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## Word-Choice and Economic Performance in European Countries Methodological Comments and Empirical Results

### Abstract

The article analyzes the effect of a nation's lexical features on the nation's socioeconomic performance. Selected lexical features of European national languages are compared to selected socioeconomic data through accepted statistical tests. The case studies carried out yield the following results: (1) Countries in which the school language shows the pattern "one-and-twenty" do surprisingly not score worse in the PISA maths test than countries in which the school language shows the pattern "twenty-one". (2) Countries in which the protected term for 'organic' contains *eco-* have a higher share of organic land than countries with other protected terms. (3) Countries in which the metaphor "lean state" is present show, in contrast to those where the metaphor is absent, (a) a lower public expenditure quota, (b) a higher rate of people at risk of poverty, and (c) a higher rate of people in material deprivation. The case studies are examples from a larger project in progress.

### Sommaire

L'article analyse l'effet de traits lexicaux d'une nation sur la performance socioéconomique. Une sélection de traits lexicaux de langues nationales en Europe est comparée à une sélection de données socioéconomiques en des tests statistiques. Les études modèles mènent aux solutions suivantes: (1) Des pays dans lesquels la langue scolaire utilise le type "un-et-vingt" ne sont étonnamment pas pire dans les tests mathématiques de PISA que les pays dans lesquels la langue scolaire utilise "vingt-et-un". (2) Les pays dans lesquels le terme protégé pour 'biologique' contient *éco-* montre une proportion d'agriculture biologique plus large que des pays avec d'autres termes. (3) Les pays qui utilisent la métaphore "état mince" montre, en comparaison avec des pays dans lesquelles la métaphore est absente, (a) un taux plus bas de dépenses publiques, (b) un taux plus élevé de gens qui sont en danger de tomber dans la pauvreté, (c) un taux plus élevé de gens qui souffrent de déprivation matérielle. Les études sont des exemples d'un projet plus large qui est exécuté à présent.

### Zusammenfassung

Der Artikel analysiert den Effekt von lexikalischen Merkmalen einer Nation auf die sozioökonomische Leistung der Nation. Ausgewählte Merkmale europäischer Nationalsprachen werden anhand von statistischen Tests mit ausgewählten sozioökonomischen Daten verglichen. Die Fallstudien zeigen die folgenden Ergebnisse: (1) Länder, in denen die Schulsprache das Muster "einundzwanzig" verwendet, schneiden bei den mathematischen PISA-Tests erstaunlicherweise nicht schlechter ab als Länder, in denen die Schulsprache das Muster "zwanzigeins" verwendet. (2) Länder, in denen der geschützte Begriff für 'biologisch' das Element *öko-* enthält, weisen einen höheren Anteil an biologisch genutzter landwirtschaftlicher Fläche auf als Länder mit anderen geschützten Begriffen. (3) Länder, die das Bild "schlanker Staat" verwenden, zeigen im Vergleich mit Ländern, in denen dieses Bild nicht präsent ist, (a) einen geringeren Anteil an öffentlichen Ausgaben, (b) einen höheren Anteil an Menschen, die von Armut bedroht sind, und (c) einen höheren Anteil an Menschen, die an Armut (materieller Deprivation) leiden. Die Fallstudien sind Beispiele eines größeren Projekts, das derzeit durchgeführt wird.

## 1. Preliminaries

The idea that language influences thought has found many supporters over the past 200 years. Concrete views and methods have been diverse. Some have concentrated on the connection between the linguistic system and thought, such as Humboldt (1836), Boas (1911), Sapir (1921), Whorf (1956), and Brown (1976). Others have analysed style and thought, such as Lakoff (1987), Levinson (1996), Lucy (1997), Boroditsky (2001). Still others have enlarged their view on language, thought and action. Here Chase (1938) and Hayakawa (1949) seem to have been the first.

Names that are connected with the effect of language on economic acting, as a specific aspect of behavioral economics, are, for instance, Chaiken (1980), Petty and Cacioppo (1986) and Tversky and Kahnemann (e.g. Tversky/Kahnemann 1981, Kahnemann 2011). These latter studies are among those which have corroborated the view that the economic activities of human beings are, in contrast to what (neo-)classicists assume, irrational and emotional. All studies on language, thought and political/economic acting have compared the effect of text-linguistic, collocational or lexical variants within one language.

