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“Bacon wrapped cancer”: the discursive construction of meat carcinogenicity

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Abstract: In 2015, the World Health Organization published a report on the carcinogenicity of red and processed meat (IARC, 2015. Carcinogenicity of consumption of red and processed meat. *The Lancet Oncology* 16(16). 1599–1600), attracting intense interest from both the general public and the scientific community. This study combines corpus approaches, Systemic Functional Linguistics and discourse analysis to investigate and compare scientific and animal rights movement reactions to the IARC 2015 report. Scientific reactions are exemplified by three research papers published immediately after the report; responses from animal rights campaigners are investigated through an analysis of texts taken from the website of the nongovernmental organization PETA. The aim is to explore how discourse not only describes, but also constructs meat carcinogenicity, in texts produced by two discourse communities (scientists and animal campaigners) which, for entirely different reasons, have an important stake in this issue. Qualitative (close reading) and quantitative (corpus-based) methods are combined, focusing on vocabulary, grammatical metaphor, and Appraisal (Martin, Jim and Peter White, 2005. *The language of evaluation: Appraisal in English*. Basingstoke: Palgrave Macmillan). The results show a high level of hybridity, discursive erasure (Stibbe, Arran, 2012. *Animals erased: discourse, ecology, and reconnection with the natural world*. Middletown: Wesleyan University Press), and some substantial differences in the discourse reactions to the IARC report by the two sources, reflecting the ideologies and ethical assumptions they espouse in their approach to the announcement that red and processed meat can cause cancer.

Keywords: corpus linguistics, discourse analysis, systemic functional linguistics, discursive erasure, animals used for food, cancer

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1 Introduction

In October 2015, the WHO (World Health Organization) published a report on the carcinogenicity of red and processed meat (IARC 2015), generating a heated debate in the media, and attracting significant interest from the scientific community, especially in the area of medicine, where the relation between cancer and food had been researched extensively for many years (Lippi et al. 2016). The International Agency for Research on Cancer (IARC)'s inclusion of red meat in the list of Group 2A carcinogens (probably carcinogenic to humans) and of processed meat in Group 1 (carcinogenic to humans) also triggered reactions from the animal rights community, perhaps most notably a PETA (People for the Ethical Treatment of Animals) campaign urging people to embrace veganism in direct response to the IARC announcement. For this campaign, shocking images were used, and a free vegan starter kit was offered “to anyone ready to ward off cancer as well as a slew of other health issues” (Kretzer 2015: 1).

This paper combines corpus approaches with systemic functional and discourse analytical tools to investigate and compare scientific and animal rights movement reactions to the IARC report. The main goal is to explore how discourse not only describes, but also constructs meat carcinogenicity, in texts produced by two discourse communities (scientists and animal campaigners) which, for entirely different reasons, have an important stake in this issue. This explorative comparison, despite its limitations (specifically connected with the restricted range of texts), is intended to test a series of claims in the discourse analysis literature about the linguistic and social representation of animals as food, and to see how they are reflected in these two registers. While this study is purely linguistic and descriptive, it also aims to provide a starting point for more sociolinguistically and/or critically oriented frameworks investigating common areas of concern across linguistic and medical studies: for example, understanding which animals count as “red meat” and identifying the meaning of “meat processing” is just as important in epidemiological studies as it is in linguistic studies looking at the role of Noun Group structures in shaping our worldview.

Scientific reactions to the IARC report are exemplified by three research papers published immediately after its release: the first (Lippi et al. 2016) appeared in a review of oncology, the second in a gerontology journal (Kouvvari et al. 2016), and the third in an environmental research journal (Domingo and Nadal 2016). These three articles are therefore quite heterogeneous in their approach to meat carcinogenicity, due to the different research fields they pursue. Together with the restricted number of texts, this may

represent another limitation of the present study, as the criterion for text selection (proximity between their publication and the IARC report's) is largely opportunistic. The reactions of animal rights activists are investigated through an analysis of texts taken from the PETA website,¹ specifically its Issues, Living, and Blog sections.

The methodology adopted for this study includes an analysis of some lexicogrammatical features of scientific language (Halliday 1993 [1989]), “which conspire [...] to construe reality in a certain way” (Halliday 2001 [1990]: 193), specifically as concerns the semantic areas of human health and animals as food, which are known to have complex associations with ideology (Stibbe 2012), identity (Brookes 1999), and policy making (Paul 2007). A close reading of the texts is complemented with corpus queries performed on AntConc 3.4.4. (Anthony 2014), after POS tagging on TagAnt 1.2.0. (Anthony 2015). The lexicogrammatical aspects considered are choice of vocabulary, grammatical metaphor, and features of Appraisal (Martin and White 2005). The combination of qualitative (close reading) and quantitative (corpus) methods proved necessary in order to highlight some elements of this discourse which were not “readily available to naked-eye perusal” (Partington et al. 2013: 11). For example, comparing mass and countable nouns used to identify the same animals (Section 3.2.2), analyzing the use of gendered pronouns (3.2.3), and performing Appraisal analysis of specific parts of speech (adjectives, in Section 3.4) would likely have entailed a much larger error margin if the close reading had been unaided by corpora.

After a brief introduction to the extralinguistic context of the study, with some descriptive remarks about the scientific journals analyzed, the IARC, and PETA (Section 2), each of these linguistic features is analyzed separately (Section 3), eventually reaching a series of conclusions (Section 4) about the similarities and differences in the way that scientists and animal rights campaigners have constructed meat carcinogenicity discursively.

2 The background

In this section, some background to this study is provided. Firstly, I present a brief overview of the IARC, including its relation to the WHO and main activities; secondly, I introduce the journals from which scientific reactions to the IARC report were extracted; finally, I describe PETA, specifically its campaigns against meat eating.

¹ <http://www.peta.org> (accessed 22 March 2018).

