Measuring Economization with Diachronic Word Embeddings

Extended Abstract for IC2S2 2023

Social scientists often claim that there is an "increasing influence of economic factors and values on the political agenda and other areas of society" (Blumler and Kavanagh, 1999: 210). This is typically called a process of economization (Çalışkan and Callon, 2009). However, although existing research has analyzed this process in various social domains across Western societies (e.g. Morgan, 2003; Roth et al., 2017; Spring, 2015), evidence on economization remains mostly qualitative to date. In addition, there is a well-established strand of (mostly German) literature that discusses economization from a theoretical perspective based on systems theory (e.g. Schimank and Volkmann, 2008). Quantitative evidence still remains rare, however. The only exception known to the author are two studies that test the economization hypothesis by examining the relative frequency of specific terms in English, French, and German in the Google Books corpus. Doing so, they find that economic terms have indeed become more prevalent over the last 200 years, but that they have not achieved a dominant position compared to terms belonging to other social domains (Roth, 2014; Roth et al., 2017).
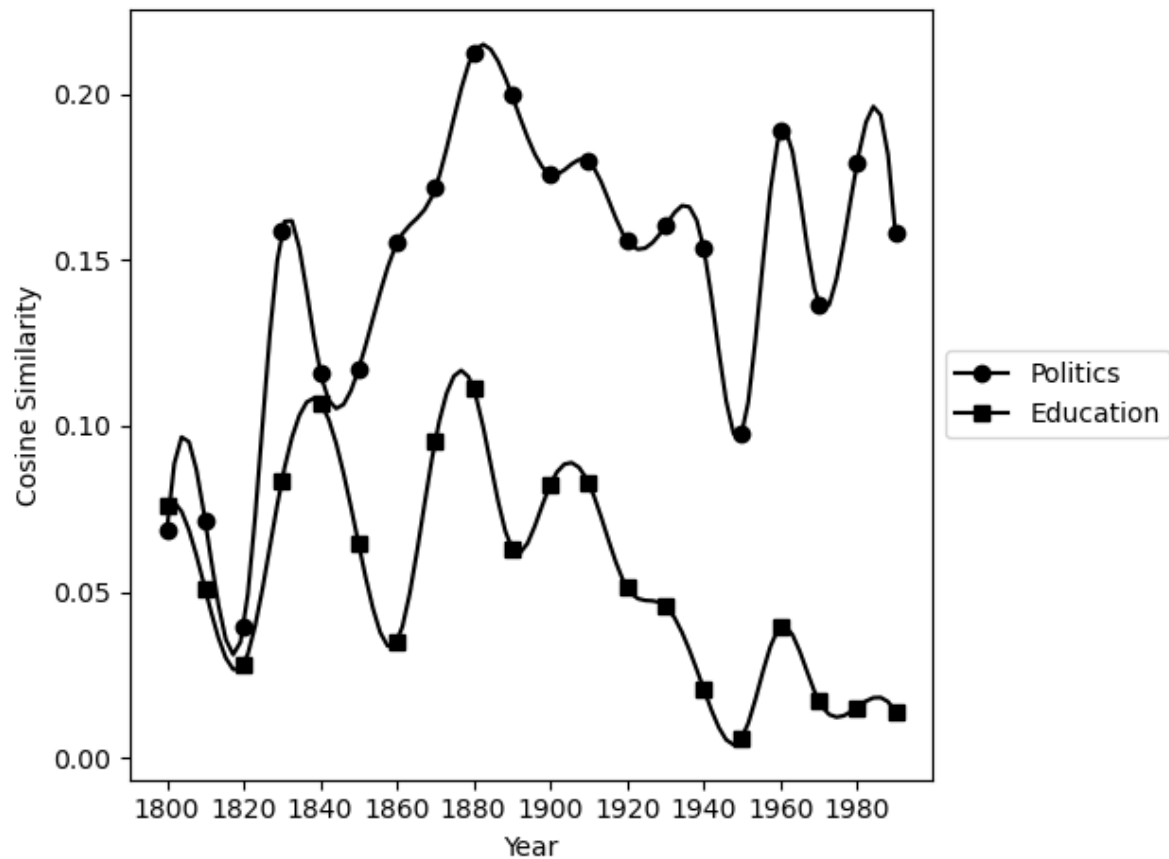
While these are certainly interesting findings, the approach chosen by these studies only allowed to test for the economization of society in general. However, it did not allow to test for the economization of specific social domains individually. Nevertheless, having chosen this approach can easily be explained because it simply was the only available approach at that time. Today, however, new computational methods have made it possible to analyze such data in more sophisticated ways. Thus, large-scale data from historical texts and artificial neural networks can be used to create so-called word embeddings (also "word vectors"). These word embeddings place each word in a high-dimensional space, and the meaning of a word can then be inferred from the relative position of words to each other. By creating different models for different periods, researchers can then track changes in the meaning of words over time (Hamilton et al., 2016). In addition, social scientists recently discovered that these characteristics of word embeddings can also be used to capture cultural associations between specific concepts over time (Kozlowski et al., 2019).

The project to be presented at IC2S2 23 therefore uses diachronic word embeddings based on the English Google Books corpus to analyze the association between the economic and various other social domains between 1800 and 1999. Each domain is thereby represented by a cloud of words, which improves the stability of measurements compared to measuring the association between single words. Thus, first, the center of each word cloud is calculated and then the distance between these centers is measured. As usual for high-dimensional spaces, the distance between domains is expressed by cosine similarities, which range from -1 to 1. Higher values thereby mean stronger associations. Thus, if a domain is found to move closer to the economic domain over time, it means that economic terms are more often found in the context of words representing this domain. This is interpreted as a process of economization.

At the time of writing this extended abstract, tentative analyses have been conducted for the political and the educational domain. Results are displayed in figure 1. One finds that these domains have undergone quite different developments. Thus, the political domain clearly experienced a process of economization during the 19th century but this process did not continue during the 20th century. The educational domain, on the other hand, seems to have become more detached from the economic sphere over most of the observed period. However, all these results are preliminary and may change after a necessary revision of the respective word lists. Further, additional analyses

will be conducted for various other domains including science, leisure, love, culture/arts, media, medicine, and work.

Figure 1: Association of the political and the educational domain with the economic domain (preliminary results)

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