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FACOLTÀ DI SCIENZE LINGUISTICHE E LETTERATURE STRANIERE UNIVERSITÀ CATTOLICA DEL SACRO CUORE

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A cura di Elisa Bolchi e Davide Vago

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AN EXPLORATORY ANALYSIS OF SCIENCEBLOG

CATERINA ALLAIS

A recent international project, *Investigating Interdisciplinary Research Discourse*, carried out at the Centre for Corpus Research (University of Birmingham) investigates the entire holdings of the journal *Global Environmental Change* as a model of interdisciplinary discourse (http://paulslals. org.uk/IDRD/). Another international research project carried out by the University of Leicester and by two Norwegian research centres (University of Bergen and Uni research) regards the representations of the future in English language blogs on climate changes. But what lexical features are employed as regards the new and increasingly widespread ecological sensibility? Do they carry a positive or a negative connotation? This question will be answered through an exploratory lexical analysis carried out on Scienceblog, a recent corpus of 103,175,233 words not yet investigated, which comprises a selection of posts and comments from the scienceblogs.com website, published from 2006 to 2014, now available on the online query system SketchEngine.

Keywords: corpus linguistics, ScienceBlog, Sketchengine, environment, lexical analysis

1. Introduction

The research aim of this exploratory study is to investigate to what extent semantic prosody contributes to the positive or negative construal of the discourse of environment in the public sphere. Blogs are taken as the sample genre of the public sphere and, to achieve this aim, Scienceblog, a specialised corpus dealing with the topic of environment, is chosen. Semantic prosody refers to the analysis of the collocates which accompany a word and 'colour' it with a positive or negative connotation'; the scope in the current study is narrowed to ecodiscourse. In this paper, Section 2 presents the literature review on ecodiscourse, Section 3 provides a description of the corpus and of the methodology used, while findings are reported under Sections 4 and 5 and conclusions in Section 6.

2. Literature Review

Discourse about the environment has been a highly debated topic lately, as we can see from the number of research projects which have been started all around the world. An international project, *Investigating Interdisciplinary Research Discourse*, carried out at the University of Birmingham, is investigating the entire holdings of the journal Global Environ-

¹ B. Louw, Irony in the Text or Insincerity in the Writer? The Diagnostic Potential of Semantic Prosodies, in Text and Technology, M. Baker – G. Francis – E. Tognini Bonelli ed., JBP, Amsterdam 1993, pp.157-176.

mental Change as a model of interdisciplinary discourse². Another international research project carried out by the University of Leicester and by two Norwegian research centres regards the representations of the future in English language blogs on climate change³. Several socio-cultural approaches have contributed to defining the role of perceptions: Leiserowitz4, for example, has investigated the extent to which American risk perception of global climate change can influence climate policies. Since the 1990s, when ecolinguistics emerged as a discipline, several studies have shed light on the type of language used to describe environmental issues and on new avenues of research⁵. While Alwin⁶ unmasks apparent ecological attitudes in the use of the word 'sustainable', creative compounds, such as 'carbon indulgences' have been detected and studied in online discourses⁷. The emergence of the new media is contributing to shaping public understanding of important environmental issues, such as climate change. Within Corpus Linguistics (CL), Salway, Hofland and Touileb⁸ are developing tools and methods for analysing blogs about climate change, while Wildt, Church, Mc Carthy and Burgess⁹ have conducted a lexical analysis of environmental vocabulary on three web corpora and a reference web corpus, combining corpus linguistics and critical discourse analysis. The current study partly follows the same lines, while focussing on the semantic prosody of 'natural' and 'climate change'.

3. Corpus Description and Methodology

The corpus ScienceBlog – 103,175,233 words – was compiled within the concordancing programme the Sketch Engine¹⁰ and, as far as I know, no research has yet been published about it¹¹. Finalised in 2014, it includes a selection of posts and comments from the *Scienceblogs.com* website, ranging from the year 2006 to the beginning of 2014. This website, set up in 2002, comprises blogs written and maintained by readers with an interest in science from all over the world. The variety of topics and the internationality

² http://paulslals.org.uk/IDRD/ last accessed November 7, 2015.