2.1 The IARC

The IARC is a WHO division, established in 1965 and headquartered in Lyon (France), which brings together a number of research groups working on different areas of cancer studies. One of the main instruments of IARC research dissemination is a series of *Monographs on the Evaluation of Carcinogenic Risks to Humans*, which has been running since 1972: volume 114, entitled *Red Meat and Processed Meat*, is not yet available at the time of writing this paper, but its findings are summarized in IARC (2015). The substances classified in IARC monographs are grouped in a set of lists, known as the Standard IARC classification:

- Group 1 Carcinogenic to humans
- Group 2A Probably carcinogenic to humans
- Group 2B Possibly carcinogenic to humans
- Group 3 Unclassifiable as to carcinogenicity to humans
- Group 4 Probably not carcinogenic to humans

Despite its not being the only existing classification standard for carcinogens, the IARC's is very well reputed throughout the scientific community.

2.2 The scientific journals

For this study, a query was run in Elsevier Science Direct, a large database of research journals available on subscription, looking for the keywords "IARC", "meat", and "cancer" in the sections Agricultural/Biological Sciences, Biochemistry, Genetics/Molecular Biology, Environmental Science, Medicine/Dentistry, and Nursing/Health Professions. The search, which was performed in December 2015, retrieved 61 articles, three of which contained direct mention of the IARC report, issued about two months before, stating that red meat was probably carcinogenic for humans, and processed meat was certainly so. The sample is therefore opportunistic (or "serendipitous," to borrow a term dear to corpus linguists who thus refer to incidental discoveries made while investigating large databases; Partington et al. 2013: 9), but also grounded in the fact that, according to the database queried, these articles were chronologically the first to quote the IARC (2015) findings among their sources of scientific knowledge.

All the journals are peer reviewed, have Impact Factor, PubMed scores, and other major metrics. Taken in alphabetical order, the first (*Critical Reviews in Oncology/Hematology*) is the official journal of the European School of Oncology

(ESO) and has as its main concern the publication of research reviews on cancer and blood diseases; the second (*Environmental Research*) is primarily interested in the effects of chemicals on environmentally induced illnesses; the third (*Maturitas*) is the official journal of the European Menopause and Andropause Society (EMAS), focusing on midlife and elderly health. The editorial boards and author lists of all three journals include scholars of many nationalities, utilizing English as the lingua franca of science. Although all the journals have open access policies, the three selected articles are only available to subscribers. Their lengths are respectively: 11,899 words for the oncology review, 8,580 words for the environmental research paper, and 7,151 words for the geriatrics paper.²

2.3 PETA

PETA is a US-registered charity with branches in the United Kingdom, the Netherlands, Germany, France, India, Hong Kong and Australia. Within the varied universe of animal rights organizations, PETA can be considered to belong to the antispeciesist category, with an explicit reference to Singer (1975) and philosophical utilitarianism.³ Although the acronym PETA seems to include the word “pet,” the organization’s first interest when it was constituted in 1980 was not addressed to companion animals,⁴ but to animals used in scientific laboratories. PETA’s main mission consists in organizing campaigns for animal rights, through both lobbying and direct action involving boycott, undercover investigations in breeding farms, and demonstrative occupations of corporate offices and other facilities. Many of these actions have been successful in shifting policies in the United States and beyond, in the areas of animal testing, fashion design, farming, entertainment, advertising, and even military personnel training.

² To explain these differential sizes, it should be specified that, throughout this paper, I use the term “corpora” in a broad sense, i.e. “a collection of pieces of language that are selected and ordered according to explicit linguistic criteria in order to be used as a sample of the language” (Sinclair 1996: 4). Strictly speaking, these samples would not constitute corpora, due to their opportunistic nature, restricting their statistical reliability and capacity to provide generalizable results.

³ A discussion of antispeciesism and its roots in utilitarianism is beyond the scope of this paper. See Ryder (2012).

⁴ The word “pet” to refer to companion animals is actually avoided by antispeciesists, who consider it patronizing. The expression “non-human animal” is also usually favored in antispeciesist discourse over the unmodified noun “animal.” Parallels between the grammar of racist, sexist, and speciesist discourse have been traced at many levels, as summarized in Stibbe (2001).

PETA's campaign against meat eating is detailed in a section of its website entitled "Animals used for food", in which abuse of animals, environmental issues and health benefits are mentioned (in this order) as reasons to embrace a vegan diet. In fact, in compliance with its antispeciesist principles, PETA encourages its supporters to go *vegan*, rather than simply vegetarian, as diets including animal protein that is not meat or fish still involve eating products derived from farming, a practice that antispeciesists reject as a form of exploitation. For this study, from among the extensive materials published on PETA's website on the hazards of meat eating, only those that were explicitly about human health were selected,⁵ for a total of 20,992 words.

3 The study

This section describes the study, starting from theoretical and methodological considerations, and going on to analyze the texts.

3.1 Analytical framework

The discursive representation of animals as pets, pests, food, and other has recently attracted some quite specific interest by corpus linguists (Gilquin and Jacobs 2006; Pak and Sealey 2015), although it is more traditionally rooted in critical frameworks of language and power (Murata 2007; Vandekinderen et al. 2014), and ecolinguistic studies (Mühlhäusler 2006; Alexander and Stibbe 2014), many of which explicitly undertake to provide data and insight to explain, and eventually reverse, the social and psychological processes whereby weaker social groups are marginalized. As a matter of fact, animals are an outgroup, i.e. non-human, by definition (Costello and Hodson 2010), and therefore provide a wealth of metaphors, idioms, and other linguistic features sustaining mental schemes and discursive strategies to "erase" (Stibbe 2012) narratives and beings that are at odds with the dominant social order. Just as it is consistently wielded to justify the abuse and mass killing of animals for human needs, discursive erasure is also used to reinforce hegemonic discourse more generally (Stibbe 2004) and to marginalize human groups that do not conform to dominant ideologies (Stibbe 2014).

⁵ The whole section entitled "Issues/Animals used for food/Eating for your health" was selected. In addition, posts related to the IARC report elsewhere on the website, and other texts about meat eating and cancer were retrieved through a query on the website search engine.

