On the Connection between Countries' Onomasiological and Ecological Behavior

Joachim Grzega (Donauwörth/Eichstätt-Ingolstadt)

Abstract

Five onomasiological features in EU countries are statistically compared to environmental performances of these countries (in selected years) by way of Welch's t-tests and Cohen's d. The analyses show, for years with statistically significant results, that national energy use is smaller when the environment is onomasiologically "middle/central" than when it is onomasiologically "around", the national ecological footprint of one year is smaller when human beings are onomasiologically "beings" rather than morphologically opaque, the national percentage of organic farming is larger when two terms for "organic" are legally protected instead of just one, the national percentage of organic farming is also larger when the term for "organic" is morphologically related to "economic", and national meat consumption is (in two years) smaller when meat is morphologically not distinct from "flesh".

1 Background and Aim

The view that language has impact on human thinking and acting has had many supporters over the past 200 years, no matter how different concrete views on the strength or nature of this impact and how different approaches may have been: from the works by Humboldt (1836) in the 19th century to those by, among others, Boas (1911), Sapir (1921), Whorf (1956), Chase (1938), Lakoff (1996), Lucy (1997) in the 20th century to new quantitative research by, for instance, Boroditsky (2001), Chen (2013) and Grzega (2013). In some of these works the impact of style was analyzed, in others – and this is also the scope of this contribution – the impact of lexical structures. Studies on linguistic relativity have normally been restricted to comparing a very limited set of speech-communities (often from very different cultures), often qualitative. With its further development, the Database of Cross-Linguistic Colexifications (CLICS) could provide data for more lexico-cultural analyses across languages world-wide Quantitative methods, too, often rely on a small set of people or texts; moreover, the non-linguistic figures may be biased if they were specifically elicited for the linguistic investigation. Therefore, methods are required where (1) a rather large set of language communities can be involved, (2) language communities are represented that show basically the same culture (to avoid the possibility that the language is influenced by the culture), (3) a large number of language users is involved, (4) such behavioral features are analyzed that were not particularly triggered for the linguistic research. Hence, an adequate field is Eurolinguistics – in its proper sense the comparison of European languages or EU languages or, at least, a representative selection of European or EU

languages. Prior quantitative Eurolinguistic analyses in this area of cognitive lexicology dealt with the relation of lexis and economy (e. g. Grzega 2017a) and the relation of lexis and peace (e. g. Grzega 2017b, 2019a, 2019b). This study adapts the methods suggested there in order to shed light on the relation of lexis and ecology; in other words: are the way people construct their lexis and the way they treat the environment somehow connected?

2 General Method

2.1 Language Selection

The relationship between linguistic and non-linguistic variables is to be examined, specifically the impact of language on non-linguistic variables and not vice versa. For this reason, the following aspects are taken into consideration:

(1) To respect the *ceteris paribus* principle, focus is put on countries from the same socioeconomic-political culture and, since the article is on environmental aspects, the same biomic zones, or ecozones (see Point (4) of this section). On that account, the countries of the European Union are preferred over a globally spread set of languages. A broader set of languages would cover a broader range of ecozones and a broader range of socioeonomic-political-cultural frames. With the restriction to EU countries, it is much more likely excluded that differences in performance are attributable to differences in the cultural framework. Croatia is included, too; it has only been an official member state since 2013, but EU accession negotiations had already been completed in mid-2011.

(2) The current standard variety of a language is resorted to as a unit of reference, since this is the variety that reaches most speakers of a country.

(3) Countries or country-parts are only included if linguistically largely homogeneous, i. e. if the official language is a mother-tongue for over 90 percent of the population or if one official language and another official language are equal in structure and are mother-tongues for over 90 percent of the population according to the CIA World Factbook. This forces us to have close looks at Belgium, Bulgaria, Estonia, Latvia, Malta, Slovakia, and Spain. These countries can only be taken into account if the same linguistic variant for the variable in question is characteristic for 90 percent of the population. Bulgaria is thus linguistically too heterogeneous to be incorporated. With respect to Malta, it has to be stressed that Maltese children usually first acquire Maltese as their mother-tongue; but nearly all of them get into contact with English at such an early period of their life (and also have to acquire English as official language and the language of secondary schools) that Malta can be considered at least bilingual. Italian is also spoken by many Maltese citizens, but is more and more pushed into the role of a foreign language. This means that the analysis of a variable includes the following countries if the succeeding languages feature the same linguistic variant in their national standard variety:
   - Belgium: Dutch and French
   - Estonia: Estonian and Russian
   - Latvia: Latvian and Russian
   - Luxemburg: Luxemburgish, French and German
   - Malta: Maltese and English
   - Romania: Romanian and Hungarian

- Slovakia: Slovak and Hungarian
- Slovenia: Slovene and Croatian
- Spain: Castilian/Spanish and Catalan

Further, countries are excluded if a linguistic variable has more than one variant or if there is a vital difference between colloquial and codified language. Country abbreviations used in the tables are the Internet TLDs.