³ K. Fløttum – A. Müller Gjesdal – Ø. Gjerstad – N. Koteyko – A. Salway, *Representations of the future in English language Blogs on Climate Change*, "Global Environmental Change", 29, 2014, pp. 213-222.

⁴ A. Leiserowitz, *Climate change risk perception and policy preferences: the role of affect, imagery, and values,* "Climatic Change", 77, 2006, pp. 45-72.

⁵ S. V. Steffensen – F. Alwin, *Ecolinguistics: the state of the art and future horizons*, "Language Sciences", Special Issue 41(A), 2014, pp. 6-25.

⁶ F. Alwin, *Language and ecology: ecolinguistic perspectives for 2000 and beyond*, "AILA Review", 14, 2001, pp. 60-75.

⁷ N. Koteyko – M. Thelwall – B. Nerlich, *From Carbon Markets to Carbon Morality: Creative Compounds as Framing Devices in Online Discourses on Climate Change Mitigation*, "Science Communication", 32, 2010, 1, pp. 25-54.

⁸ A. Salway – K. Hofland – S. Touileb, *Applying Corpus Techniques to Climate Change Blogs*, in *Proceedings Corpus Linguistics Conference 2013*, A. Hardie – R. Love ed., UCREL, Lancaster 2013, pp. 357-359.

⁹ K. Wild – A. Church – D. McCarthy – J. Burgess, *Quantifying lexical usage: vocabulary pertaining to ecosystems and the environment*, "Corpora", 8, 2013, 1, pp. 53-79.

¹⁰ A. Kilgarriff et al., *The Sketch Engine: ten years on*, "Lexicography", 1, 2014, 1, pp. 7-36.

¹¹ This was confirmed to me by Kilgarriff (private communication).

of the audience are the main strong points of this corpus. The methodology combines automatic and manual analysis. First, fifty environment-related words were identified through the Thesaurus feature of the SketchEngine and compared to the BNC to see the prevailing environmental attitudes of Scienceblog. Consequently, in order to identify the bloggers' perceptions regarding environmental issues, two randomly-selected items, 'natural' and 'climate change', were investigated in detail: automatic corpus-based analysis was integrated with manual reading in order to detect different connotative meanings and evaluative tendencies. Wordsketches¹² – summaries of a word's grammatical and collocational behavior – helped identify the semantic prosody of each lexical feature considered.

This Section presents the lexical items included in the analysis, following the same procedure set up by Wildt, Church, McCarthy and Burgess (2013), but limiting the number of items. In order to identify the fifty most relevant terms connected with ecodiscourse, the term 'environment' was used in the Scienceblog corpus as a starting point for the thesaurus function of the SketchEngine. This function can generate a list of lemmas that occur with similar collocates, and in similar grammatical relations, to an input lemma. A thesaurus of 'environment' includes terms such as 'climate', 'life', 'nature' and 'change'. The thesaurus process was then repeated for each new item (that is, for 'climate', 'life', 'nature' and so on). Key collocates, such as 'climate change' (both as a noun and an adjective) and 'global warming', retrieved from word sketches (see the following Section) were also added to reach the pre-set number of fifty items. Finally, all the words with their raw and normalised frequency (per million words) were detected in the Scienceblog corpus and in the BNC, as the reference corpus. The final list is provided in Table 1 in the Appendix.

If we compare word frequencies, only a handful of terms show higher (normalised) frequency in the BNC: 'being', 'change', 'place', 'policy', 'pollution' and 'wildlife'. Among these, only 'pollution' and 'wildlife' are connected to the environment. The words which seem to stand out in the Scienceblog corpus tend to focus on the issues of global warming and climate change with a prevalence of negative ('poison', 'radiation', 'risk') on positive terms ('biodiversity', 'biological', 'ecological', 'habitat'). Finally, a consistent group of words belongs to the field of biology: 'existence', 'life', 'nature', 'organism', 'species'. In order to identify the reasons of this disproportion between the BNC and the Scienceblog, two randomly-selected items – 'natural' and 'climate change' – were analysed in detail and their findings are reported in the following Sections.

