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Greening the Market: the Development and Effect of Environmental Terms on Consumer Perception of Products

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ABSTRACT

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History, discourse analysis, and corpus linguistics show the green movement (humankind's response to issues affecting the environment) to have proliferated both ecological ideologies and the linguistic tools to discuss them, (R. J. Alexander, 2002; Bang, Døør, Steffensen, & Nash, 2007; Carvalho, 2007; Mahlberg, 2007; Wang, 2009) showing the development of green or environmental language in the lexicon. The topic has also left its mark on the market, and green market research has shown effects of messages on perceptions of green brands (Phau & Ong, 2007) and profiles of m (J. A. Roberts, 1996). However , surprisingly little research has been done on how these terms are used, whether some words are more green than others, nor how effective these terms are in persuading consumers to buy green. Thus, the goal of this study is to identify the use of green terms, what consumers see as green terms and how they perceive products advertised using green language. Experiment one examined the development of environmental terms using Google Book's NGram Viewer (Google, 2011) and the Corpus of Historical American English (COHA) (M. Davies, 2010) and Corpus of Contemporary American English (COCA) (Davies, 2008). Results revealed changes in the use of several green terms over time, including the creation of several following the 1960s, as well as increased collocation with other terms associated with the environmental movement. Experiment two examined green terms for levels of perceived greenness. Different levels of greenness for several words were identified, with words like *environmentally friendly* rating positively and *industrial* rating negatively. Experiment three examines the effects of a word's level of greenness on participants' perceptions of automobile, personal care, and cleaning products' attractiveness, effectiveness, buyability, and environmental friendliness. . Green words were shown to have a significant effect on participants' values of attractiveness and buyability for personal care and cleaning products, effectiveness for cleaning products, and environmental friendliness for both aforementioned products. Significant differences between automobile types were also found. Implications include an affirmation of the link between world view and language, the use of large corpora to view semantic shift, and application of the data in green marketing.

Keywords: corpus linguistics, marketing, environment, sociolinguistics, green language

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1 Introduction

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1.1 Background

Since 1969 when the first "green", or environmentally focused, political parties began forming (Benz, 2000) and 1970, the year of the first Earth Day (Papadakis, 1998, p. xiii), English and other languages across the globe have continued to develop words expressing an ideological interest in the environment. We see now the polysemy of *green* , the proliferation of *organic*, and a new, highly-productive morpheme *eco*-, (Benz, 2000) among the many environmental (or "green") terms in use today. And yet, when the needs of the world affect changes in semantic values and proliferate novel words, the question arises, how does this language in turn affect the world?

The question of language's effect on speaker perceptions is not a new one. For much of the last century, the debate of what later became known as the Sapir-Whorf Hypothesis has explored the relationship between language and thought. The various interpretations and degrees

of this idea have been visited by many scholars over the years (Gumperz & Levinson, 1991; Hampton, 1989; Lakoff, 1990) and, whatever the conclusion, recent research suggests that language in some degree both expresses and affects human perception (Boroditsky, Schmidt, & Phillips, 2003; Cubelli, Paolieri, Lotto, & Job, 2011; Wasserman & Weseley, 2009). All people use language not only to communicate, but also to affect their surroundings, to influence others, and to manipulate the world. So green terms, too, have become a tool to express thoughts and needs regarding the environmental movement as it has become more salient.

And as words enter the lexicon, they also enter the market (Ottman, Stafford, & Hartman, 2006). Companies exploring ways to satisfy customers, mollify governments, and increase their market share couple their products with terms like *eco-friendly*, *sustainable*, and *renewable*. Research has shown the language of advertisements affects consumer behaviors as well, regardless of the truth of their claims (Kangun, Carlson, & Grove, 1991). Already some legislation has been enacted in several countries to regulate products' claims of being positive or less-harmful on the environment (Morris, Hastak, & Mazis, 1995; Scammon & Mayer, 1995). Studies show that gender (Bilaniuk, 2003, 2005; Gal, 1978; Labov, 1990; Trudgill, 1972) , age (Cameron, 2005; Trudgill, 1972), and political and economic forces (Bilaniuk, 2003; Chand, 2011) affect people's use or perception of language. Research suggests that differences in environmental involvement are associated with differences in reactions to green advertising (Schuhwerk & Lefkoff-Hagius, 1995) and pro-environmental views are associated with the positive perception of products (Tanner & Wölfing Kast, 2003). Additionally, advertising has been concerned with the demographic identification of the green consumer (Diamantopoulos, Schlegelmilch, Sinkovics, & Bohlen, 2003; Shrum, McCarty, & Lowrey, 1995). However, surprisingly little research has been done on how environmental terms are used, whether some

words are more green than others, if different perceptions of these terms are associated with various demographics, nor how effective these terms are in persuading consumers to buy green. Thus, the goal of this study is to identify what consumers see as green terms and how they perceive products advertised using green language.

