

What does happiness depend on? Quantitative comparative analysis of various cultures

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Abstract. This article presents a comparative analysis of the change trends in the frequency of use of the *happiness* during the last two centuries in English, French, German, Spanish, Italian and Russian languages. We investigate how the level of happiness depends on factors such as the ratio of wealth and misery, as well as the ratio of success and difficulty, according to their expression in texts. The concepts of ‘happiness’ and ‘fortune’ are also compared. We use the well-known data set Google Books Ngram, comprising 6% of all ever-published books. It is shown that even within Europe happiness in different cultures is understood in different ways and distinctively depends on external factors.

1. Introduction

The considerable amount of text data accumulated on the Internet allows for the application of new quantitative approaches in the study of culture and society. The most intensively investigated are the social networks; in recent years great attention has been attracted by Google Books Ngram (<https://books.google.com/ngrams/>), an unprecedented huge diachronic text resource. The information collected in social networks reflects just a few last years; on the contrary, the books from Google Books have accumulated mankind experience in the last few centuries, which makes it one of the most valuable web resources for the study of lengthy changes in culture and society.

Such arrays of text data makes it possible to carry on diverse quantitative investigations. After the appearance of Google Books Ngram, most attention was paid to the study of individualism dynamics in various societies [1-3]. Emotions are another focus of attention; their expression dynamics has been the subject of several investigations [4, 5]. For instance, the frequency trends of use in the 20th century of several words synonymous to Anger, Disgust, Fear, Joy, Sadness and Surprise in American and British English were examined in [4]. It was shown that the frequency of use of emotive words is in general decreasing. As an interesting result of this work, it was detected a significant increase of emotionality in American texts compared to British ones in the last 20 years.

Happiness is both an essential concept in human culture and a main political objective in many countries [6]. In the last decades many works were dedicated to the study of happiness [7]. The ambiguity of this concept is noted in [8]. It was shown in [5] that the concept of happiness has undergone in USA a change from fortune (external factors) to positive internal psychological condition; this change occurred around the year 1920. The research tool employed in this case was Google Books Ngram.

In this paper we extend this approach to other European languages/countries. We also analyze the connection of happiness with fortune, well-being (the ratio wealth/misery) as well as successful life in the sense of success/difficulty frequency ratio (according to Google Books Ngram).

2. Data and methods

Google Books Ngram contains more than 500 billion n -grams, extracted from 8 million books printed since 1500 in 9 languages, including main European languages [9]. The service for plotting frequency graphs of words and phrases and the accessibility of the whole data set are some of the most important features of this project, allowing for any necessary calculation. We use data from all the European languages of this corpus starting just in 1800, since for earlier periods there are not enough data.

Each concept is represented by the word with the highest frequency. When considering another part of speech (happiness-happy) or synonyms using WordNet (happiness-felicity), we see (fig. 1) that the frequencies of these words change, as a rule quite synchronously. This allows taking into consideration a single word when describing trends of change. A similar phenomenon is observed for languages with rich morphology as Russian.

Trends of use of the word *happy* in the considered languages are compared with trends of use of some other words that are essential for describing the condition of man and society: fortune, wealth, misery, success, difficulty. By analogy with [4], we analyze the frequency difference between the word pairs ‘*wealth-misery*’ and ‘*success-difficulty*’.