3.1 Word sketch of 'natural' and subsequent manual analysis

Word sketches are a distinctive feature of the SketchEngine. They show the context of a lemma, its collocates and colligates (recurrent word classes). Part of the word sketch

¹² Sketch Engine has several unique features, such as word sketches, i.e. one-page, automatic, corpus-driven summaries of a word's grammatical and collocational behaviour (Kilgarriff et al., 2004, p. 105), as can be read at: http://www.sketchengine.co.uk/?page=Website/LandingPage last accessed November 7, 2015.

of 'natural' is reproduced in Table 2 of the Appendix. The word 'natural' is shown in its grammatical relations displayed in the columns. The words are listed according to their raw frequency (RF, first figure after each word) and their salience, calculated with logdice¹³ (second figure after the word).

If we consider the first column, where the words listed act as modifiers of 'natural', some of the most salient items – entirely, wholly, completely, totally – are intensifiers, adverbs that emphasize the adjective¹⁴ in a positive way. In the second column 'and/or', where the words listed follow one of the two Boolean operators, we see that 'natural' is used together with words with opposing meanings such as 'organic', 'herbal', 'synthetic', 'artificial' and are therefore difficult to interpret.

The manual reading of a sample of hundred concordance lines out of 29,700 proved that the word 'natural' often carries a strong semantic connotation and it is associated with homeopathy, herbs and alternative medicine, often with a note of sarcasm and almost contempt. The concordance line 1 hereby reported exemplifies this concept:

1. In particular, since "homeopathic" seems to have become in common parlance synonymous with "natural", it's always a good thing to remind people from time to time what homeopathy really is and why it's such utter pseudoscience.

'Natural' can collocate with 'good', but also with its comparative 'better' and superlative 'best'. However, this association carries a negative semantic prosody, in as much as it is seen with skepticism or as a popular belief. Concordance lines 2-3, containing the "natural is better" phrase, exemplify this point.

2. Yes, there is a definite belief underlying much of CAM that technology and pharmaceuticals are automatically bad and that "natural" must be better. Flowing from that belief is the belief that people were happier and much healthier in the preindustrial, preagricultural past, that cardiovascular disease was rare or nonexistent, and that cancer was seldom heard.

3. The above rant is the same old tired "natural is better" blather. "Natural" (whatever that means in this context) is not necessarily better. It may be. But it may not be.

Despite the relatively high frequencies (as compared with the BNC) of positive collocates of 'natural' such as 'good', 'better' and 'best' (see Table 3), it is close reading that allows for more specific targeted considerations. Automatic retrieval of collocates alone is insufficient for drawing any definite conclusions.

¹³ LogDice is a metric based on the frequency of the headword in the same syntactic position (with any collocate) and the frequencies of the collocate (in any syntactic position).

¹⁴ R. Carter, M – McCarthy – G. Mark – A. O'Keeffe, *English Grammar Today*, Cambridge University Press, Cambridge 2011, p. 255.

Collocates of 'natural'	Raw Frequency (ScB)	Logdice (ScB)	Raw Frequency (BNC)	Logdice (BNC)
good	224	5.680	89	5.065
better	181	5.984	26	4.164
best	76	5.185	41	4.830

Table 3 - 'Natural' and its collocates 'good', 'better' and 'best' in Scienceblog (ScB) and in the BNC.

As in the study by Wild, Church, McCarthy and Burgess¹⁵, considerations on how 'nature' is conceptualised emerge in the current study, although the perspective provided here is different from theirs. The term 'natural' seems to evoke mixed feelings and carries a negative semantic prosody; as a matter of fact, according to the findings in *Scienceblog*, there is growing skepticism on the part of bloggers with an interest in science, on the 'natural=good' equation which would debase traditional medicine, while exalting alternative medicine, represented by homeopathy or naturopathy, as Example 4 shows:

4. Make no mistake, 'naturopathy' is a hodge-podge of quackery that includes homeopathy, reiki, traditional Chinese medicine and various detoxification woo, while many chiropractic practices are also highly dubious.

3.2 'Natural capital'

Among the collocates of 'natural', there is the collocation 'natural capital', a low-frequency item, occurring only thirty eigth times in the corpus (0.31 per million). I have decided to carry out a qualitative analysis on this collocation. The emphasis in the examples quoted is on the growing awareness of the consumption of natural resources and ecosystems due to human activity. In this case the writer is using the word literally and the possibility of losing our natural capital for good is perceived as a real danger.