## 2. Objective

In contrast to the works just mentioned, this contribution aims to continue ideas propagated in the book *Studies in Europragmatics* (Grzega 2013) and analyze the potential effect of aspects of a language's lexical system by employing a Eurolinguistic approach. The Eurolinguistic character is achieved through a selection of analyzed languages that represents all geo-cultural sub-areas of Europe (north, east, south, west). Since culture has been shown to influence economic acting, it seems appropriate to pick, from all major definitions of Europe (cf. Grzega 2012: 11-23, Grzega 2013: 2-4), the cultural definition of *Europe* for this article. If only languages from the same macro-culture are used, namely Europe, this also lowers the probability that non-linguistic cultural aspects have impact on the economic aspects that will be analyzed. Automatically, though, this also means that the case studies presented here will cover all major diachronic language groups (Germanic, Romanic, Slavic, Finno-Ugric).

## 3. Methodology

For the objective envisaged, a method is needed where

- a large set of language communities is involved
- a large number of representatives is involved
- such behavioral features are analyzed that were not particularly triggered for the linguistic research.

The following methodological design seems to respond to these needs.

- (1) Largely accepted cross-national socioeconomic databases and indexes are used on condition that national data rest on common a definition for all countries and on the same way of data-collection. Indexes that express only one parameter or a very limited set of parameters are more appropriate than figures based on multiple parameters, since the latter case may be vulnerable to Simpson's paradox (Simpson 1951).
- (2) The standard variety of a language, as represented in dictionaries, is selected as a unit of reference, since this is the variety that reaches most speakers of a language.
- (3) Countries or country-parts are only included if they are linguistically largely homogeneous, i.e. if the official language is a mother-tongue for over 80% of the population or if one official language and another official language are equal in structure and are mother-tongues for over 80% of the population according to the CIA World Factbook (Website01).

In addition, with each aspect analyzed, the following principles are respected.

- (4) Multilingual countries are only included if the socioeconomic features are clearly assignable to speech-communities with diverse linguistic variants.
- (5) Countries are excluded if a linguistic variable has clearly more than one variant or if there is a vital difference between colloquial and codified language.
- (6) Countries are also included if categorization into a linguistic variant is not possible because linguistic sources (humans or dictionaries) are unreliable or unclear.

The statistical tests that will be used in the case studies to follow is Welch's  $t$ -test (Welch 1947). However, other types of lexical features analyzed (e.g. the degree of a certain phenomenon) will require different statistical tests. The resulting  $p$ -values are interpreted as follows:

0	$\leq p \leq$	0.001	extremely statistically significant
0.001	$< p \leq$	0.01	strongly statistically significant
0.01	$< p \leq$	0.05	slightly statistically significant
	$p >$	0.05	not statistically significant

If the  $p$ -value shows that there is probability that a certain correlation or relationship is not accidental, then the effect size of the linguistic variable has to be determined. For  $t$ -tests this is done through an omega-square calculation ( $\omega^2$ ). Effect sizes of the omega-square calculation for  $t$ -values are interpreted in highly different ways. For this study, two sources are resorted to: Ferguson (2009) and Cohen (1988).

## 4. Case Studies

### 4.1. Case Study 1: PISA Results

Does the formation of numerals have an impact on our capacities (cf. the debate in Dehaene 1997)? In some languages, the numerals from 21 onwards are built in an inverse way, i.e. "one-and-twenty", e.g. Danish, Dutch, German, Slovene and Arabic. This has led to discussions on whether this has effects on mathematical skills. In Germany, for instance, the association *Zwanzigeins* fights for the acceptance of the pattern "twenty-one" in educational contexts; in Norway, the pattern "twenty-one" was, in fact, officially introduced in 1951. In a sense, the 2009 PISA studies (Website03, Website06, Website07, Siniscalco/Meraner 2011, Knighton/Brochu/Gluszynski 2010) can be considered a socioeconomic parameter for school contexts. PISA stands for *Programme for International Student Assessment* and is a study initiated by the OECD in 2000. Since then, it has assessed 15-year-olds' school performance on mathematics, science, and reading several times.