1.2 Purpose

The purpose of the present study is to reveal the use of green language terms and to identify their effects on people's perceptions of products. Understanding the effects of claims in the language used in a product's presentations can have application in multiple areas. There are possible legal and political ramifications of unfounded claims in product advertising when made in opposition to green regulations (see Federal Trade Commission's "Green Guides" ("Federal Trade Commission's Green Guides," 2012)). Similarly, responsible marketers may use this research to better understand the effects of their advertising on consumers, allowing for more effective promotion of products to their intended market. In order to achieve this purpose, this research seeks to answer a number of questions.

1.3 Research Questions

The present study explores green language and its effect on people's perceptions of products, focusing on a list of selected environmental language tokens from various sources. The study will be guided by the following research questions:

1. How are green terms used in corpora–with what collocates and in what frequency?
2. Do some words connote greenness more than others: in other words, can different

levels of greenness be identified?

3. Is the level of greenness of a term significantly different based on a person's gender, age, political affiliation, or feelings toward the environment?
4. How do consumers perceive the effectiveness, the likability, and the environmental impact of different products when linked with green terms? Is there a difference between their perception of a product with a green term and a neutral term or a green term and the negation of an environmentally harmful term?
5. Are there any demographic identifiers that can be used to predict consumers' perceptions of these products (as opposed to simply their perceptions of green words)?

1.4 Definition of Terms

A few terms in this study require definition of their specific use. They are as follows:

Green - a. Of, relating to, or supporting environmentalism, esp. as a political issue; (also with capital initial) belonging to or supporting an environmentalist political party. b. Of a product, service, etc.: designed, produced, or operating in a way that minimizes harm to the natural environment. (Oxford English Dictionary"green")

Greenness - the level to which something is *green*

Environmentalness - synonymous with *greenness*

Environmental movement - humankind's response to issues affecting the environment, aiming to create an ecologically sustainable society

Corpus/corpora – a body/bodies of text

1.5 Delimitations

The present study has several delimitations. First, though the environmental movement may have begun outside the United States, only American English is discussed. Second, the goal of this particular study is not to create an exhaustive list and description of all environmental terms and their use. It instead focuses on examining a sample of tokens from the green movement, including coinages from more recent years and semantic shifts which are now used in an environmental context. Additionally, the corpus analysis, while broader than previous examinations of environmental terms through corpora, is not meant to focus as deeply as discourse analyses discussing this topic. Instead, its purpose is to provide context and show the correlation between the corpus data and the experimental data which follows.

Finally, though this study draws from marketing research, it does not follow traditional marketing research methodology. Rather than focus on developing and evaluating products, this study seeks to evaluate terms as they relate to products. No single product or brand is of interest, and connection to any specific product was avoided. The study does look at several products in several different families of products, but, like the list of green terms, it is not meant to be an exhaustive study of environmental terms' effects on all different products. Although this study does not test the effect of green terms on all product types, it is possible that the results may generalize to other products.

1.6 Thesis Structure

This thesis is organized in six chapters. Following this introduction is a review of relevant

literature discussing the history of the "green" movement, language change, fields such as corpus linguistics and sociolinguistics, as well as the effect of language on people and applicable marketing research. The three chapters following the literature review contain the three experiments to answer the research questions posed. Chapter 3 examines green language through the use of large corpora, including Google Books (Google, 2011), the Corpus of Historical American English (M. Davies, 2010), and the Corpus of Contemporary American English (Davies, 2008). Chapter 4 describes the methodology and results of the creation of a participant-rated "green list." Chapter 5 explains and discusses the experiment testing the effects of selected terms from Chapter 4's list on people's perceptions of products. The results from each of Chapters 3-5 will be given in the respective chapter, then summarized and synthesized in Chapter 6, which will also include limitations of the current study and suggestions for future research.

With this in mind, relevant concepts and research will now be reviewed.