5. what happens if we exhaust our natural capital?

6. humans are devouring natural capital like there is no tomorrow.

The use of the collocation 'natural capital' goes in the same direction as the depiction of nature as a commodity¹⁶.

4. 'Climate change'

The collocation 'climate change' has also been analysed both with word sketches and manually. As is often the case on the web, the word 'climate' tends to occur with misspelling variants (cliamte, cliimate, clilmate...). Two different opinions emerge: on the one hand

¹⁵ K. Wild – A. Church – D. McCarthy – J. Burgess, *Quantifying lexical usage*.

¹⁶ *Ibid.*, p. 74.

there are the supporters of the existence and dangers of climate change; on the other, there are those who deny this phenomenon, on the basis that we cannot say whether today's changes are more relevant than those that happened in the past. Climate change revision-ism prospers on Scienceblog.com, as Example 7 demonstrates.

7. NOT a local phenomenon. There are traces of it all over the globe. The proxy studies cannot prove that this period was colder than today. Neither can the proxy studies show at which rate the cliamte changes took place. We simply do not know if todays changes are extraordinary (probably not).

Peculiar collocates, such as 'climate change refugees', emerge from reading (see Example 8). As pointed out by Bergoglio¹⁷, there has been a tragic rise in the number of migrants seeking to flee from the growing poverty caused by environmental degradation, without being recognized by international conventions as refugees. The issue is becoming current and is present even in the dystopian novel *The Stone Gods* by Jeanette Winterson¹⁸.

8. a story from the Reuters news agency in December claimed that residents of the Pacific island of Tegua in Vanuatu were among the first, "if not the first", climate change refugees, forced to flee sea level rises caused by global warming.

A growing sensibility towards environmental issues is partly due to the ability of the media to set the political agenda, as this example shows:

9. U.S. databases v. Australian news As the federal election rapidly approaches, climate change, energy, and environment have become leading issues among candidates and the media.

The relationship between politics and climate change is definitely an area worth further investigation in future studies.

5. Conclusions

Environmental issues such as climate change, environmental change and natural remedies, are highly debated on the web. The current study has investigated Scienceblog, a corpus of science blogs, with the aim of identifying the bloggers' perception with regard to the topic of environment and the type of semantic prosody used.

Using the Thesaurus feature of the SketchEngine, it was possible to identify a set of fifty words connected to the target word 'environment' and to compare their frequency to the BNC. What emerged is a tendency in Scienceblog for terms that either carry a negative

¹⁷ Francesco, *Laudato si*, Libreria Editrice Vaticana, Città del Vaticano 2015, p. 21.

¹⁸ See E. Bolchi, *Fuga verso il presente. Un'analisi delle fughe in The Stone Gods di Jeanette Winterson*, "L'Analisi linguistica e letteraria", 22, 2014, 1-2, pp. 137-144.

implication ('climate change', 'global warming', 'risk', 'emission'), or relate to the biological field ('existence', 'species', 'organism').

The analysis of collocates through Word Sketches, combined with the manual reading of concordance lines, helped explore the semantic prosodies carried by 'natural' and 'climate change', two of the fifty relevant lexical items previously identified. 'Natural' is often associated with 'good', 'better' or 'best', but often with a negative connotation, while the collocation 'natural capital' is always accompanied by perceptions of danger and risk. Moreover, 'climate change' occurs very frequently, but is often accompanied by a negationist attitude. As a matter of fact, the bloggers' perception of environmental problems is variegated: some hotly debated issues, such as 'natural' remedies and 'climate changes', are opposed and denied, while other less discussed topics, such as the consumption of our 'natural capital' are felt as real problems. Interestingly, more blog writing is dedicated to demonstrating who is right and why, than to talking about what is perceived as a real danger for our environment. Hopefully, this preliminary study contributes to a better understanding of bloggers' construal of ecodiscourse in terms of negative semantic prosody.