If we take the 2009 PISA mathematics results, we can compare countries or country-parts with the school language using the inverse pattern (Austria, Denmark, Germany, Netherlands, Slovenia, Dutch-speaking Belgium, German-speaking Belgium, German-speaking South Tyrol in Italy) to the countries or country-parts using the non-inverse pattern (Croatia, Estonia, France, Hungary, Iceland, Ireland, Latvia, Lithuania, Norway, Poland, Portugal, Slovakia, Sweden, UK, French-speaking Belgium, Finnish-speaking Finland, Swedish-speaking Finland, Italian-speaking South Tyrol in Italy).

	PISA09	inv?
HR	460	n
HE	466	n
LT	477	n
LV	482	n
IT	483	n
IE	487	n
IT-it(ST)	487	n
PT	487	n
US	487	n
BE-fr	488	n
HU	490	n
UK	492	n
CZ	493	n
SE	494	n
PL	495	n
FR	497	n
SK	497	n
NO	498	n
IS	507	n
ET	512	n
AU	514	n
CH-it	518	n
FI-sv	527	n
CH-fr	530	n
BE-nl	537	n
FI-fi	541	n
AT	496	y
SL	501	y
DK	503	y
DE	513	y
BE-de	517	y
IT-de	519	y
NL	526	y
CH-de	539	y

Fig. 1: PISA results / numerals

An appropriate statistical test will tell us whether the differences are significant. The appropriate test for this largely heterogeneous set of elements (countries) is Welch's t-test. This test reveals that the differences are strongly statistically significant ( $t=2.97$ ,  $df=18$ ,  $p=0.008$ ), but differently than expected: Groups with the inverse pattern score higher (mean=514; median=515) than groups with the non-inverse pattern (mean=493; median=493.5). 23 percent of the differences are statistically assignable to this linguistic difference ( $\omega^2=0.23$ ). Ferguson (2009) would classify this effect size as small, Cohen (1988) as considerable.

#### 4.2. Case Study 2: Organic Farming

With respect to organic farming, the EU is interesting because the member states have declared different adjectives as protected terms (European Commission Regulation (EU) No. 834/2007; Website02). Some protected terms are morphologically related to the word *ecology* (e.g. Sp. *ecológico*), others are not (e.g. E. *organic*, Fr. *biologique*) (Website02). Austria, Czech Republic, Denmark, Estonia, Germany, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, Slovenia,

Spain and Sweden have a protected term related to *ecology*, Bulgaria, Belgium, Finland, France, Greece, Ireland, Italy, Malta, Netherlands, Portugal and the UK do not. Is this opposition reflected in the percentage of organic agricultural land with respect to the total of agricultural land as listed by EU statistics (Website05)? Is the use of *ecology* connected to “organic” economics?

	'org'<ec	%org.la.09
NL	n	0.4
BG	n	1.2
BE	n	2.4
UK	n	2.5
PT	n	2.7
MT	n	4.5
FI	n	4.9
IT	n	5.6
HE	n	9.4
IE	n	10.5
FR	n	12.6
ES	y	0.3
SK	y	1.2
PL	y	3.0
AT	y	3.3
SI	y	3.9
LT	y	4.4
EE	y	5.3
HU	y	5.9
DK	y	6.0
SE	y	7.2
DE	y	7.5
RO	y	8.7
CZ	y	9.0
LV	y	18.5

Fig. 2: words for 'organic' / share of organic land with respect to total agricultural land

In the first group the mean share is 7.3% (median=4.5%), in the second the mean is 3.5% (median=5.6%). If the figures for the two groups of countries and their official languages are compared in a Welch's t-test, the results are slightly statistically significant ( $t=2.61$ ,  $df=21$ ,  $p=0.017$ ): those countries who have a protected term for organic farming that is related to the term *ecology* show more organic agricultural land. 19 percent of the differences can statistically be explained by the linguistic difference ( $\omega^2=0.19$ ), an effect size which Ferguson (2009) would regard as small, but Cohen (1988) as considerable.