(4) The EU mainly covers two biomic areas (cf. Schultz 1995): the southern area of subtropic zones with Mediterranean forests (Portugal, Spain, Italy, Croatia, Greece, Cyprus), and a northern area of humid, temperate climate areas with broadleaf forests. It has to be admitted, at first sight, that the major parts of Sweden and Finland consist of taiga areas – an extreme northern area, as it were. However, the major parts of the respective populations live in humid, temperate climate areas, which is why Sweden and Finland are not seen as a separate biomic type for the studies here; with respect to the *ceteris paribus* principle, they can thus be included. Furthermore, the environmental features to be analyzed will not be specific to certain biomic areas only.

2.2 Linguistic Feature Selection

The article will cast light on lexical features from the realm of environment that allow for grouping a large part of the languages mentioned in Section (2.1) into two categories. Historical aspects of languages or genealogical relations between languages are not relevant for this study. As a matter of fact, if genealogical relations are comparatively strong, this can only be of an advantage, since this also respects the *ceteris paribus* principle when analyzing specific onomasiological features of the present-day state of the languages.

2.3 Environmental Values Selection

Since the article discusses environmental topics, but all the EU is characterized by not just one biomic area, such environmental values are selected that have a more or less equal chance to occur in both biomic areas. Thus, three sources will be respected in order to measure the treatment of the environment.

(1) A well-known indicator of environmental destruction is the ecological footprint. The ecological footprint measures the quantity of natural resources required to keep up the standard of living of an individual or a country. For this, it takes into account the necessary space for food growing, fiber production, timber regeneration, absorption of carbon dioxide emissions from fossil fuel burning, and accommodating built infrastructure. The ecological footprint was developed by Wackernagel under the auspices of Rees (cf. Wackernagel 1994, Wackernagel/Rees 1996) and is nowadays officially calculated by the Global Footprint Network. The global footprint concept is also supported by the European Commission (cf. Best et al. 2008).

(2) A more encompassing index is the Sustainable Society Index. It was developed by van de Kerk and Manuel (2008) for the Sustainable Society Foundation. It comprehends several parameters, some environmental, some not. Among the environmental parameters are energy use, carbon dioxide emissions, and the ecological footprint without carbon dioxide emissions. It is calculated every other year; at the time of the research for this study, the most recent values date from 2012, 2014, and 2016.

(3) The Food and Agricultural Organization of the United Nations (FAO) supplies definitive figures for meat consumption in kilogram per capita for the EU countries from 2012 to 2016 (cf. the item "meat + (total)" in the entries "food supply – livestock and fish primary equivalent" (FAO-CL) and "new food balances" (FAO-FBS) on fao.org.

2.4 Statistical Method

The research questions are all on whether there is a connection between a concrete linguistic phenomenon and a concrete environmental phenomenon. Each linguistic phenomenon is of a nominal "scale", or qualitative "scale", that allows binary country grouping, while the respective environmental behavior is measured on interval scales. We will face unequal variances, but normal distributions according to Shapiro-Wilk Normality Tests (cf. Shapiro/Wilk 1965). Therefore, Welch's t-test will be applied to each single research question (cf. Welch 1947). It will be searched for statistical significance at the 0.05-level, in other words: *p* values of the statistical tests under 0.05. Under a *p* value of 0.05, the null hypothesis that differences are pure accident will be rejected. If a t-test yields a significant *p* value, this does *per se*, of course, not yet tell us something about causation, only of an existing correlation. However, since the lexemes chosen are older than the figures of environmental performance looked at, it can solidly be assumed that when there is a significant correlation, the direction of effect can only be from the lexical pattern on the environmental behavior, and not vice versa. This does not deny that prior to the situation now there may have been a certain non-linguistic variable that has led to the onomasiological pattern. Theoretically, it may also be that, with each grouping, there is another binary factor that goes parallel with the linguistic pattern in focus and that could likewise be held responsible for the results; however, in none of the country groupings does there seem to be an obvious binary non-linguistic feature paralleling the linguistic feature in question. Furthermore, one may want to know whether other factors such as population density or poverty (in one of the current definitions) has more impact on the environmental behavior. Since such factors are measured in interval scales, they can thus not be analyzed in the same test as a binary qualitatively, or nominally, defined linguistic phenomenon. Additional non-linguistic studies will have to find out about this. At any rate, if an analysis yields a significant *p* value, it is, of course, not implied that the onomasiological phenomenon is the sole connection; other factors may very well also be at work. However, an additional statistical test can help to measure the effect size of the onomasiological pattern. The effect sizes in this article will be calculated with Cohen's *d* and transferred into the common language effect size indicator (CL) and its specific wording designed for a general public (cf. Cohen 1988; McGraw/Wong 1992; Dunlap 1999; Lakins 2013).