Lexical item 1 atmosphere		Frequency in the ScB	Frequency in the BNC	
		7,074 (57.50)	4,828 (43.04)	
2	being (noun)	10, 349 (84.20)	89,499 (797.80)	
3	biodiversity	1,242 (10.10)	95 (0.85)	
4	biological	7,922 (64.40)	1,972 (17.58)	
5	biosphere	645 (5.25)	67 (0.60)	
6	carbon	20,050 (163.10)	2,485 (22.15)	
7	cell	30,604 (248.90)	13,052 (116.30)	
8	Co	17,096 (139.10)	4,485 (39.98)	
9	change	51,864 (421.90)	64,703 (576.80)	
10	climate	65,733 (534.70)	3,024 (26.96)	
11	climate change	25,700 (209.00)	233 (2.08)	
12	climate-change (adj)	562 (4.57)	2 (0.02)	
13	climatic	766 (6.23)	438 (3.90)	
14	creature	5,106 (41.50)	3,808 (33.95)	
15	earth	33,600 (273.30)	9,322 (83.10)	
16	ecological	2,172 (17.70)	729 (6.50)	
17	ecosystem	2,413 (19.63)	283 (2.52)	
18	effect (noun)	45,387 (369.20)	33,315 (297.00)	
19	emission	13,129 (106.80)	2,078 (18.52)	
20	energy	16,153 (131.40)	14,361 (128.00)	
21	environment	49,132 (399.60)	12,971 (115.60)	
22	environmental	13,462 (109.50)	8,387 (74.76)	
23	evolution	51,491 (418.80)	2,489 (22.19)	
24	existence	13,215 (107.50)	6,505 (58.00)	
25	exposure	9,280 (75.50)	2,416 (21.50)	
26	global	35,544 (289.10)	3,524 (31.41)	
27	global warming	17,833 (145.50)	599 (5.34)	
28	greenhouse	7,021 (57.10)	1,075 (9.58)	
29	habitat	1,712 (13.90)	1,420 (12.66)	
30	heat	11,594 (94.30)	6,578 (58.64)	
31	life	76,174 (619.60)	62,654 (558.50)	
32	nature	25,404 (206.60)	17,953 (160.00)	
33	natural	29,700 (241.60)	14,081 (125.50)	
34	organism	8,583 (69.80)	1,792 (15.97)	
35	place	51,067 (415.40)	67,237 (599.40)	
36	planet	18,358 (149.30)	2,364 (21.07)	
37	poison	3,875 (31.50)	1,564 (13.94)	
38	policy	22,575 (183.60)	34,586 (308.30)	
39	pollute (verb)	1,041 (8.47)	470 (4.19)	
40	pollution	3,851 (31.30)	4,142 (36.92)	
41	radiation	10,085 (82.00)	1,773 (15.80)	
42	risk	28,942 (235.40)	14,807 (132.00)	
43	science	159,954 (1,301.00)	12,556 (111.90)	
44	specie	11,779 (95.80)	27 (0.24)	
45	temperature	20,967 (170.50)	5,782 (51.54)	
46	universe	26,840 (218.30)	2,588 (23.07)	
47	variation	7,101 (57.80)	5,211 (46.45)	
48	warming (noun)	22,595 (183.79)	683 (6.09)	
49	weather	9,167 (74.60)	5,885 (52.46)	
50	wildlife	1,564 (12.72)	1,990 (17.74)	

Appendix

Table 1 - List of the 50 environment-related words retrieved using the function Thesaurus in the SketchEngine. Next to each word is its raw and normalised frequency (per million words)

purely	53	8.70	artificial	46	7.98
perfectly	78	8.17	anthropogenic	44	7.95
entirely	62	7.34	man-made	32	7.84
wholly	8	6.77	organic	47	7.62
completely	51	6.08	supernatural	49	7.60
only	121	5.44	unguided	20	7.50
totally	16	5.32	synthetic	22	7.31
perhaps	6	4.87	Darwinian	24	7.15
all	47	4.83	herbal	20	7.13
thus	7	4.80	manmade	13	6.84
quite	20	4.57	holistic	14	6.81
fairly	7	4.53	unnatural	14	6.76
mostly	8	4.52	material	12	6.55
fully	7	4.46	spontaneous	12	6.42
as	49	4.42	biological	30	6.33
about	37	4.17	cosmic	15	6.28
very	39	3.60	undirected	8	6.21

Table 2 - Part of the Word Sketch of 'natural'

