporary societies. At a time of unprecedented technological development where global economies are becoming increasingly dependent and reliant on technology, and where artificial intelligence is permeating every aspect of social life, the relationship between technology, globalization, and supra-national identities such as “Western societies”, is becoming tighter than ever before. It is therefore of crucial important to continue monitoring their symbiotic interdependence and therefore understanding its evolution in an increasingly technified world.

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