3 Studies

3.1 Study 1: When the Environment Is Onomasiologically Central

At a Eurolinguistics conference, in a paper on language and violence/peace, light has already been shed on one aspect of violence against the environment (cf. Grzega 2019b). The environment is onomasiologically conceived as an "around" thing by some language communities (e. g. Fr. *environnement* [whence English *environment*], German *Umwelt*), and as a "mid" thing by others (e. g. Spanish *medio ambiente*, Polish *środowisko*); the rest of the communicaties use

different, in part opaque designations, which will be excluded here (e. g. English *environment* and Dutch *milieu* from a synchronic view of the respective languages). Is this onomasiological type of a speech community related to the way it treats the environment? At the Eurolinguistics conference paper mentioned, the ecological footprint was seen as an indicator of violence/peace that nation confronts the environment with. It was shown that the designation for "environment" and the ecological footprint are related: In countries where the environment is seen as an "around" thing the ecological footprint is bigger than in countries where the environment is seen as a "middle/center" thing. Here, an additional test is applied with the aid of the Sustainable Society Index. Among its parameters is energy use defined as "TPES (Total Primary Energy Supply) production + imports – exports ± stock changes", measured in tons oil equivalents (toe).

a = around-thing; m = middle-thing				
Country	**envtmt <?**	**Energy Use (toe)**	**Energy Use (toe)**	**Energy Use (toe)**
		2012	2014	2016
AT	a	4.1	3.9	3.8
BE	a	5.5	4.9	4.7
CY	a	3.0	2.6	2.3
CZ	a	4.2	4.1	3.9
DE	a	4.1	3.9	3.8
FR	a	4.0	3.8	3.7
GR	a	2.5	2.4	2.1
HR	a	2.1	2.0	1.9
HU	a	2.6	2.4	2.3
LT	a	2.3	2.5	2.4
LU	a	8.3	7.7	6.8
NL	a	5.0	4.6	4.3
SL	a	3.6	3.4	3.2
ES	m	2.7	2.7	2.5
PL	m	2.6	2.5	2.4
PT	m	2.2	2.0	2.0
df		*13*	*13*	*13*
t		*2.96*	*2.79*	*2.90*
p		*0.0110*	*0.0152*	*0.0124*
mean	*a*	*3.94*	*3.70*	*3.48*
mean	*m*	*2.53*	*2.42*	*2.31*
median	*a*	*4.02*	*3.84*	*3.67*
median	*m*	*2.61*	*2.54*	*2.44*
N	*a*	*13*	*13*	*13*
N	*m*	*3*	*3*	*3*
d		*1.90*	*1.79*	*1.86*
CL		*.91*	*.90*	*.91*

Table 1: Lexical types for the environment related to energy use

The values in the two groups are all normally distributed at the 0.01-level of a Shapiro-Wilk test. At the 0.05-level the figures are only normally distributed in the years 2012 and 2016. As Table 1 shows, a Welch's t-test yields significant differences for 2012 and 2016. If we integrate also the year 2014, this is corroborated. Cohen's *d* as indicator of the effect size ranges from 1.79 to 1.90. Expressed in Common Language Effect Size terminology, this means that if you compare two randomly chosen countries, each one coming from the different groups, in about 90 percent of cases the country where the environment is onomasiologically a "middle" notion will use less energy than the country where the environment is onomasiologically an "around" notion. In other words: of all factors somehow influencing energy use (measured in tons oil equivalent), the designation for "environment" seems to be a very important one. Of course, it may very well be that the decisions for a certain designation for "environment" were triggered by a certain already existing national environmental thinking. The designations, however, have been in the languages long enough and EU policies have much later been approximating national policies to say that the older onoasiological patterns are strong enough to influence more recent energy use.