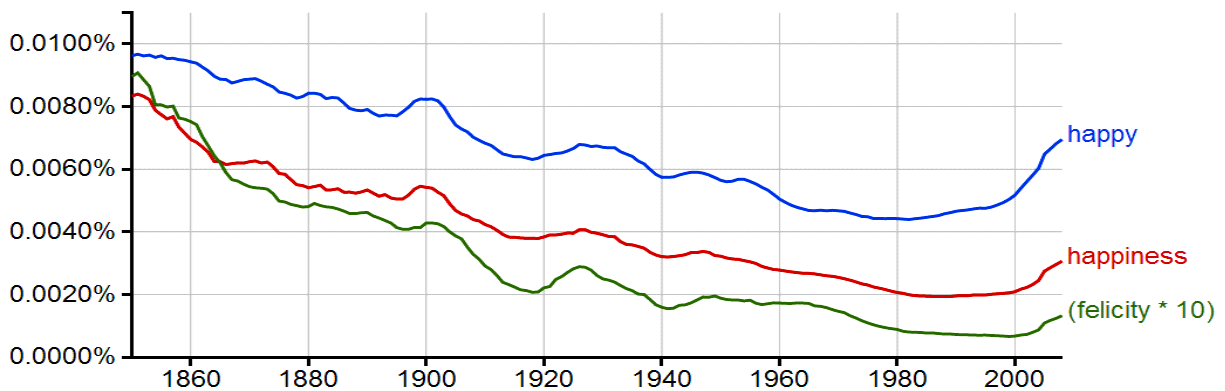


Fig. 1. Dynamics of the word *happy*, its derivate and synonym

3. Results and discussion

3.1. English language (USA and United Kingdom)

The level of happiness drops for more than 180 years while the focus on wealth has increased during most of this period. Thus, there is not necessarily a direct correlation between happiness and the level of prosperity, as it might be expected. Difficulties in Anglo-American society grow during two thirds of 19th century, then success begins to prevail; a significant rise is observed in the last half century. It is interesting that the abrupt growth in the level of happiness in the year 2000 occurred just 40 years after the rise of success level and the reduction of difficulties. It can be hypothesized that it took 40 year for the success of society to be reflected in personal happiness. The frequency of the word *fortune* changed synchronously with the word *happy*. This suggests that fortune is still an important aspect of happiness, despite the assertions made in [5].

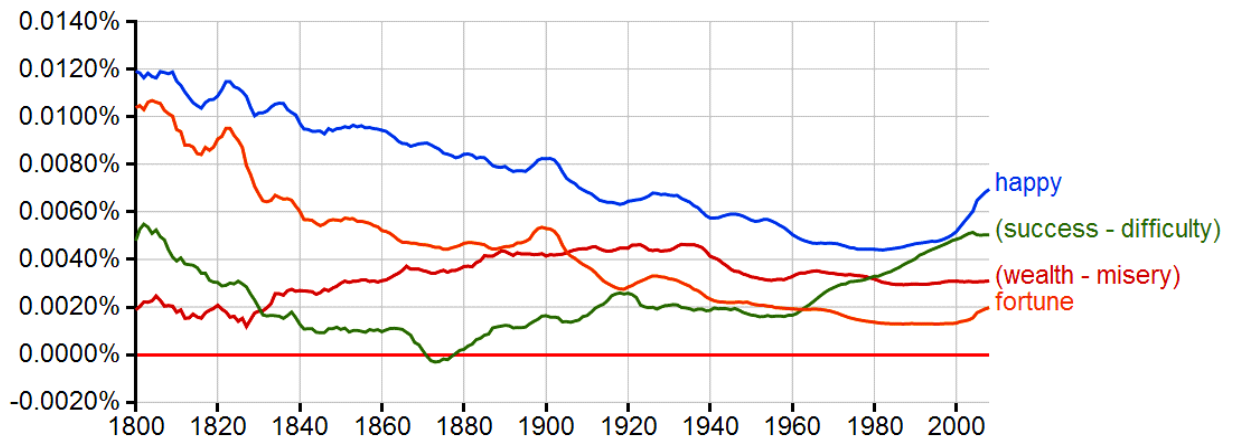


Fig. 2. Dynamics for the word *happy* and related words in English language

There are really no significant differences between British and American variants of English, except for a more perceptible reduction of the level of happiness in the British one during First and Second World Wars, which is absolutely natural taking into account the greater involvement of the United Kingdom in both wars.

