"Natural Disaster(s)": Going Back to the Roots of Misleading Terminology. Insights from Culturomics

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MOTIVATIONS

The noun *disaster* (1590s) comes from the French *désastre* (1560s), from the Italian *disastro*, which derives from *dis-* (ill) and *astro* (star), literally "ill-starred"; the term *astro* results from the Latin *astrum*, which in turn arises from the Greek *astron* (Harper, 2001).

The United Nations Office for Disaster Risk Reduction (UNDRR, formerly UNISDR) defines a disaster as "a serious disruption of the functioning of a community or a society at any scale due to hazardous events interacting with conditions of exposure, vulnerability and capacity, leading to one or more of the following: human, material, economic and environmental losses and impacts" (UNDRR, 2020). Furthermore, according to the World Bank "unnatural disasters are deaths and damages that result from human acts of omission and commission" (World Bank–United Nations, 2010). These statements clarify that disasters are the result of a complex interaction between hazardous events (e.g., earthquakes) and the vulnerability of the social system, due to *human choices*. Therefore, the adjective "natural" misrepresents the formal meaning of "disaster."

The unnatural character of disasters has been dealt with at least since the mid-eighteenth century after the great 1755 Lisbon earthquake and downward through the discussion of the scientific community that began in the 1930s through the 1970s, and is still active today (Ball, 1975; Gaillard et al., 2007; Gould et al., 2016).

Nonetheless, the expression "natural disasters" is still used by politicians, media, international organizations, and scientists posing possible concrete implications, such as lowering the sense of human responsibility (Chmutina and von Meding, 2019) and influencing people to believe that ("natural") disasters are ineluctable. That might adversely affect disaster preparedness.

However, online initiatives and campaigns try to discourage the use of this expression ("#NoNaturalDisasters" web or Twitter campaigns). Additionally, the UNISDR banned the terminology from official communications in 2018 (Chmutina and von Meding, 2019).

Is it possible to infer when and how this (improper) lexicon developed? To try to answer this question, we asked for help from culturomics, a form of computational lexicology that studies human culture and human behavior based on the analysis of large digital data sets resulting from the collection, digitization, and indexing of a huge amount of words contained in printed works. We used the Ngram Viewer search engine, the free lexicometric tool developed by a team at Google Books (Michel et al., 2010).

GOOGLE NGRAM VIEWER (GNV): FEATURES AND SHORTCOMINGS

GNV allows anyone to make queries about the frequency and evolution of terms in several languages over time, based on the world's most comprehensive index of books that is Google Books. However, the quality of the data set only becomes adequately large to be used for scientific purposes by the year 1800 (Michel et al., 2010).

GNV shows the frequency of words or phrases (n-grams) in a graph. A "1 g" is defined as a string of characters uninterrupted by a space and an n-gram as a sequence of 1 g. Therefore, the *x*-axis of GNV displays the year in which books from the selected language corpus were published, the *y*-axis represents the frequency with which GNV graphs the percentage of each word in each year by dividing the number of instances of the word in a particular year by the total number of words in that year (Michel et al., 2010). However, some shortcomings have to be considered, such as errors related to the optical scanning and metadata (e.g., date), unsystematic material, and doubles.

APPLICATION TO "NATURAL DISASTER(S)"

We searched for a 2 g *natural disaster(s)* [ND(s)] in the American English (2019) corpus from 1900 to 2019. Data was downloaded and analyzed on 9 Oct. 2021. Before 1900, GNV only provides a few results, most of which have inconsistent metadata. The oldest book is a sermon published in 1724.

Figure 1 shows that the two bi-grams begin to emerge since the 1930s and progressively increase over the entire period, especially NDs, even if with significant rises and falls. For NDs, the lowest peak is in the second half of the 1940s; the highest peak is in the second half of the first decade of the 2000s. Overall, the frequency of bi-gram(s) has decreased over the past decade and beyond.

The search results related to NDs were also analyzed to identify both the typology and authors of the books as well as the main topic of each document. The analysis was performed for each of the five periods in which GNV automatically groups the results: 1900–1967 (I period, includes the lowest peak), 1968–2006 (II, highest peak), 2007–2010 (III), 2011–2014 (IV), and 2015–2019 (V) (Fig. 1).