3.2 Study 2: When Human Beings Are Onomasiologically Not Beings

A complementary aspect to the way we lexically conceive the environment in relation to us humans is the designation for "human being". In some languages, human beings are onomasiologically "beings" (e. g. English *human being*, French *être humain*, Italian *essere humano*), in others they are morphologically opaque from a contemporary point of view (e. g. German *Mensch*, Polish *człowiek*, Hungarian *ember*). Diachronically, it is interesting to see that sometimes there were words in general (not just scientific) language that covered both human and non-human animals, such as Latin *animal*, from *anima* 'air; breath of life' (cf. Buck 1949: 137f.). With regard to the statistical data available, it is only possible for this study to focus on present-day linguistic patterns, taking into account the most neutral and thus most widespread word for "human being" in its singular notion – sometimes there are specific words for the plural (such as *people* in English, *Leute* in German or *gents* in French), often there are also more administrative words (such as the lexical type *person*, widespread in northern, western and southern languages of the EU). The EU languages can be divided into these two groups of languages, namely those with a designation of "human being" including a morpheme for "being" and those without such a morpheme. They can then be connected to the global footprint per capita at the end of the respective year.

		global hectares per cap.		
Country	**human= being?**	**2014**	**2015**	**2016**
AT	n	6.0	6.0	6.0
CY	n	3.4	3.5	3.7
CZ	n	5.6	5.6	5.6
DE	n	5.0	4.9	4.8
DK	n	7.1	7.2	6.8
ET	n	6.8	7.1	7.1
FI	n	6.0	5.8	6.3
GR	n	4.2	4.1	4.3

		global hectares per cap.		
Country	**human= being?**	**2014**	**2015**	**2016**
HR	n	3.6	3.8	3.9
HU	n	3.6	3.6	3.6
LT	n	5.6	5.6	5.6
LV	n	5.8	6.3	6.4
NL	n	6.1	5.7	4.8
PL	n	4.4	4.2	4.4
RO	n	2.8	3.0	3.1
SE	n	6.5	6.2	6.5
SI	n	4.7	4.9	5.1
SK	n	4.3	4.2	4.2
ES	y	3.8	4.0	4.0
FR	y	4.7	4.7	4.4
IE	y	5.0	5.2	5.1
IT	y	4.4	4.4	4.4
PT	y	3.7	4.0	4.1
UK	y	4.7	4.6	4.4
df		*20*	*21*	*21*
t		*1.90*	*1.74*	*2.21*
p		*0.0716*	*0.0956*	*0.0382*
mean	*n*	*5.09*	*5.09*	*5.12*
mean	*y*	*4.39*	*4.49*	*4.42*
median	*n*	*5.29*	*5.25*	*4.98*
median	*y*	*4.55*	*4.52*	*4.40*
N	*n*	*18*	*18*	*18*
N	*y*	*6*	*6*	*6*
d				*0.90*
CL				*.74*

Table 2: Lexical types for humans related to per-capita ecological footprint in global hectares

The figures in both groups are normally distributed in all three years according to a Shapiro-Wilk test. The result is, as shown in Table 2, that in the year 2016 there is a statistically significant connection. The effect size is a d-value of 0.90, which means in Common Language Effect Size terminology that if you randomly compare a country from one group to a country of the other group in 74 percent of the cases, the country where a human being is onomasiologically a "being" will have a smaller ecological footprint than the other country. In the other years, the differences come close to the level of statistical significance. In other words: the designation for "human being" may not be central for the per-capita ecological footprint, but it does play a certain role. Once again, it may very well be that the decisions for a certain designation for "human being" were triggered by a certain already existing cultural environmental thinking. The designations, however, have been in the languages so long that they are able to explain in

part why the current ecological footprints differ the way they do despite EU policies approximating national policies.

3.3 Study 3: When Organic Can Be Legally Expressed More than Once

Another aspect of a mindful relation between humans and the environment is to see how much land is used for organic farming. To avoid manipulating use of language in connection with organic food production, a special label was established in EU Council Regulation (EEC) No. 834/2007. This regulation contains the legal definition and thus the protection of words as designations for products from organic food production. Some countries have only one term protected (e. g. *organic* in the UK and Ireland, *biologique* in France, *ekologiczne* in Poland), some countries two terms (e. g. *ökologisch* and *biologisch* in Germany and Austria, *ecológico* and *biológico* in Spain (during the years studied), *ekologické* and *biologické* in the Czech Republic). The legal protection encompasses lexical derivates as well. It shall be assumed that if two good-sounding lexemes are protected (no matter what their actual formal character is), then this will have raised more awareness for organic farming and thus led to fewer lexical misuse and more of true organic food production. The two groups are compared to the percentage of organic food production according to the Sustainable Society Index, which defines it as area of fully converted and in-conversion organically cultivated land as the percentage of total agricultural area. Although, the use of quantity (instead of morphological transparency) looks as if this was an interval scale this time, the existence of just two values (namely 1 and 2) is not commonly treated as an interval scale in statistics. Therefore, the two groups are again seen as qualitative, or nominal, groups, so that Welch's t-test is applied.