2 Review of Literature

2.1 Review

2.1.1 History of green language & green movement.

As the age of Enlightenment passed into the romantic era, a changed view of nature began to emerge, moving from a focus on "the cold, mechanical view of the universe, so popular in the scientific age…" to "a renewed love for the wilderness" (Kline, 2011, p. 38). Philosophers of the time such as Henry David Thoreau expressed their views of a connection between man and nature, rejecting materialism and promoting the preservation of the natural world and proving a foundation for what later developed into the environmental movement (Kline, 2011, pp. 39-40). This perspective on the environment has since spread and is referred to by some researchers as an *ecological worldview* (Dunlap, Van Liere, Mertig, & Jones, 2000). Harré et al. (1999) describe the meaning of 'ecological' as "having… relationships with and being part of a wider ecology." Harré et al. (1999) further suggest that we have "in recent years… experienced a conceptual revolution in how we conceive our relation to the natural world that is commensurable in its effect on our lives with the most important events that have occurred in the past," (p. 5). Understanding this "conceptual revolution" provides insight both into our present and our future, providing context for the very salient issues of environmental concern—the state of the climate, environmental degradation, fuel and transportation, as well as the effects and contents of products in our homes. Research into the public discourse, or what we talk about and how we talk about it, can reveal how widespread this "ecological worldview" has become and what it means in everyday life.

As mentioned above, the beginning of current views of the environment stem from not far

in the past. Highlighting some of the events in the last 150 years shows this pattern of an increased concern with ecological issues. The Historical Dictionary of the Green Movement (Papadakis, 1998) provides a thorough timeline of increasingly frequent environmental events, from which the following highlights are drawn.

Many of the events associated with the environmental movement, or humankind's response to issues affecting the environment, issue from a need to react to other events which had some kind of negative effect on the environment, such as the 1863 Alkali Act in Britain attempting to curb emissions caused by increased use of powered machinery (see MacLeod, 1965). Other events, such as the formation of national parks, seem to show a perspective of preservation. After several British and US parks were nationally protected, between 1873 and 1903, a wave of similar acts passed across the world, followed through the 1920s by the designation of areas for natural preserve (Papadakis, 1998). Such acts of preservation were attempts to preserve not only the wilderness, but the quality of the people and their nation (Kline, 2011, p. 55).

As the world recovered from World War II, nuclear development continued—including testing by the US, Britain, and Russia close to habitation—inciting perhaps the greatest reaction of environmental groups. In the words of historian Donald Worster, "the Age of Ecology began on the desert outside Alamogordo, New Mexico on July 16, 1945… It began, appropriately, in the United States, where the nuclear era was launched." (1977, p. 339). In an effort to curb possible future catastrophes, individuals, groups, and political entities formed to lobby for and control the first nuclear testing, then the disarmament of nuclear arsenals. Following 1971, a period of growth of foundations, conventions, publications, conservation efforts, and protests addressed a number of other environmental issues across the world. In 1978, the formation of the

Grüne Partei in Switzerland began a pattern of environmentally conscious political parties (Galtung, 1986), first in the German-speaking realm, then gaining foothold in other political bodies, even winning elections in European parliaments (Papadakis, 1998). In recent years, growth of the environmentally conscious entity has only continued, moving beyond the political and into the market (Cronin, Smith, Gleim, Ramirez, & Martinez, 2011; Elkington, 1997; Morris, et al., 1995; Ottman, et al., 2006; Scammon & Mayer, 1995) and from there, into homes and minds (Saad, 2006).

These events represent only a small fraction of the literary, political, and social movements in which individuals and groups have acted in a pro-environmental way, promoting activities and policies which suggest an ecological worldview. They are the world-wide events, grand in scale, and yet they affect the world on an individual level. Knowledge of these events, perceptions of their purposes and goals, and even the preparation and creation of them depend upon language, "a tool kit involved in all sorts of human practices" (Harré, et al., 1999).

2.1.2 Language & change

As these historical events have been affected by language, through the speakers who drove them, these events have also shaped language. As Keller states, "no linguist has ever had any doubt about the universality of change in natural languages," (1994, p. 5). Language shifts in syntax (I. Roberts, 2007), morphology (van Loon, 2005), and phonology (A. Martinet, 1955). Lexicons grow and shrink. Words are lost and changed, borrowed and created (Aitchison, 2001, pp. 16-17) . Paradigms for language change have been widely discussed (Keller, 1994) as have language change's merits (Aitchison, 2001) and methods (Hock & Joseph, 1996; McMahon, 1994).