Discursive erasure spans throughout the spectrum of lexicogrammar, ranging from vocabulary (Glenn 2004; Gupta 2006; Sealey and Oakley 2013; Cook 2015), to grammatical metaphor (Mitchell 2006; Sealey and Oakley 2014), and extending to conceptual metaphor (Stibbe 2003; Goatly 2006; Milstein 2016) and argumentative chains (Swan and McCarthy 2003). In this study, I analyze only a selection of these devices, with a view to identifying the main similarities and differences in the discursive reactions to the IARC (2015) report on meat carcinogenicity by scientists and animal rights campaigners.

3.2 Vocabulary

Some of the main vocabulary features that typify the discursive representation of animals are as follows:

- Mass nouns, often in the role of Classifiers, to describe animals, especially when used for food. This explains, for example, the downranking of animal referents, from the role of Participant in the action to simple premodifier, in Noun Groups like *meat/poultry/fish intake*, where the Process of eating animals remains hidden behind the nominalization.
- The restriction of animal-based discourse to a few emblematic species, usually dogs/cats as companion animals, and pigs/cows as farmed animals.
- A certain inconsistency in the choice of which gender to assign animal referents.

In this section, claims in the literature concerning these vocabulary features are tested against my own data.

3.2.1 Mass nouns

Using mass nouns to identify animals, as well as positioning their names as Classifiers in Noun Groups (e.g. *pig farm*), is a common strategy in scientific registers, which contributes to the reinforcement of ideologies whereby animals are “mere tonnage of stuff” (Stibbe 2014: 595). This Noun Group structure also supports the “growthist” view that resources, including animal ones, are inexhaustible, or that “the[ir] only source of restriction is the way that we ourselves quantify them” (Halliday 2001 [1990]: 194).

In these texts, *animal* is almost always used as a noun Classifier, and in fact more so by PETA (99 %, Figure 1, over a total of 89 occurrences) than in the scientific articles (87 %, Figure 2, over a total of 15 occurrences), in what is

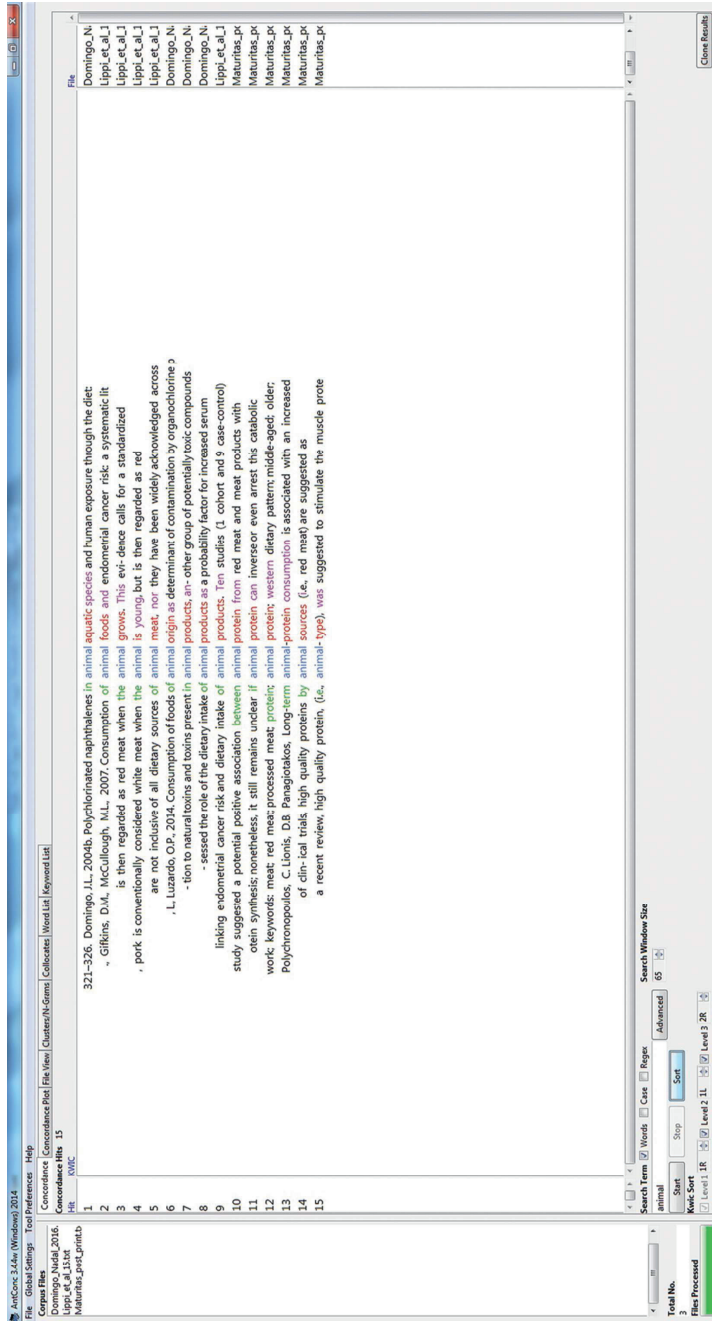


Figure 2: Concordance of animal: Scientific articles.

probably a preoccupation by this organization with adopting a scientific, objective register to project a credible image.

When the plural form of the same word is queried, things change drastically: PETA refers to *animals* 54 times, with *intelligent* and *hurt* as top collocates, while there is only one mention of the plural of this noun in the scientific articles, as part of a metalinguistic comment (“the term ‘red meat’ is used to design beef, pork, lamb and goat from domesticated *animals*, whereas ‘processed meat’ defines types of meat preserved by smoking, curing or salting, or addition of chemical preservatives” [Lippi et al. 2016: 12]).

This coexistence between a singular form, *animal*, used in very much the same “objectified” way as it occurs in scientific discourse, and a plural that overtly exposes PETA’s sympathy toward the plight of suffering animals, may be considered as evidence of register idiosyncrasy (Miller and Johnson 2013). This kind of register overlap results from the hybridization between the discourse of science that PETA quotes on its website and its mission to uphold animal rights: features of scientific language, such as names of sentient beings as Classifiers, thus appear in conjunction with more inclusive, alternative discourse,⁶ even when different forms of the same word are concerned. Interestingly, the word *cancer* appears among the collocates of *animal* in the PETA texts, but not in the scientific articles. This can be explained not only by the relatively low frequency of the word *animal* in the scientific articles (16 occurrences, counting the plural), which may be insufficient to retrieve relevant collocates, but also by the fact that these articles, as seen in Section 3.4, attempt to be more specific than PETA’s as to *which* animal-based foods are in fact carcinogenic, according to the IARC and other studies.