		Organic Farming	**Organic Farming**	**Organic Farming**
		2012	**2014**	**2016**
Country	**legal terms**	**%**	**%**	**%**
BE	1	4.3	4.4	4.9
CY	1	2.4	2.7	2.7
FI	1	7.4	8.7	9.4
FR	1	3.1	3.8	4.1
GR	1	3.7	5.6	3.1
HR	1	1.7	2.4	3.8
HU	1	2.7	2.8	2.7
IE	1	1.2	1.3	1.3
IT	1	8.7	9.1	10.8
LT	1	5.2	5.4	5.7
MT	1	0.2	0.4	0.3
NL	1	2.4	2.5	2.5
PL	1	3.4	4.3	4.3
PT	1	5.8	6.0	6.3
RO	1	1.3	2.1	2.1
SE	1	14.3	15.7	16.4
SI	1	6.4	7.6	8.8

		Organic Farming	Organic Farming	Organic Farming
		2012	**2014**	**2016**
UK	1	4.1	3.4	3.0
AT	2	19.7	19.9	19.4
CZ	2	10.5	11.0	11.1
DE	2	5.9	6.2	6.3
DK	2	6.1	6.6	6.3
ES	2	5.9	6.4	6.9
ET	2	12.0	15.3	16.2
LV	2	9.1	10.8	11.2
SK	2	9.0	8.8	9.5
df		*10*	*10*	*11*
t		*-2.89*	*-2.99*	*-2.90*
p		*0.0160*	*0.0136*	*0.0130*
mean	*1*	*4.35*	*4. 88*	*5.12*
mean	*2*	*9.78*	*10.62*	*10.86*
median	*1*	*3.6*	*4.0*	*3.9*
median	*2*	*9.0*	*9.8*	*10.3*
N	*1*	*18*	*18*	*18*
N	*2*	*8*	*8*	*8*
d		*-1.23*	*-1.27*	*-1.23*
CL		*.19*	*.18*	*.19*

Table 3: Number of legally protected terms for "organic" related to organic farming

A Shapiro-Wilk test shows that the figures are not normally distributed at the 0.05-level. Only if a 0.01-level is accepted can we term the figures normally distributed. Welch's t-test reveals very clearly (see Table 3) that there is a significant relation. If we accept a 0.01-level for the Shapiro-Wilk test, then also the other years could be included in the analysis, all leading to the same result, with d-values of -1.23 and -1.27. This means, in Common Language Effect Size terminology, that if you randomly select a country from one group to a country of the other group, in slightly under 20 percent of the cases, the country in which two terms are legally protected will engage less in organic farming than the country where only one term is protected; or in other words: in over 80 percent of the cases, the country in which two terms are legally protected engage clearly more in organic farming than the country where only one term is protected. Here too, it may very well be that the decisions for the number of protected terms were triggered by a certain already existing national environmental thinking. But the EU concept of "organic" was defined collectively by all states who were EU members (at the time). Thus, first came the concept with the designations; later came the actual realization of the concept. A clear EU concept of "organic" did not exist prior to that. Although not to be overestimated, the designations have been in the languages long enough that they show some power to explain part of the farming differences years later despite EU policies approximating national policies.

3.4 Study 4: When Organic Is Morphologically Related to Economic

Hooking on to the preceding study, we will check whether there is a significant difference in the percentage of organic farming if the word for "organic" is morphologically related to "economic", which means if the respective equivalent for the Graeco-Latin morpheme {eco} is used. Here, Hungary, Slovakia and Romania must be excluded from the analysis because there is no morphological relative of *economic* in common Hungarian language, which only has *gazdasági*. The linguistic groups are again compared to the percentage of organic food production as defined by the Sustainable Society Index, i. e. the area of fully converted and in-conversion organically cultivated land as the percentage of total agricultural area.