### 4.3. Case Study 3: The Role of the State

The next case study leads us to the role of the state in Europe. After World War II, the western European countries agreed to follow the system of the European welfare state, based on John Maynard Keynes's (1936) empirical socioeconomic studies. Its key pillars were personal liability, the mixture of state-run and entrepreneurial economic branches and prevention of economic power through the approval of small and medium-sized companies. This European economic and social order had led to prosperity for practically everyone in Western Europe and allowed to master the two oil crises in the 1970s. Nevertheless, from the late 1970's onward, it was gradually replaced in Britain, Germany and other European countries. Although national constitutions as well as the EU

treaties still continued, up to the present day, to claim that they are welfare states, what they actually have had is called the *neoliberal model*, or as some say *market-radicalism* (cf., e.g., Friedman 1962). It is a system that was not based on empirical research, but on purely theoretical assumptions and constructions. After the introduction of this model, states quickly suffered a strong increase in unemployment (cf. statistics at Website04). Although market-radical politicians and political advisors redefined *unemployment* several times, unemployment rates have never reached the low level they had before the change of the economic system. Other rhetorical tricks have been used as well. And they are still used after the outbreak of a deep financial and existential crisis. In order to give a positive sound to extreme export rates, in other words: extremely an uneven balance of trades, the Germans invented the term *Exportweltmeister* ‘export champion’. *Exportweltmeister* is a good example for disguising something negative (at least from a macroeconomic point of view) with the help of a word that triggers positive connotations.

Another metaphor from the neoliberal theory is the one of a “lean state” (e.g. E. *lean state*, G. *schlanker Staat*, It. *governo snello*). It sounds much better and healthier than *weak state*. And this rhetorical trick is all the more important when the empirical data presents a different reality of health. With *lean state*, we have entered the field of collocations. Collocations are much harder to check through dictionary work. Therefore 15 countries (Austria, Czech Republic, Denmark, Germany, Ireland, Finland, France, Hungary, Italy, Netherlands, Poland, Portugal, Slovakia, Spain, Sweden, United Kingdom) and their (major) official language(s) are selected and Google is used to search all websites from a specific country for possible collocations such as *lean state*, *slim state*, *lean government*, *slim government* etc.—always in the basic form. If the number of hits of all variants taken together did not exceed 100, the country is classified as free from this metaphorical expression. Otherwise, the metaphor is considered present in a country.

We can now have a look at the public expenditures of these countries, as given by Eurostat (the European Union’s statistics unit; Website05). The quota indicates the percentage of the corresponding gross domestic product (GDP) in 2011 (the most recent year, where figures are available for all countries at the time of the analysis).

	lean state	2011
IE	n	47.1
NL	n	50.1
SE	n	51.5
FI	n	55.3
FR	n	55.9
DK	n	57.7
SK	y	38.2
CZ	y	43.2
PL	y	43.4
DE	y	45.0
ES	y	45.9
UK	y	47.9
PT	y	49.3
IT	y	49.9
HU	y	50.1
AT	y	50.8

Fig. 3: “lean state” – public expenditure quota (percentage of GDP)

A Welch's *t*-test reveals that the differences between countries that do not use the metaphor (mean=52.9% of the GDP; median=53.4% of the GDP) and those that do (mean=46.4% of the GDP; median=46.9% of the GDP) is slightly statistically significant ( $t=3.16$ ,  $df=10$ ,  $p=0.010$ ); and the effect size is considerable ( $\omega^2=0.36$ ). In other words: In countries where the image of a "lean state" is well spread on Internet pages, the public expenditure quota is (already) lower.