The many discussions on the methods of language change derive perhaps from the fact that language change presents itself in an interesting dichotomy, often treated both as an "organismic"—as a creature that evolves—and also as a "mechanistic"—as the result of human action—system (Keller, 1994). In other words, we can ask both the question, "Why does language change?" and also, "Why do speakers change their language?" Keller presents the theory of an invisible hand in language change, describing it as a both a natural phenomenon independent of human will and a humanistic phenomenon dependent upon human acts to change (1994). Given a set of ecological conditions in which speakers find themselves, their multitude of individual—and not-necessarily aligned—intentions result in a set of actions, which, if they share significant similarities, produce a change in the language.

To draw an example from Keller, the German *englisch* 'angelic' and *englisch* 'English' in the mid-eighteen-hundreds were both culturally significant, with 'angelic' being a desirable trait for women at the time and 'English' rising as a product of Industrialization and German-rivalry (1994, pp. 93-95). Use of these homonyms could present a source of misunderstanding, and the resulting change was the shift of *englisch* 'angelic' to structures such as *engelhaft* 'angelic' and subsequently the loss of the *englisch* 'angelic.' In this invisible-hand process, as *englisch* 'angelic' dropped in frequency of use, it was "forgotten by those who once knew it" and "no longer learned by the next generation of speaker," (1994, p. 94) . They could, in fact, no longer learn the word, as it was less frequently available in speakers' active vocabularies, and, subsequently, those who did know the word, used it less frequently, where before they ran the risk of *being misunderstood*, they then ran the risk of *not being understood*. In such a way, the linguistic environment of speakers both acts and is acted upon as a collective of individual linguistic acts brings a progressive change to language.

Keller brings up another important point, that "language has a multitude of functions and if one should be stressed, it is the function of influencing others, to which 'mutual understanding' is subordinated," (1994, p. 96) . In communicating, people seek to be *understood* and *not misunderstood*, or in other words, they seek for their *intentions* to come across, both implicit and explicit. One might say that language is used to accomplish one's goals, while maintaining the principle of economy that guides the adaptation of language (A. Martinet, . 1960). Keller describes this in the maxim, "Talk in such a way that you are socially successful, at the lowest possible cost," (1994, p. 107) . These principles are evident in other areas of linguistic research and application thereof, such as sociolinguistics and advertising, as will be shown subsequently.

2.1.3 Language use & perception in society

As "a tool kit" used by humans to interact with each other and the world (Harré, et al., 1999), language is used and perceived by different individuals and groups in unique ways. Characteristics such as gender (Bilaniuk, 2003, 2005; Gal, 1978; Labov, 1990; Trudgill, 1972) , age (Cameron, 2005; Trudgill, 1972), and political and economic forces (Bilaniuk, 2003; Chand, 2011) have been shown to affect people's use and perception of language.

Within sociolinguistics, the branch of linguistics examining language use as it relates to aspects of society, researchers have found differences in language use between genders to accomplish their "social success," as Keller puts it. Trudgill's (1972) research on sociolinguistic factors in the pronunciation of several linguistic forms (i.e. '-ing' and '-r') in Norwich revealed women's greater use of linguistic forms associated with the prestige standard than men. He suggests this might be due to women being more status-conscious than men, as well as the working-class forms being more closely associated with attributes more desirable for men than

for women. Further data from his study showed women more likely to report using a standard form more often than they actually used it. Moreover, among men, non-standard forms were found to be of higher-prestige, differing from the women's use.

In a similar demonstration of gender differentiated language perception, Gal's (1978) research on Hungarian peasants in Oberwart shows language's symbolic representation of social situations and people's reactions to that representation. Hungarian peasant women in her study chose both to speak more German than the peasant men, but also refused to marry the Hungarian-speaking peasant men, preferring instead the German-speaking industrial workers, which represented an advancement in socioeconomic potential (Gal, 1978). Situations like that presented in Gal's research are not only a function of language, but also drive language change themselves. As individuals see language as a means to meet their needs, they manipulate their use of the tool, in order to achieve their goals.

Differences in language perception based gender have also been shown in research on linguistic attitudes, such as Lai's (2007) study on Hong Kong boys and girls. In a quantitative study followed with a qualitative questionnaire, girls were found to have more favorable attitudes toward both English (a prestigious non-native language) and Putonghua (a non-native language) than boys, while boys favored Cantonese (the vernacular). Lai points out the likelihood of females' role being greater in pushing Hong Kong into greater multilingualism due to this perception.