		Organic Farming	**Organic Farming**	**Organic Farming**
		2012	**2014**	**2016**
Country	**org=eco?**	**%**	**%**	**%**
BE	n	4.3	4.4	4.9
CY	n	2.4	2.7	2.7
FI	n	7.4	8.7	9.4
FR	n	3.1	3.8	4.1
GR	n	3.7	5.6	3.1
IE	n	1.2	1.3	1.3
IT	n	8.7	9.1	10.8
MT	n	0.2	0.4	0.3
NL	n	2.4	2.5	2.5
PT	n	5.8	6.0	6.3
UK	n	4.1	3.4	3.0
AT	y	19.7	19.9	19.4
CZ	y	10.5	11.0	11.1
DE	y	5.9	6.2	6.3
DK	y	6.1	6.6	6.3
ES	y	5.9	6.4	6.9
ET	y	12.0	15.3	16.2
HR	y	1.7	2.4	3.8
LT	y	5.2	5.4	5.7
LV	y	9.1	10.8	11.2
PL	y	3.4	4.3	4.3
SE	y	14.3	15.6	16.4
SI	y	6.4	7.6	8.9
df		*16*	*16*	*18*
t		*-2.67*	*-2.83*	*-2.96*
p		*0.0168*	*0.0122*	*0.0084*
mean	*n*	*3.94*	*4.34*	*4.41*
mean	*y*	*8.35*	*9.29*	*9.70*
median	*n*	*3.7*	*3.8*	*3.1*
median	*y*	*6.2*	*7.1*	*7.9*

		Organic Farming 2012	Organic Farming 2014	Organic Farming 2016
N	*n*	*11*	*11*	*11*
N	*y*	*12*	*12*	*12*
d		*-1.11*	*-1.18*	*-1.19*
CL		*.22*	*.20*	*.19*

Table 4: The etymology of "organic" related to organic farming

A Shapiro-Wilk test shows that the values in the two groups are normally distributed in all years analyzed. A Welch's t-test unveils (see Table 4) that there is indeed a statistically significant difference, with d-values from -1.11 to -1.19. In Common Language Effect Size terminology, this means that in comparisons of two randomly selected countries, each from another group, in about 20 percent of the pairings the country where "organic" is morphologically related to "economic" displays a lower percentage of organic food production, or put the other way around: in about 80 percent of the pairings the country where "organic" is morphologically related to "economic" displays a higher percentage of organic food production. In other words: of all factors somehow influencing the spread of organic farming after it was defined by the EU, the morphology of the words for "organic" seems to have a considerable impact.

3.5 Study 5: When Meat Is Onomasiologically Not Flesh

Apart from organic farming, meat consumption can be seen as a factor of environmental awareness. Consequently, terms for "meat" are examined. In English and French, the word for "animal flesh processed as food" is morphologically unrelated to the word for 'flesh (of a living being)' (English *meat ≠ flesh*, French *viande ≠ chair*); in the other European languages this onomasiological divergence does not exist (e. g. German *Fleisch*, Italian and Spanish *carne*, Polish *mięso*, Russian *мясо*). Taking into account the figures for meat consumption published by the Food and Agricultural Organization of the United Nations (under their statistic data entries "Food Supply – Livestock and Fish Primary Equivalent" for 2012–2013 and "New Food Balances" for 2014–2016, selected items "Meat + (Total)" and "Food supply quantity (kg/capita/year)"), we can now juxtapose the two onomasiological groups: UK, Ireland and France on the one hand, the major part of the EU countries on the other hand (Latvian also has the distinction between "flesh" and "meat", but Latvia's comparatively large minority language Russian does not, which is why Latvia is excluded from this analysis).

Country	meat ≠ flesh	meat per kg/cap 2012	meat per kg/cap 2013	meat per kg/cap 2014	meat per kg/cap 2015	meat per kg/cap 2016
AT	n	87.51	90.87	90.48	90.59	88.01
CY	n	80.78	75.78	71.96	70.35	71.37
CZ	n	74.96	72.83	76.81	80.42	81.26
DE	n	86.41	85.94	88.14	87.88	88.53
DK	n	76.25	81.87	63.84	59.91	69.98
ES	n	95.68	94.04	94.54	96.44	97.93
ET	n	61.04	58.54	60.02	63.93	66.04
FI	n	78.28	77.53	75.58	74.82	75.20
GR	n	74.90	76.60	73.75	68.62	68.78