The noun *meat* is certainly worth investigating: not only is it semantically related to *animal*, insofar as it essentially identifies the same referent viewed as having been butchered for food, but it is also a fundamental keyword to understand this discourse.⁷ As a matter of fact, what qualifies as *meat* is not an objective datum, but it varies across cultures and over time, as shown in historical studies (Montanari 1993; Rodriguez-Wittmann 2014) that dwell on food prescriptions excluding meat eating such as, in Christianity, Lent and other “lean” periods. If, in the Middle Ages, fish was considered a paradigmatic

⁶ Discourses that deviate from dominant practices, espousing transformative ecosophies (see Section 3.3.1) in an attempt to resist the discursive erasure of animals, are described by Stibbe (2003: 387) as “poetic activism.”

⁷ Keywords were not generated by Antconc through a comparison with reference corpora, but selected on the basis of the close reading of the texts and their raw frequency.

example of “non-meat,”⁸ and therefore admissible during Lent, dairy products and eggs were seen as much more symbolically connected with meat, and therefore generally excluded; for the modern Western person, another unsettled question is if poultry and processed and/or tinned meat-based products, like hot dogs or *pâté*, are kinds of meat or constitute different semantic categories.

Although the scientific articles mention *meat* much more frequently (795 times, against 144 in the PETA texts), the percentage of Classifier use for this word is around 30% in both corpora, showing again a convergence toward premodification as a discourse strategy to convey objectivity. Where a striking difference emerges between the corpora, and may offer at least a partial explanation for the lower frequency of this word in the PETA texts, is in the competing use of the word *flesh*. In the scientific articles, this word is not used, whereas PETA treats *meat* and *flesh* as near synonyms, having similar semantic scope, phraseologies and a clear association with *cancer* (e.g. “eating the *flesh* of chickens, cows, and other animals promotes cancer,” line 26, Figure 3). For PETA, *flesh* encompasses all types of animal bodies used for food, including fish (the phrase *fish flesh* appears 12 times); unlike *meat*, the experiential role of *flesh* in this corpus is never Classifier, but most commonly nominal head. This allows *flesh*, when used, to take up the most prominent position in the Noun Group, implicitly underscoring PETA’s anti-meat-eating ideology.

In both corpora, *meat* (especially premodified by *red*) collocates strongly with *cancer*. The scientific articles are again more precise, showing further collocational ties with *colon* and *colorectal*. No similar associations are detectable in the PETA corpus for *flesh*, although the hazards of eating animals are exemplified in its collocations too, especially in expressions like *contaminated*, *contaminant*, *damage*, and *antibiotic resistant*. Concerning the phrase *processed meat*, the semantic association with *cancer* is even stronger, but PETA only uses it in the plural (*processed meats*). The plural *meats* is also attested in the scientific articles, but in the PETA texts it identifies more specific kinds of products, i.e. products that *look like* meat, but are not made (only) from the flesh of animals. It is thus that, when used in the plural form, the same noun, *meat*, takes on quite different associations in the PETA corpus depending on whether it is premodified by *faux*, *mock*, or *vegan* (presented as *tasty*, *delicious*, and even *appealing to kids*) or by *processed* (in which case *meats* are *cancerous*).

To conclude this analysis of mass nouns, in both corpora, the most typical expression including the word *cancer* is *cancer risk*, detailed in the collocates with various names of affected organs. The array of organs is, as expected, more

⁸ Fish being also a Christian symbol is probably connected with its “ambiguous position” (Montanari 2015: 72) in European food culture.