In a study on the perception of sexist vs. non-sexist language, Parks and Roberton (1998) examined differences in age and gender in a questionnaire evaluating perceptions of sex-differentiating terms used in sport and non-sport contexts. Results revealed that females had a slightly positive attitude toward non-sexist language while males held a neutral position, with

gender accounting for 11% of the variance. In addition, each age group showed a more positive attitude toward non-sexist language than the immediately preceding age group, accounting for 12% of the variance in scores. Both age and gender influence people's perception of the terms used in language.

These differences have been echoed in studies on age and language use. In the same study where Trudgill examined gender differences between different socioeconomic classes, age also played a role in the production of standard or non-standard linguistic forms. Non-standard forms were shown to be of higher prestige than standard forms not only for men, but for both genders among the young (Trudgill, 1972). Other research shows an interactive effect between gender and age differences in speech production. Cameron's (2005) work on aging and gendering shows differences in speech patterns between genders depending upon the age, based upon gender segregation commonly found during certain age ranges, suggesting that age and gender represent social differences affecting language use.

Political forces are also at play in the influence of speakers' perception and use of language. Bilianuk's (Bilaniuk) research on Ukranian showed speakers to favor English and Russian, politically more prestigious languages. Chand's (2011) research on perception of Hindi showed liberal Indian elites to devalue the Hindi language. In each piece of research above, the speakers of their languages have language attitudes shaped by the circumstances surrounding them, and use language, as Bilianuk expresses it, "for establishing and maintaining higher social status, and their effort to shape the linguistic values around them." (2003)

2.1.4 Language & thought

The relationship between language and thought has been thoroughly reviewed since the

formulation of the Sapir-Whorf hypothesis as presented in Whorf's (1956) work. In short, Whorf proposed that differences between language structures would show parallels in non-linguistic cognitive processes and that one's native language would either strongly influence or fully determine a speaker's view of the world (Brown, 1976). As the views of Whorf have been evaluated by researchers, moving from the initial linguistic determinism to weaker interpretations of linguistic relativity, variations of the original hypothesis have been proposed (Gumperz & Levinson, 1991) as results have shown that language structure does not fully determine thought, but does have an effect on speakers' interpretation of the world.

For example, research has shown grammatical gender to affect thought, as in Boroditsky et al's (2003) discussion on grammatical gender, which summarizes studies showing that speakers of languages with grammatical gender associate objects of a certain grammatical gender with pictures of people with the same biological gender and also describe objects of a certain grammatical gender with adjectives associated with those biological genders. Wasserman and Weseley's (2009) research on English, Spanish, and French speakers showed speakers of the languages with grammatical gender to express greater sexist attitudes than the English speakers. Wasserman and Weseley suggest that grammatical gender emphasizes the differences between males and females, which then causes them to promote sexist attitudes. Cubelli's (2011) research on grammatical gender showed Italian and Spanish speakers able to respond more quickly in judging whether two objects were of the same semantic category when those items shared grammatical gender than were English speakers. The same study also found Spanish speakers, when given an articulatory suppression task (repetition of 'blah, blah, blah') while answering questions about the objects, showed no difference in speed. Their results suggested that the grammatical gender may not be part of the conceptual representation of the object, but rather part

of the object's name. Thus, current research on the topic may suggest that lexical and structural values of a speaker's language may activate like values for other ideas.

Lakoff (1990) proposes the relationship between language and thought predominantly as a question of categorization, suggesting that language in some way affects the relationship between different ideas in our minds. The classic example from the title of his work, *Women, Fire, and Other Dangerous Things*, comes from the Dyirbal language, which classifies its nouns based on certain characteristics. Women, fire, and other dangerous things, along with several other types of nouns fall into the same category based on very logical, often metaphorical, classifications determined by the Dyirbal speakers' beliefs and culture. For example, most birds fall into this category because they are seen in myth to be the spirits of dead females. The hairy mary grub is placed in the same category because it is said to cause one to burn like the sun, which, in myth, is seen as a female person. Interestingly, Lakoff points out research on Dyirbal showing differences in categorization between speakers based on their age/generation and whether Dyirbal was their predominant language, showing that the perception of these words or assignment of these categories can change over time. Ultimately, Lakoff's discussion of Dyirbal and categorization in general leads to the understanding that language is used to express the connections between different ideas, even in grammatical structures, and that those can vary between individuals depending upon social characteristics affecting what they have learned and how they view the world. While Lakoff's and others' work on linguistic relativity have focused on grammatical structures, the semantic values given to lexical items show a similar influence on human perception of the world and can be shown through analysis of how terms are used across bodies of text.