Country	**meat ≠ flesh**	**meat per kg/cap 2012**	**meat per kg/cap 2013**	**meat per kg/cap 2014**	**meat per kg/cap 2015**	**meat per kg/cap 2016**
HR	n	68.69	66.30	68.57	71.08	71.27
HU	n	72.08	65.04	70.61	74.30	77.68
IT	n	86.51	84.04	78.65	77.69	76.68
LT	n	73.87	77.65	77.94	79.86	78.70
NL	n	90.54	89.49	77.88	78.43	76.21
PL	n	75.35	76.08	81.71	85.01	86.30
PT	n	88.27	88.35	92.58	93.54	92.86
RO	n	53.43	49.40	60.09	63.49	65.86
SE	n	78.72	81.57	78.78	79.40	78.49
SI	n	78.19	71.38	74.63	73.33	76.01
SK	n	50.51	53.87	50.76	50.49	57.67
FR	y	89.47	86.76	86.13	86.25	85.27
IE	y	83.18	86.69	85.88	89.07	78.54
UK	y	82.90	81.78	74.34	78.60	80.79
df		*9*	*15*	*3*	*5*	*8*
t		*-2.54*	*-2.88*	*-1.46*	*-2.13*	*-1.45*
p		*0.0294*	*0.0114*	*0.2414*	*0.0862*	*0.1860*
mean	*n*	*76.599*	*75.859*	*75.366*	*75.979*	*77.242*
mean	*y*	*85.183*	*85.077*	*82.117*	*84.640*	*81.533*
median	*n*	*77.220*	*77.065*	*76.195*	*76.255*	*76.445*
median	*y*	*83.180*	*86.690*	*85.880*	*86.250*	*80.790*
N	*n*	*20*	*20*	*20*	*20*	*20*
N	*y*	*3*	*3*	*3*	*3*	*3*
d		*-1.57*	*-1.78*			
CL		*.11*	*.09*			

Table 5: Lexical differentiation of "meat" and "flesh" related to meat consumption

A Shapiro-Wilk test shows that the values in the two groups are normally distributed in all years analyzed. The result of a Welch's t-test is illustrated in Table 5. Although the differences were not big enough to be labeled statistically significant in 2014 to 2016, statistically significant correlations are revealed for 2012 and 2013. Here the effect sizes are d-values of -1.57 and -1.78. This means that when you compare a country of one group to a country of the other group, in only 10 percent of the cases the nation in which the origin of meat as animal flesh has been morphologically veiled for a long time (for whatever reason) shows less current per-capita meat supply than the nation where meat is morphologically transparent flesh, or, in other words: in 90 percent of the cases the nation in which the origin of meat as animal flesh has been morphologically veiled for a long time shows more per-capita meat supply.

It would equally be interesting to compare the spread of vegetarianism (in its various definitions). As of yet, though, there are only estimates, but no reliable and comparable figures on the percentage of vegetarians in the EU countries.

4 Conclusions and Outlook

Five studies have illustrated that there are at least occasionally connections between onomasiological patterns and national environmental behavior. Since the lexemes are older than the figures of environmental performance looked at, it can solidly be assumed that the direction of effect can only come from the lexical pattern on the environmental behavior, and not vice versa. And the lexical effects turn out to be large ones. The results in a nutshell are that lexemes which are morphologically transparent demonstrate a corresponding effect on a community's acting in some years: If a designation is morphosemantically related to emotions, then the environmental referents are treated more empathetically.

This does not deny that the evolution of the onomasiological features may first have been triggered by certain cultural patterns of thinking. Studies since the 1990s mentioned in the introductory paragraph suggest that there is, in sum, a back-and-forth influence between language on the one hand and thought and behavior on the other hand; this can also be assumed for the connection between language and environmental thought and behavior. In this same vein, it shall be stressed that these five studies are of course not sufficient to make a strong broad claim that onomasiological patterns of environmental lexemes shape environmental behavior. Other comparisons will have to be carried out, always keeping in mind that linguistic features can only be included if their cultural value is practically the same in all countries analyzed or if differences cover enough countries in the onomasiological groups formed. What the few studies here do provide, though, is indication that it may be worth discussing the effect of morphological embedments for environmental discourse. Creating specific morphological consociations may give an impetus or support for new views on environmental issues.

References

Best, Aaron et al. (2008): *Potential of the Ecological Footprint for monitoring environmental impacts from natural resource use. Analysis of the potential of the Ecological Footprint and related assessment tools for use in the EU's Thematic Strategy on the Sustainable Use of Natural Resources*. Brussels: Report to the European Commission, DG Environment. ec.europa.eu/environment/archives/natres/pdf/footprint.pdf [21.09.2019].

Boas, Franz (1911): *Handbook of American Indian Languages*. Washington: Smithsonian Institution.

Boroditsky, Lera (2001): "Does Language Shape Thought?". *Cognitive Psychology* 43/1: 1–22.