Second, a look at the 2011 percentages of people at risk of poverty or social exclusion according to Eurostat (Website05), turns out to be interesting.

	lean state	2011
NO	n	10.5
NL	n	11.0
DK	n	13.0
FI	n	13.7
FR	n	14.0
SE	n	14.0
CZ	y	9.8
AT	y	12.6
SK	y	13.0
HU	y	13.8
IE	y	15.2
DE	y	15.8
UK	y	16.2
PL	y	17.7
IT	y	19.6
ES	y	22.2

Fig. 4: "lean state" – people at risk of poverty

A Welch's *t*-test reveals that the differences between countries that do not use the metaphor (mean=12.7; median=13.35) and those that do (mean=15.6; median=15.5) is slightly statistically significant ( $t=2.21$ ,  $df=10$ ,  $p=0.046$ ), even if the effect size may be considered small ( $\omega^2=0.20$ ). In other words: In countries where the image of a "lean state" is well spread on Internet pages, the number of people at risk of poverty is higher. For further diachronic studies, it should be pointed out, though, that the term *poverty* was re-defined (which resulted in lower poverty rates in Europe).

Third, the presence and absence of the metaphor of a "lean state" was compared to the 2011 percentages of people living in material deprivation as defined by Eurostat (Website05).

	lean state	2011
SE	n	1.2
NO	n	2.3
NL	n	2.5
DK	n	2.6
FI	n	3.2
FR	n	5.2
AT	y	3.9
ES	y	4.5
UK	y	5.1
DE	y	5.3
CZ	y	6.1
IE	y	7.8
SK	y	10.6
IT	y	11.2
PL	y	13.0
HU	y	23.1

Fig. 5: “lean state” – people in material deprivation

The picture is similar to the preceding analyses. A Welch’s *t*-test reveals that the differences between countries that do not use the metaphor (mean=2.8; median=2.55) and those that do (mean=9.1; median=6.95) is strongly statistically significant ( $t=3.23$ ,  $df=10$ ,  $p=0.009$ ); and the effect size is considerable ( $\omega^2=0.37$ ). In other words: In countries where the image of a “lean state” is well spread on Internet pages, the number of people living in material deprivation is higher.

## 5. Conclusion

It has been shown that culture influences economic performance (cf., e.g. Grondona 2000, Harrison 2000, Landes 2000). Does this impact of culture include language as a part of culture? The statistical tests *per se* do, of course, not say anything on the direction of influence. This needs especially to be taken into account in the case study on “lean state”. Diachronic comparisons cannot help here, because, one, some of the countries had to live in a different culture only ten years ago (even if we had reliable statistical data for them) and, two, the phase of entrenchment of “lean state” is impossible to determine. In the first two case studies, however, the lexical structure is clearly older than the type of performance analyzed, so the direction of influence is likely to go from language to socioeconomic performance. This speaks in favor of the classical version of the hypothesis: the language system can have some influence on our actions, sometimes in surprising directions. Of course, the case studies presented here are just first examples; they are a methodological appetizer. The case studies are part of a larger project I am currently carrying out, where different types of word-statuses, lexemic relationships, collocations and semantic-pragmatic qualities are compared to various socioeconomic data (e.g. distribution of wealth, gender equality, organic farming, corruption, discrimination, military expenditures).

Policy makers may intuitively know about the power of language very well. In Germany and other EU countries, fewer and fewer people go to the elections claiming that things have to be the way they are and cannot be changed. We know that this is also because of the impact of language in the media (cf., e.g., Müller 2009 for a qualitative study of German media language). Although I was only able to illustrate just a few cases, we can assume that the lexical system, not just the choice of a synonym or a stylistic device, can have impact on influences our thinking—which makes Orwell’s



Newspeak appear more than just a fictional idea. This also means that (Euro-)linguists have something to contribute to the general education of teenagers and adults. Not only in language classes. The power of words should be highlighted and discussed in every non-linguistic subject at school, in every non-linguistic seminar for adults, in every offer for political education (cf., e.g., my attempt in Grzega 2014). Applied Interdisciplinary EuroLinguistics is vital to European society.

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- Website02: <<http://eur-lex.europa.eu>>
- Website03: <[http://www.bildungserver.be/desktopdefault.aspx/tabid-2424/4531\\_read-32109/](http://www.bildungserver.be/desktopdefault.aspx/tabid-2424/4531_read-32109/)>
- Website04: <<http://www.tradingeconomics.com>>
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- Website06: <<http://pisa2009.acer.edu.au/>>
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