2.1.5 Corpora, society, & the environment

With the development of computers with higher processing power, along with the internet and other digital technology, a vast amount of linguistic data has become available for analysis. Corpus linguists have developed large corpora of text and speech to provide access to real world exemplars of what previously may have only been accessed or elicited with difficulty. The use of corpora allows researchers to explore the change in frequencies of items over time (Michel et al., 2011), look at variation in grammatical constructions , and explore commonly co-occurring words, or collocates (Davis, 1993; Stubbs, 1995). Corpora have also been used in fields of applied linguistics, including vocabulary learning (M. Davies, & Gardner, D., 2010; Nation, 2009), language learning (Salem, 2011), cognitive linguistics (Newman, 2011), and sociolinguistics (W. Teubert, 2001; Wolfgang Teubert, 2005; Wang, 2009).

The use of the corpora goes beyond simply showing the change in the frequency of a linguistic token, but can also show relationships between words and ideas. Researchers of language and ideology in critical linguistics (Flowerdew, 1997; W. Teubert, 2001) often use methods such as collocation from corpus linguistics to draw conclusions about people's beliefs and ideas. For example, Teubert (2001) shows the German magazine *Spiegel*'s presenting the term *klassische Rollenverteilung* (traditional role allocation) in the context of home and family in collocation with *ein Elternteil* (one parent), a gender-neutral term, and interprets their use of the term *klassische Rollenverteilung* as including even gay or lesbian partnerships, differing from what in some times and places would have been unacceptable in the language community. Collocation can thus be useful in detecting changes in meaning (W. Teubert, 2001). These "patterns of association—how lexical items tend to co-occur"—when built up over large amounts of text often reveal telling and otherwise more difficultly observed messages (Hunston,

2002). Several researchers have applied corpus linguist methods specifically to examine the themes of the environmental movement (**R.** Alexander, 2009; Baker, 2006; Mahlberg, 2007; Wang, 2009).

The corpus studies reveal interesting themes of environmental topics, such as in Wang's research, which shows perceptions of global warming as fact in the *Guardian* and *People's Daily* newspapers, but skepticism in the *Washington Post* (Wang, 2009). Wang's frequency analysis of the corpora for each newspaper revealed an increase in the number of articles in which global warming was mentioned. Using concordance methods, akin to collocation, the research showed language expressing uncertainty (i.e. "lingering uncertainty," "highly dubious") in the *Washington Post* in proximity to global warming, while the others used more factual language (i.e. persons of authority, "scientists," "irrefutable").

Alexander (2009). explored a number of words using corpus concordances in a critical analysis of environmental discourse Gerbig's corpus analysis is used to show differences in interpretation of the environmental topic (Gerbig, 1997). In each of these cases, corpora were used to analyze social themes through language. Though research on this topic exists, it is by no means exhaustive and invites further questions about the relationship between society's perceptions, the language it uses, and history it creates.

2.1.6 Advertising, marketing & language

Research on language in advertising and marketing includes a wide breadth of topics (i.e. bilingualism, cross-cultural concerns, gender-bias, message framing, print copy presentation), all seeking to understand the relationship between language and people's perceptions of self, products, marketers, or each other. Studies suggest that sensitivity to language concerns are

important to understanding the market in which they operate (Swift, 1991; Usunier, 2011). In exploring the issues surrounding foreign languages and marketing, Swift (1991) described competence in other languages as helping to understand business practices, as well as communicate effectively within a market. As such, accurate, culturally-focused translation is of concern. And as understanding the language is integral to understanding the market, Usunier discusses an approach in management and marketing research that considers the linguistic elements involved in cross-cultural or international business. In this, a balanced approach looking both for the universals between languages and the unique terms can make for more successful translation of key concepts, both within corporations and in cross-cultural marketing efforts. Usunier suggests that language affects worldview, including management structure, how business relationships function, and how products should be presented. Marketing blunders which stem from a lack of consideration for the cultural/social aspect of language, translating instead on a mechanical/lexical level, can be avoided by focusing on the differences between people which stem from the connection between their language and thought (Usunier, 2011).