3.2. German language

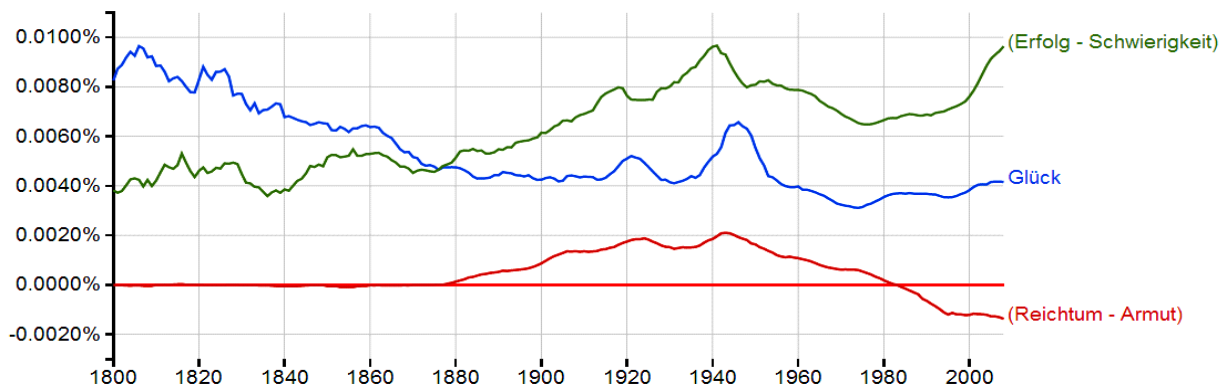


Fig. 3. Dynamics for the word *Glück* and related words in German language

The wars, specially the II World War, had a colossal significance for Germany. The rise of references to happiness during war time can be explained by propaganda publications and psychological mechanisms as an attempt to compensate somehow for the hardships of war. Germany's success grew until the attack on the USSR in 1941; after this, difficulties began to grow. And only in 2000 success started to significantly prevail over difficulties. It is curious the equal attention to both wealth and misery before 1880. However, the steady public attention to misery rather than wealth in the last 65 years requires clarification. The level of happiness in recent decades can be interpreted as the average of the parameters (Reichtum-Armut) and (Erfolg-Schwierigkeit).

In German, as well as in Spanish, French and Italian languages, the words meaning fortune evolve, in the same way that in English, synchronously with the word for '*happiness*', and are not included in the graphs below to simplify their perception.

3.3. French language

In French language we see the characteristic for western civilization decrease of happiness level for nearly two centuries, as well as the expected growth of references to happiness during war years. As in German language, the parameter (richesse-pauvreté) in French language falls during the postwar period; in the last 15 to 20 years this has occurred rapidly. The word happiness in French correlates accurately with the level of success, but not with well-being.