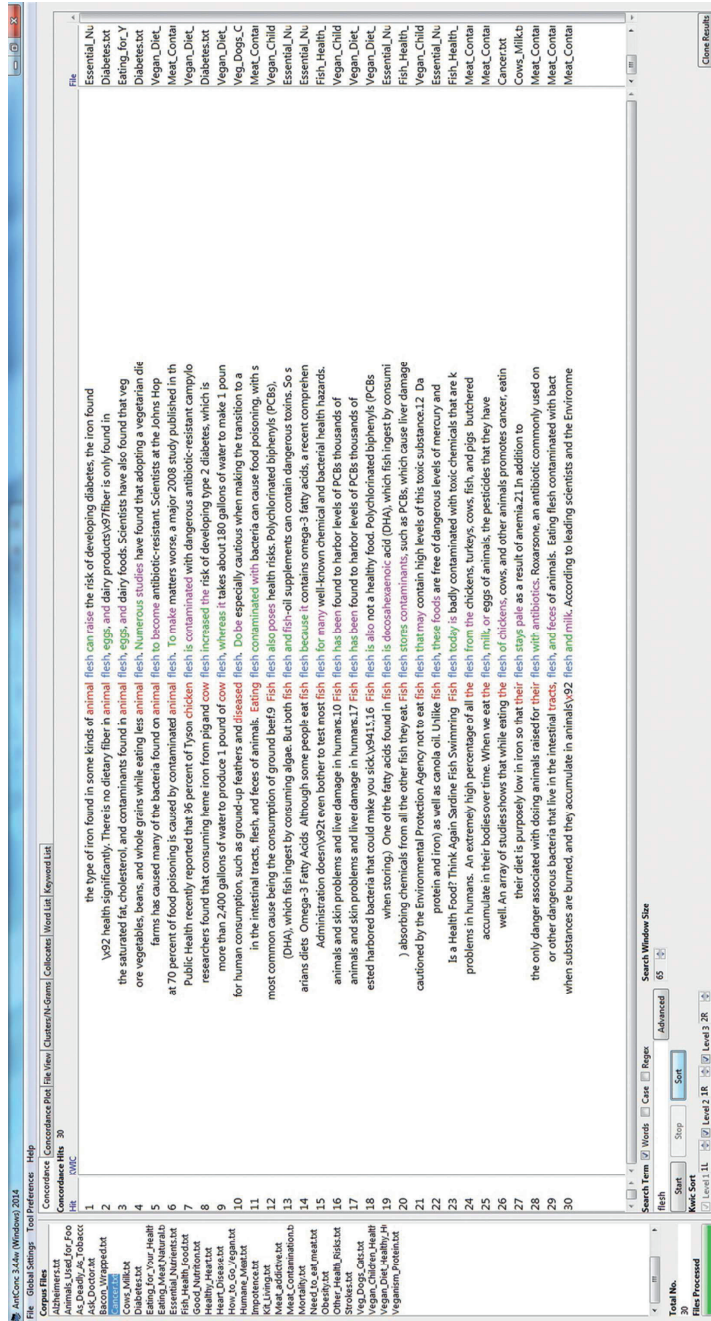


Figure 3: Concordance of flesh: PETA website.

comprehensive in the scientific articles, including (in order of frequency) colon and rectum, esophagus, stomach, lung, breast, kidney, ovary, pancreas, bladder, thyroid, endometrium, prostate, and liver. In addition to this greater precision, the scientific articles only refer to cancer in humans, whereas PETA also mentions animals having cancer. The plural *cancers* is also residually attested in both corpora (5 times in the PETA texts, against a total of 100 hits for the lemma; 15 in the scientific articles, against a total of 392).

3.2.2 Emblematic species

Discussing animals as seamless categories rather than as individuals, or at least as separate species, each with its own physical and behavioral characteristics, is an instrument of animal erasure, often used in conjunction with grammatical metaphor, as seen in Section 3.3.1. In my corpora, even PETA restricts its focus to a few emblematic species: *cow(s)* (69 occurrences) ranks first, followed by *fish* (46), with *chicken(s)* (21) a distant third, followed again by a few references to *pig(s)* (14), *dog(s)* (14), *cat(s)* (8), and more lexis identifying bovines (*calves*, 11; *veal*, 10; *cattle*, 7). Other names of animals (*turkey*, *lamb*, *tuna*, *salmon*, and *sardine*) have just a few scattered occurrences. In comparison, individual types of animals are mentioned more frequently in the scientific articles but, unlike PETA's, these texts systematically discuss animals as commodities rather than as living beings. This emerges from the predominance, in the scientific articles, of mass nouns instead of countable nouns, where English offers this choice, to refer to animals, e.g. *beef* (42 hits) over *cow(s)* (2), *pork* (64) over *pig(s)* (no occurrences), and *poultry* (52) over *chicken(s)* and *hen* taken together (33).

In the PETA texts, the relative frequency of mass nouns versus countable nouns is reversed (Table 1), and the phraseology is also different: whereas, for PETA, “*chickens* form friendships and social hierarchies”, and “*cows* suffer on factory farms”, in the scientific articles the same animals are either referred to as Classifiers (e.g. *chicken breasts* offering a potentially less carcinogenic alternative to *steak* and *hot dogs*) or simply presented in lists of foods.

The only significant exception to the patterns shown in the table concerns the word *bacon*: not only is its frequency almost the same in the two corpora (and in fact, after normalization, it is higher in the PETA corpus, at 0.71 against 0.5 per thousand words) but, in the scientific articles, this word behaves exactly like the other lexical items designing animal-based foods (i.e. it appears in lists). In the PETA texts, the use of the word *bacon* is typically tinted with connotations stigmatizing the consumption of “*bacon* sundaes,

Table 1: Relative frequency of mass versus countable nouns to refer to animals.

PETA	Scientific articles
Beef: 11	Beef: 42
Cow(s): 69	Cow(s): 2
Pork: 4	Pork: 64
Pig(s): 14	Pig(s): 0
Bacon: 15	Bacon: 14
Poultry: 3	Poultry: 52
Chicken(s): 21	Chicken(s)/Hen: 33

bacon cocktails, *bacon* cupcakes, and *bacon*-wrapped-everything-under-the-sun”. Remarkably, in this short quote, taken from a report entitled *Bacon-wrapped cancer* (Kretzer 2015), specifically about the IARC communiqué, the word *bacon* is used as a synecdoche to refer to meat products generally. Bacon, therefore, appears to have been selected by PETA as emblematic of the harms of meat eating.

3.2.3 Gender

Concordances of the full English personal pronoun system did not reveal any gendered usage for animals. In both corpora, nominalized Processes (see Section 3.3.1) are largely favored over subjective narratives following the pattern Actor ^ Process ^ Goal or, alternatively, gender-neutral *they* is used. PETA, however, consistently uses *who* as the relative pronoun for animals. This represents a point of departure between this study and the literature on the discursive representation of animals, which reports the use of gendered pronouns for both personal and relative pronouns, especially by partisan groups like PETA. A possible explanation for this difference in relation to the literature is again the mixed nature of the register, seen in Section 3.2.1, whereby PETA uses patterns of scientific discourse as well as more explicitly pro-animal features of language to address the topic of meat carcinogenicity.

3.3 Metaphor

Some of the most significant issues in animal discourse studies involving metaphor include:

- anthropomorphic terminology to refer to animals (Sealey and Oakley 2013);
- lexical expressions based on conceptual metaphors (e.g. ANIMALS ARE MACHINES; NATURE IS A COMMODITY) marginalizing animals in society in a similar manner to what happens in hate speech, including sexist and racist (Stibbe 2003);
- animal names as insults (Santa Ana 1999; Stibbe 2001; Goatly 2006) or belittling epithets, especially addressed to women (Kövecses 2005: 90–91); and
- grammatical metaphor, especially ideational.⁹

Henceforth, I concentrate on grammatical metaphor, which is particularly relevant to the language of science due to its “highly nominalized grammar” (Halliday 2001 [1990]: 196).