In the first time window (1900–1967), the results mostly (~60%) refer to official publications of international organizations (e.g., United Nations and its specialized agencies, such as UNESCO), institutions, different and short-lived U.S. civil defense agencies, documents of the legislative bodies of the U.S. (the Senate and the House of Representatives), and the related commissions still active or defunct, documents of the U.S. federal departments or the U.S. State Department, and codes of laws of both the U.S. and individual states.

The subject matter of these publications embraces annual statistics of disasters and their consequences in epidemiological, social, and economic terms; disaster relief in
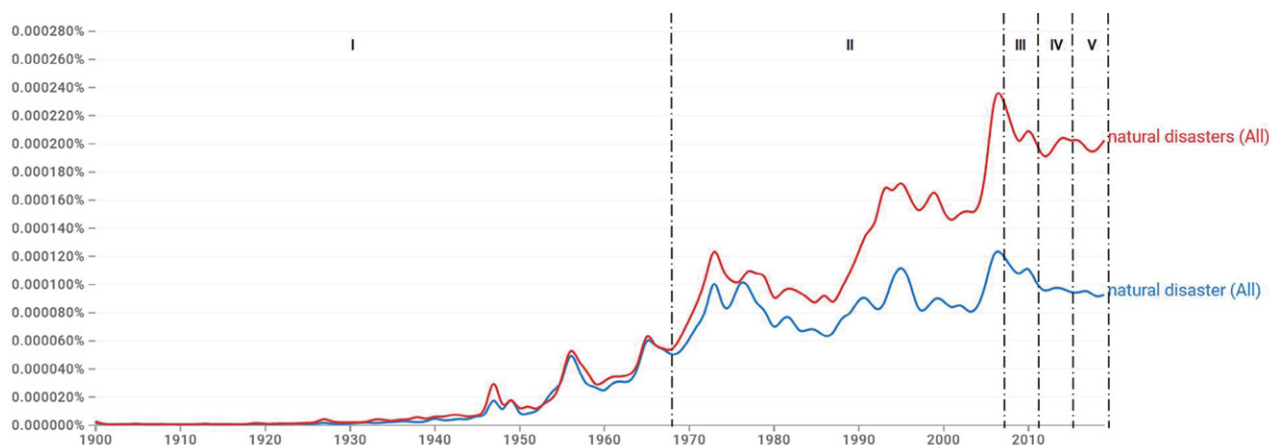
Figure 1. Frequency of "natural disaster(s)" (NDs) over time (smoothing is zero). The graph also shows the five periods in which Google Ngram Viewer (GNV) splits the NDs trend (modified from GNV). I—1900–1967; II—1968–2006; III—2007–2010; IV—2011–2014; V—2015–2019.

civil and agricultural sectors; disaster recovery and disaster prevention actions; and organization of civil defense systems. Among the remaining search results, we found magazines and articles published in scientific journals and conference proceedings as well as books whose topics are mainly history, geography, economy, and religion.

In the second period (1968–2006), the results include official publications and proceedings of conferences organized by institutions, governmental bodies or agencies, both U.S. and international organizations and associations, and so on. Again, among the issues of these publications there are statistics of disasters and their consequences. These items cover ~17% of the period, with a clear reduction compared to the first period. Indeed, most documents are books written by individual or multiple authors covering many areas such as natural science, philosophy, and religion. In the third period (2007–2010) and in the fourth and fifth periods (2011–2019), documents of official bodies and international organizations decrease further, being clearly a minority (between 4% and 7%) once compared to books, whose subjects are similar to those of the second period.

DEDUCTIONS

Culturomics can assist us in identifying the change in lexicon over time. Research points out that the terminology "natural disaster(s)" appears in books published in English in the U.S. since the 1930s, with an increase over time. Furthermore, the expression "natural disasters" seems to have had origin from institutions, bodies with public function, and international organizations. From the 1930s on, the terminology expanded, gaining importance in the lexicon of different fields of knowledge in which official documents (e.g., disaster statistics) probably played an important role as direct sources of disaster information. Over the past decade and beyond, the frequency of the expression has decreased, probably influenced by the growing skepticism about the (mis)use of the terminology and the long wave of reduced use of the phrase in official documents since the 1970s.

However, as the literature suggests (e.g., Brandt, 2018), the limitations of GNV imply that these findings have to be considered as a starting point of further research and not a landing point. Therefore, future research should involve other disciplines of social sciences and humanities, including business and administration (e.g., public and institutional administration, insurance) and the history of institutions.

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