Buck, Carl Darling (1949): *A Dictionary of Selected Synonyms in the Principal Indo-European languages.* Chicago: University of Chicago Press.

Chase, Stuart (1938): *The Tyranny of Words*. New York: Harcourt, Brace and Co.

CIA World Factbook. cia.gov/library/publications/the-world-factbook/ [13.09.2019].

Chen, M. Keith (2013): "The Effect of Language on Economic Behavior". *American Economic Review* 103/2: 690–731.

Cohen, Jacob (1988): *Statistical Power Analysis for the Behavioral Sciences.* 2nd ed. New York: Academic Press.

Cross-Linguistic Colexifications (CLICS): clics.clld.org/ [13.09.2019].

Dunlap, William (1999): "A Program to Compute McGraw and Wong's Common Language

Effect Size Indicator". *Behavior Research Methods, Instruments, & Computers* 31/4:706–709.
FAO-CL: fao.org/faostat/en/#data/CL [13.01.2020]
FAO-FBS: fao.org/faostat/en/#data/FBS [29.02.2020])
Global Footprint Network (data.footprintnetwork.org/#/ [13.01.2020]).
Grzega, Joachim (2013): *Studies in Europragmatics* (Eurolinguistische Arbeiten 7). Wiesbaden: Harrassowitz.
Grzega, Joachim (2017a): *Wohlstand durch Wortschatz? Wie Wörter die Leistung europäischer Länder prägen und uns Chancen zu Besserem bieten*. Berlin: epubli.
Grzega, Joachim (2017b): "Qualitative and Quantitative Comments on Peace and War from a Eurolinguistic Perspective". *Journal for EuroLinguistiX* 14. 48–62. eurolinguistix.com [21.09.2019].
Grzega, Joachim (2019a): *Wort-Waffen abschaffen! Beobachtungen zu Europas gewaltvoller Wortwahl und Ideen für eine friedensstiftende Sprache*. Berlin: epubli.
Grzega, Joachim (2019b): "Names, Nations and Nature from a Eurolinguistic View: Notes on Peace-Threatening and Peace-Promoting Language". *Journal for EuroLinguistiX* 16. 23–36.
Humboldt, Wilhelm von (1836): *Ueber die Verschiedenheit des menschlichen Sprachbaues und ihren Einfluß auf die geistige Entwickelung des Menschengeschlechts* (ed. Eduard Buschmann). Berlin: Königliche Akademie der Wissenschaften.
Lakins, Daniël (2013): "Calculating and Reporting Effect Sizes to Facilitate Cumulative Science: A Practical Primer for *t*-Tests and ANOVAs." *Frontiers in Psychology* 4: s. p. (Art. 863). frontiersin.org/articles/10.3389/fpsyg.2013.00863/full [21.09.2019].
Lakoff, George (1996): *Moral Politics: What Conservatives Know That Liberals Don't*. Chicago: University of Chicago Press.
Lucy, John (1997): "Linguistic Relativity". *Annual Review of Anthropology* 26: 291–312.
McGraw, Kenneth O./Wong, Seok P. (1992): "A Common Language Effect Size Statistic". *Psychological Bulletin* 11: 361–365.
Sapir, Edward (1921): *Language*. New York: Harcourt, Brace and Co.
Schultz, Jürgen (1995): *The Ecozones of the World*. Heidelberg: Springer.
Shapiro, Samuel S./Wilk, Martin B. (1965): "Analysis of Variance Test for Normality (Complete Samples)". *Biometrika* 52: 591–611.
Sustainable Society Index. ssfindex.com/data-all-countries [13.01.2020]).
van de Kerk, Geurt/Arthur, Manuel (2008): "A Comprehensive Index for a Sustainable Society: The SSI – the Sustainable Society Index". *Ecological Economics* 66/2–3: 228–242.
Wackernagel, Mathis (1994): *Ecological Footprint and Appropriated Carrying Capacity: A Tool for Planning Toward Sustainability*. Vancouver: The University of British Columbia PhD thesis. open.library.ubc.ca/cIRcle/collections/ubctheses/831/items/1.0088048. [27.03.2020].
Wackernagel, Mathis/Rees, William (1996): *Our Ecological Footprint: Reducing Human Impact on the Earth.* Gabriola Island, BC: New Society Publishers.
Welch, Bernard Lee (1947): "The Generalization of 'Student's' Problem When Several Different Population Variances Are Involved". *Biometrika* 34: 28–35.
Whorf, Benjamin Lee (1956): *Language, Thought, and Reality.* Carroll, John B. (ed.). Massachussetts: MIT Press.