3.3.1 Grammatical metaphor

The relation between “X eats Y” and “Y intake” is a good example, in systemic functional terms, of an incongruent ideational pattern, whereby instead of the typical (or unmarked, or congruent) Actor ^ Process ^ Goal grammatical structure, we have a “substitution of one grammatical class, or one grammatical structure, by another” (Halliday 1993 [1989]: 87). Here, substitution involves a Noun Group head (*intake*) expressing the Process (typically a verb, in congruent, or non-metaphorical structures) and its premodifier (*meat*) expressing the Goal (an element which usually follows the Process in unmarked structures in English), with the Actor (i.e. the meat-eating subject performing the Process) effectively erased. As a direct consequence of this replacement, ideational metaphors promote objectivity and reduce the number of words, meeting the needs of scientific discourse. Most accounts of grammatical metaphor also see it as making texts, especially scientific ones, less accessible to a lay readership, due to the increase it entails in lexical density: therefore, grammatical metaphor is also usually portrayed as a potential instrument of social control, keeping non-specialists out of scientific knowledge, and reinforcing existing ideologies.¹⁰

⁹ Systemic Functional Linguistics also encompasses interpersonal grammatical metaphors (of Mood and Modality), and some systemicists extend this framework to consider predicated Theme and thematic equatives as textual metaphors. In this study, I only refer to grammatical metaphors of the ideational kind.

¹⁰ The opposite view has also been voiced, in specific association with environmental discourse, claiming that “nominalization [...] can, along with the resources of the Ergative system,

In the scientific articles analyzed for this study, the physiological act of eating is typically nominalized, not only through *intake*, but also with other nominal forms, including *nutrition*, *ingestion*, and especially *consumption*. This makes the discourse not only more objective, but also euphemistic: nominalization actually allows the scientific articles to describe as *meat/poultry/fish intake* and *dioxin exposure* what PETA emphatically depicts as a *meat-laden diet*, in which “the *dioxin* that *animals* have built up in their bodies is absorbed into our own”. Interestingly, of the only eight occurrences of the verb *to eat* as lemma in the scientific articles, two refer to ethical preoccupations or expectations of meat eaters (“Although the discussion on ethical opportunity of *eating* horses is obviously out of scope, the impact that horsemeat may have on estimating the risk of cancer is not meaningless” [Lippi et al. 2016: 12]; “red meat *eaters* are expected to adopt a generally unhealthy lifestyle and western dietary habits” [Kouvari et al. 2016: 22]).

Another semantic domain that often involves a metaphorical shift from Process to abstract Noun is that of growth. As seen in Section 3.2.1, the idea that growth is a social and economic good worth pursuing is well attested in various areas of discourse in Western capitalist society, to the extent that the cult of growth has been described as “growthism” (Halliday 2001 [1990]: 198). A positive view of economic growth is not only upheld by narrow neoliberal interpretations of human prosperity as only – or mainly – related to financial wealth, but it also extends to some ecological philosophies, or “ecosophies,” used by ecolinguists (Stibbe 2015b: 501) who believe that economic growth can lead to social progress. It comes as no surprise, therefore, that the concept of growth is very productive in generating positively connotated language expressions (Halliday 2001 [1990]: 192) especially, but not exclusively, in economics (White 2003). Despite this, in my own corpora, words related to the domain of growth (e.g. *grow[th]*, *increase*, *raise*, *rise* as lemmata) seem to exhibit a consistently negative semantic prosody, collocating mainly with names of illnesses and of cancer-affected organs. This is in line with Stibbe’s observation that “when cancer ‘grows’ or crime figures ‘rise’ there is certainly no positivity implied. What we can say, however, is that certain words like ‘rise’, ‘more’, ‘grow’ or ‘ahead’ amplify the positivity of already positive things” (Stibbe 2015a: 84). Common collocates of *growth* in my corpora also include *risk*, *meat*, and

be harnessed to construct a more consonant grammar, reflecting an epistemology more in keeping with current scientific and ecological ontology” (Goatly 1996: 555).

cancer, reflecting findings, related by both sources, according to which there is a direct proportional association between the amount of meat eaten and cancer risk. These semantic associations appear to be not only register-specific, but also topic-specific, as the main issue addressed is the development of cancer, which involves by definition an abnormal proliferation of cells.

Finally, nouns ending in the morpheme *-tion* and its allomorphs are worth investigating as they represent one of the most common signs of nominalization of Processes, although they by no means include all nominalized forms in English. Overall, this kind of nominalization, as expected, is much more frequent in the scientific articles, with 632 nouns ending in *-tion* against 235 in the PETA texts. In both corpora, the most frequent abstract nouns of this kind are *consumption* (227 in the scientific articles; 24 in the PETA texts) and *association* (114 in the scientific articles; 26 in the PETA texts), although in the PETA corpus this word almost always identifies medical societies (e.g. Gastroenterological/Veterinary/Dietetic Association). The most striking difference in the use of these nominalized Processes seems to be the much higher rate of repetition in scientific articles, as shown by words that tend to cluster together (N-grams) around nouns ending in *-tion* (Figures 4 and 5).

This betrays the more formulaic nature of phraseology in scientific language, with PETA adopting a less specialized communicative approach to the same topic. Clearly, PETA can afford a higher degree of discretionality in its use of terminology, grammar, and overall data presentation/interpretation, because it does not have accountability to the scientific community: therefore, its texts enjoy the possibility, which is much more limited for scientific writers, to explicitly take sides and exploit scientific findings to draw extra-scientific conclusions about meat eating, i.e. the belief that it is unethical. In fact, although PETA does deploy scientific language features to build its anti-meat-eating arguments, and these include some patterns of nominalization, it is actually in its use of adjectives, rather than nouns, that its rhetorical strategy emerges most clearly.

3.4 Appraisal

Appraisal is a theory developed within Systemic Functional Linguistics by Martin and White (2005) to analyze evaluative language. One of its main advantages is the focus on how evaluation expresses, and at the same time builds, value systems, providing a fundamental tool for the study of ideology in discourse (Thompson 2003: 6). In this section, I restrict my focus to one of the



Figure 4: N-grams with normalized processes: PETA website.