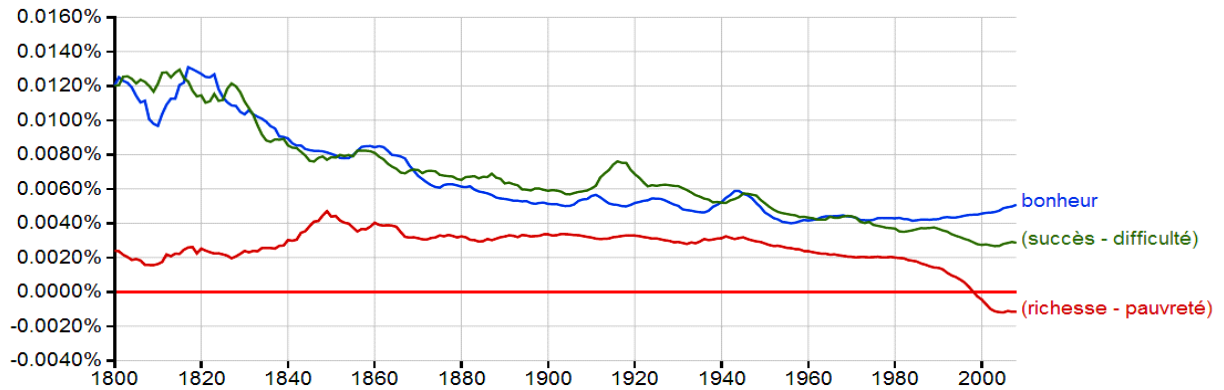


Fig. 4. Dynamics for the word *bonheur* and related words in French language

3.4. Spanish language

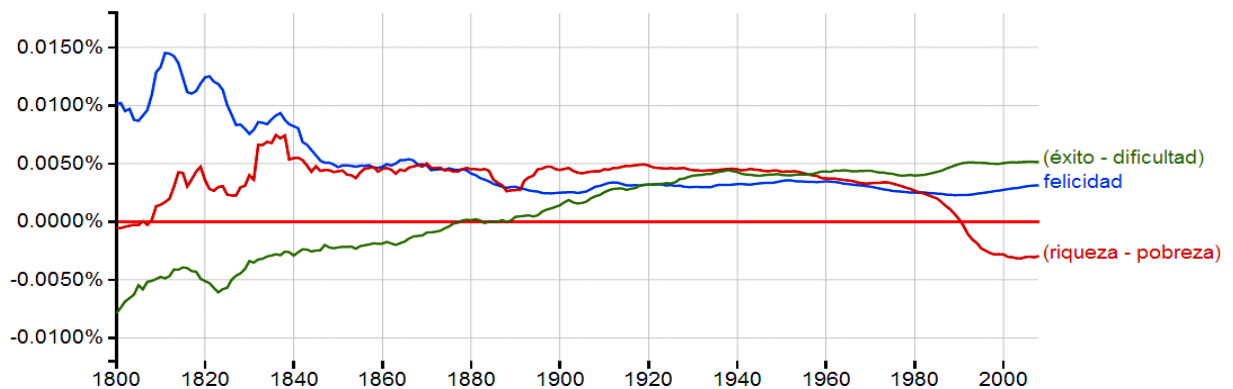


Fig. 5. Dynamics for the word *felicidad* and related words in Spanish language

World Wars affected Spain to a lesser extent than other European countries. The level of happiness also falls in 19th century, but then stabilizes and its dynamics is approximately the same as that of the parameter (éxito-dificultad) – (success-difficulty). It is interesting that the parameter (riqueza-pobreza) also falls rapidly in recent decades, i.e. misery pays much more attention in literature than wealth.

3.5. Italian language

It is unexpected the sharp dominance of difficulty over success in Italian language. On the other hand, the focus on the difficulties of life in Italy can be felt in the films made by Fellini and other great Italian directors' neo-realism. Otherwise, the dynamics qualitative picture of the considered parameters is close to that of other Western European countries.

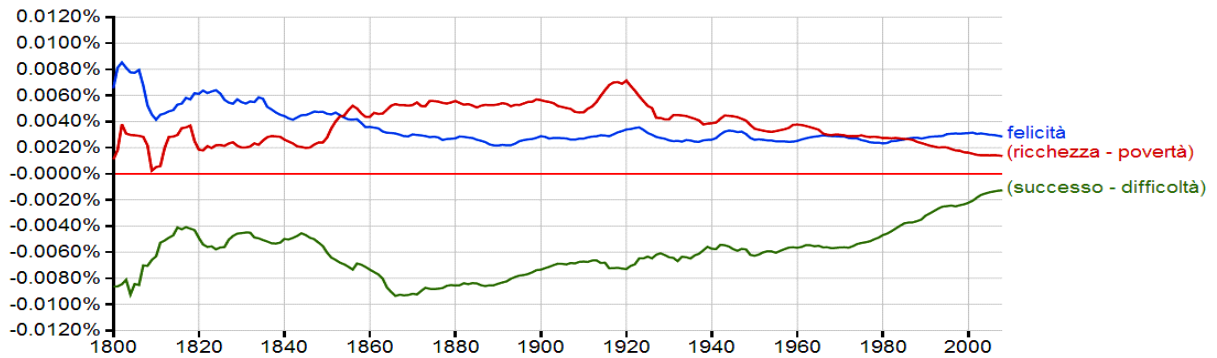


Fig. 6. Dynamics for the word *felicitá* and related words in Italian language

We can formulate the general regularities that are typical of western European countries. The level of happiness decreases in the 19th century and is at about the same level in the 20th century. Perhaps this is due to the fact that Western society is pragmatically oriented, and it pays far more attention to specific aspects of material existence than it does to such an abstract concept as happiness. The parameter wealth/misery has a relatively stable value on a large time interval for most of the examined cultures, but suddenly its value drops sharply in recent years in German, French and Spanish languages, although not dramatically in Italian and English. The value of the parameter success/difficulty increased in most societies, which looks natural in the light of the overall progress of civilization. Also, the natural exception is Germany because of a high influence of the lost war. We see as well an unexpected steady decline of this indicator for France.