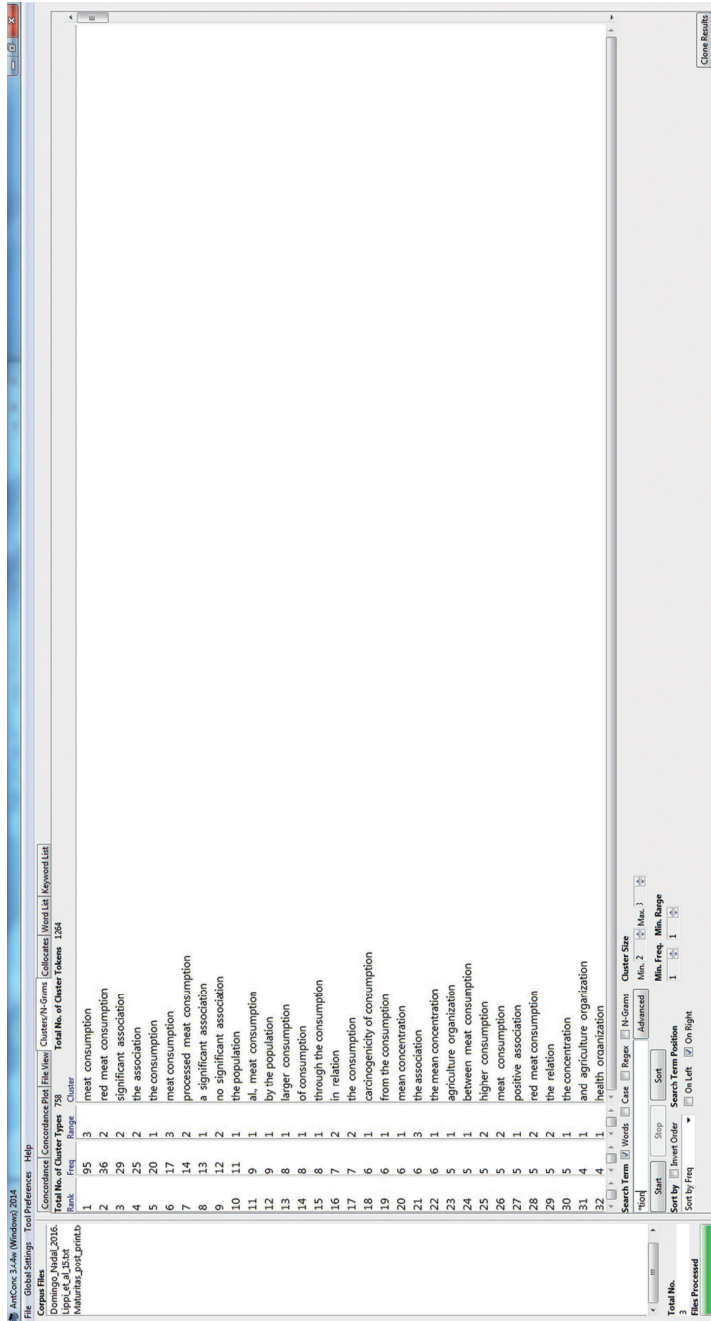


Figure 5: N-grams with nominalized processes: Scientific articles.

systems of Appraisal developed within this framework, Attitude, whose function is to address the “semantic regions covering what is traditionally referred to as emotion, ethics and aesthetics” (Martin and White 2005: 42), across the three dimensions of Affect (“registering positive or negative feelings”), Judgement (“attitudes towards behaviour, which we admire or criticize, praise or condemn”) and Appreciation (“evaluations of semiotic and natural phenomena according to the ways in which they are valued or not in a given field”).¹¹ Appraisal can be inscribed in many parts of speech, but the selection here is restricted to adjectives: while this limits the range of analyzed items, it reduces human error in the identification of the relevant words, as Antconc can automatically identify and retrieve individual parts of speech to a high degree of accuracy from POS-tagged corpora. In addition, although this analysis does not by far exploit the full potential of Appraisal, it relies on previous research showing that even a partial utilization of this theory can reliably address evaluative meaning in environment-related registers (Bednarek and Caple 2010).

Table 2 reports the frequency of adjectival word types in the two corpora, as well as the percentage of evaluative adjectives, or Epithets,¹² and of their positive connotation in context.

Table 2: Adjectives in PETA website and in scientific articles, compared.

	# Adjectives: Types	# Adjectives: Tokens	% Evaluative	% Positive connotation
PETA	358	1693	49.4 %	52.5 %
Scientific articles	290	2480	38.6 %	59.8 %

Note: The percentages are calculated on word types, but tokens are also taken into consideration to account for the extent of lexical repetition in the corpora.

The second most frequent category of adjective types after evaluative ones, in both the corpora, includes Classifiers which are scientific terms (29% in the scientific articles; 17.6% in the PETA texts): perhaps unsurprisingly, in terms of word tokens (counting repetitions of the same words), scientific terms are more frequent (825 word tokens) than evaluative adjectives (570) in the scientific

¹¹ The explanatory glosses for Affect, Judgement and Appreciation are all quoted from Martin and White (2005: 42–43).

¹² Epithets are distinguished from Classifiers in Systemic Functional Linguistics, as they describe the quality of the noun instead of its kind/class.

articles, while the reverse is true in the PETA corpus (875 are evaluative; 197 are scientific). The data therefore confirm that the role of evaluation is relatively more important in the PETA texts, although they largely rely on the same sources as the scientific articles. Despite this, there certainly is an attempt on PETA's part to use specialized terminology to convey a credible image, including some quite complicated terms, i.e. docosahexaenoic, unattested as such in the scientific texts, which only discuss Omega 3 fatty acids generally, without naming them individually.

Overall, however, it is still evaluative adjectives that play the most important role in PETA's approach to the carcinogenicity of red and processed meat: the relatively high percentage of positively connotated adjectives is clearly connected with the nature of the appraised entities, which often foreground the advantages of a meatless diet, in the context of arguments claiming that going vegan can help prevent not only cancer, but a variety of other quite diverse health issues, like depression and fertility problems, in both female and male.¹³ In the scientific articles, in sharp contrast with PETA, meat consumption is largely taken for granted as a fact of human nutrition, so it is not a typical object of evaluation. Instead of evaluating meat, its eating or, on the opposite site, abstinence from meat, the appraised entities in the scientific texts are more commonly the studies and data quoted as sources, described as *major*, *significant*, *systematic*, or, in a few cases, *questionable*. This, however, does not mean that the scientific articles are totally objective, or devoid of any overt or covert ideologies *vis-à-vis* the issue of meat eating: as a matter of fact, one article explicitly addresses the need to "calm down the consumers" in relation to the recent IARC inclusion of meat in the list of carcinogens, and all the articles stress the benefits of a small amount of meat in the diet.

The single most frequent adjective in the scientific articles (309 occurrences), however, is neither an evaluative Epithet nor a scientific term, but another kind of Classifier, i.e. a color word, *red*, always occurring in the expression *red and/or processed/white meat*. This is clearly a feature of intertextuality, as not only the IARC report, but also a number of other scientific sources quoted in these articles focus specifically on the carcinogenicity of beef and pork. In the PETA corpus, there is a wider variety of color words (*black*, *blue*, *brown*, *green*, *red*, and *white*, where the scientific articles only use *red* and *white*, with just one occurrence each for *green* and *black*), but none is particularly frequent, with

¹³ In this respect, it is worth noting that while adjectives in the PETA corpus include both *male* and *female*, referring to both animals and humans, the scientific articles only include *male*, always in association with the nutritional needs of a typical *adult male* human individual, taken as the yardstick against which dietary patterns are assessed.

only 32 word tokens for all color words taken together, and just 8 for *red*, 4 of which refer to *meat*. Premodifying the noun *meat*, with color words or other forms of classification, seems far less important for PETA, as this organization stigmatizes the consumption of all meat and animal-based products as not only unsafe for human health, but also as unethical and hazardous for the environment: for this reason, the noun *meat* more typically (34 %) occurs, unpremodified, in Noun Group Complexes including names of other animal-derived foods, such as *meat and dairy products*, *meat and milk*, and *meat, eggs and poultry*.

The distinction between *meat* and *poultry* raises again the question of “what is meat?”, the answer to which, as seen in Section 3.2.1, varies across different discourse communities, and even within the same one (Croney and Reynnells 2008; Packwood Freeman 2009; Graça et al. 2015). Contrary to expectations grounded in the more argumentative nature of the PETA texts, this issue is given more prominence in the scientific articles, one of which explicitly addresses the “semantic debate” (Lippi et al. 2016: 2) as to whether “processed red meat” and “processed meat” should be considered “synonymous,” concluding that the “development and application of universally agreed definitions of meat subtypes and products are unavoidable steps in future clinical studies aimed to investigate the association between meat consumption and cancer” (Lippi et al. 2016: 12). In other words, setting the denotational boundaries of meat through the use of unambiguous Classifiers is an issue not only in linguistics, but also in epidemiological studies focusing on its alleged carcinogenicity.

4 Conclusion

This exploratory study, despite its limitations, has identified some of the main discourse patterns in scientific and animal rights reactions to the 2015 IARC announcement that red meat and processed meat have been officially included among agents causing cancer. While the sample of texts selected is restricted, and these findings are from only these texts, some distinct patterns have emerged, especially concerning register hybridity, i.e. the tendency for the analyzed PETA texts to rely on scientific sources, as well as on typically scientific discursive features, to increase their credibility.

Despite this common ground, deeply rooted in the ideational dimension of these discourses, some degree of divergence has also been identified, showing that the ideologies and ethical assumptions from which the two sources proceed are indeed quite different. Both PETA and the scientific articles develop a rhetoric that not only reports, but also constructs the discursive

reality of meat carcinogenicity, and they do so especially through discourse strategies involving Noun Groups – their selection, modification, and use in grammatical metaphor. However, the strategies deployed in scientific texts favor grammatical metaphor (therefore, in systemic functional terms, ideational meaning), while PETA relies more on Appraisal (falling within interpersonal meaning). This is not only an expected consequence of the diaphasic difference between scientific and non-scientific texts, but it also reflects different ideological assumptions of why the IARC findings on meat carcinogenicity are important. On the one hand, what makes this IARC claim truthful and worthy of discussion for the scientific texts is essentially the wealth of epidemiological data and the high quality of the clinical studies it relies on; on the other hand, PETA constructs the IARC announcement as proof that veganism is the right lifestyle for everyone to follow. This emerges, in particular, from features of Appraisal, exhibiting the greatest divergence between texts written by scientists and by animal campaigners. Against this backdrop, whether or not meat actually causes cancer, what kinds of meat are most dangerous, and the extent to which this discovery should revolutionize our eating habits is beside the point: both PETA and the scientific articles recognize the validity of the IARC report not for its intrinsic, objective truthfulness, but for its adherence to their respective discursive orders.

This study has a series of limitations, mainly connected with corpus size and scope of analysis. So it should be extended to other texts and language issues (e.g. conceptual metaphor, the whole area of Modality, more features of Appraisal and ideational meaning, which reasons of space precluded analyzing here) to ascertain if and the extent to which its findings are applicable to the discursive representation of animals in general, and to the discourse of animal rights movements and scientific articles discussing animals and human health in particular.

Although this study does not adopt a critical stance, it must also be recognized that all ecolinguistic research is, implicitly or explicitly, based on an ecosophy. In fact, a descriptive study of the linguistic features that express a particular view of the human/animal interface can only make sense if it represents a starting point toward formulating a more articulated proposal to create a different, more environmentally consonant worldview. To this effect, Stibbe (2015b: 501) lists a variety of ecosophies that can be used in ecolinguistics – some more akin to dominant ideologies, due to their positive vision of economic growth (cornutopism, sustainable development), and some more militant and transformative (social ecology, ecofeminism, deep ecology, transition, Dark Mountain Project, deep green resistance). It is probably through a combination of some of these transformative ecosophies that the most suitable frameworks for further research in the directions indicated by the present study could be found.

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