3.6. Russian language

Russia, being an original country and experiencing the influence of the East, stands somewhat apart from the Western European civilization. Let us see to what extent its trends correspond to those of Western Europe.

The graphs shown in fig. 7 are quite interesting. Russia is the only one of the examined countries in which the happiness level grows in the 19th century. It is also the only country in which wealth/misery parameter falls in the 19th century. This means that there is anti-correlation between the level of happiness and the value of wealth/misery parameter in all societies, but in Russia it has opposite sign. It should be noted that this pattern is observed in 19th century, i.e. before Russia's transition to socialism. Possibly, this desire for happiness while reducing public interest in wealth was kind of a psychological precondition for socialist revolution.

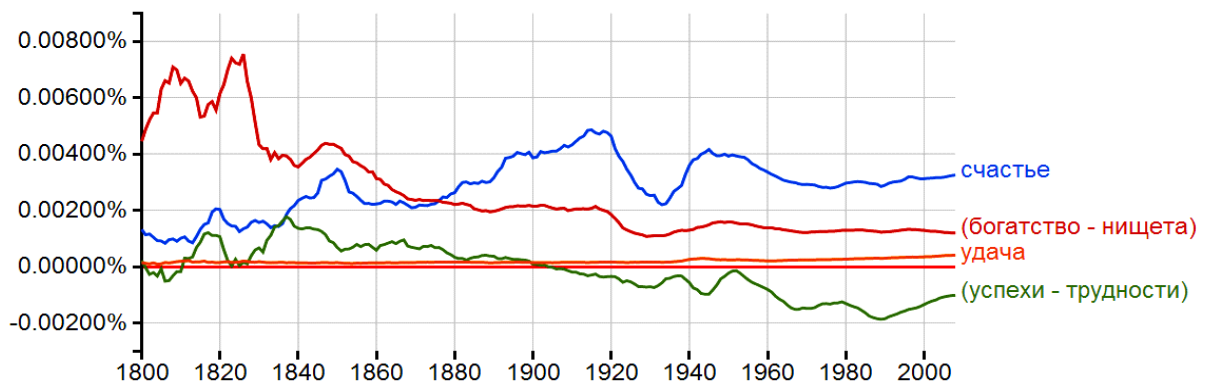


Fig. 7. Dynamics for the word 'happiness' (счастье) and related words in Russian language

It is also worth noting that happiness was not considered important during Stalin's government (the 30s of 20th century), and as in other countries affected by II World War it was more frequently used during the war. In the last 50-60 years, the attitude to happiness and wealth/misery in Russia did not change substantially. Success/difficulty have a local minimum during the war, which is natural; then Russian society difficulties grow until the end of Gorbachev's perestroika (late 80s), and in the last 20 years the balance shifts toward success.

In contrast to western European countries, the concept of 'fortune' does not have great significance for Russian society and does not correlate with happiness.

4. Conclusion

This paper presents the first comparative study of the correlation of happiness level and factors such as fortune, well-being and achievements level in a society. It turns out that among six major European countries, Russia can be noticeably distinguished by the trends. It is interesting that *wealth-misery* and *happiness* curves anti-correlate, which confirms Russian expression "*Money doesn't bring happiness!*".

Modern super-large corpora such as Google Books Ngram provide researchers in the humanities with new opportunities. One can expect that the application of computerized corpora and methods of analysis in the humanities will become more frequent and will bring them closer to natural sciences by the level of rigor.

5. Acknowledgement

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