The importance of language in bilingual advertising is not lost on advertisements. The debate about which language to use, English or Spanish, in advertising to the US's Latino population has been a matter of concern (Johnson, 1999). While the demographic grows, it changes as it becomes more bilingual, and advertisers seek to understand how to use English and Spanish to draw the attention of consumers from the group. Bishop (2006) examined how codeswitching, or changing languages or dialects within a conversation, in English and Spanish advertisements affects Mexican-American youth. Bishop tested message recall, perceived advertiser cultural sensitivity, and expectations of empathy and responsiveness in the presentation of advertisements which exhibited code switching (English to Spanish/Spanish to

English) when placed in the context of English or Spanish, i.e. preceded and followed by articles in one of the two languages. Results showed that the embedded language in an ad was more easily recalled when it differed from the context language (i.e. Spanish context, Spanish to English codeswitch). Advertisers were not perceived as more sensitive culturally when embedded language differed from the context. Additionally, advertisers were only perceived as more empathetic in the English context condition and more responsive in the Spanish context with English to Spanish codeswitching. These results suggest that the way bilinguals are presented advertisement language can influence not only the effectiveness of advertisements, but also their perception of the advertisers and their message.

As advertisements' purpose is the influence of consumers' thought and action, researchers have also sought to understand the implications of the linguistic terms used (not just which language is used) in advertisement. Griffin and Berry (2003) examined the language used in food advertising and suggested connections between the advertisement language and religious and modern anorexia. Foods in the advertisements analyzed were presented with religious or moralistic language, including terms like *heaven, temptation, decadent, purity*. The authors suggested that where religious anorexia was motivated by religious and cultural beliefs, now as mass media increasingly forms a modern consumer culture, contemporary anorexia may be linked with a modern-day 'holy anorexia,' influenced by such language as displayed in food advertisement.

Similarly, as in Artz et al.'s research (1999), the implications of gender-biased language (i.e. the use of 'he' in reference to a non-gender-specific individual) has been discussed over the last several decades, and the movement to promote gender-neutral language has been on the rise. Advertising, however, has seemed to grow in sexist displays, both visual and linguistic (Artz, et

al., 1999). Artz et al.'s (1999) study looked at television advertisements and found more sexist display in visual form than linguistic, but did find gender-biased and gender-specific language in advertisements, especially with cleaning products. Though the majority of the advertisements examined did not exhibit gender bias, the authors pointed out that sexist language has an effect on people, and gender-biased language often results in the deprecated or negative stereotyping of women.

Research has suggested that linguistic expressions not only in *what* is presented but also *how* it is presented in advertisements can have an effect on consumer perceptions. Maheswaran and Meyers-Levy's (1990) research examined message-framing (positive or negative) in advertisements imploring college-age students to get a cholesterol level and diagnostic blood test after being told about the risk of heart disease. Students who were told people their age also were at risk of heart disease (high-involvement) responded to the negative framed ads while students told about seniors being at risk (low-involvement) responded to the positive framed ads. Martin and Marshall (1999) similarly examined message-framing in advertisements and involvement level of participants, but with cell phones. High involvement had higher responses to negative framing while lower involvement had higher responses to positive framing.

In Bertrand et al.'s (2010) research on factors involved in advertisement effectiveness, linguistic factors were shown to have no significant effect. Direct mailers advertising actual loan applications were sent out to over 50,000 people in South Africa. Among the variables studied were a note, "We speak your language," in the receiving party's non-English language (the remainder of the ad was in English) and the labeling of the loan rate as "low" or "special." Effectiveness of the ad was measured by the number of completed applications by the deadline indicated in the advertisement. The labeling of the loan rate in the advertisement showed no

significant effects, while the "We speak your language" also had no significant effect on the number of applications, but was associated with both receiving a lower loan amount and participants' borrowing from another lender. These results suggest that these linguistic factors may not have as great of an effect as other advertising techniques, such as the use of photos and sample loan applications to simplify necessary action, as shown to be significant in this study.

In other research, changes in copy language, sentence structure, textual layout, and illustration were tested to see the effect on a reader's perception of the ad (Motes, Hilton, & Fielden, 1992). It was found that the vividness of the language used, whether it was personal or impersonal, as well as whether it was passive or active had an effect on people's perceptions of the advertisement. Some combinations increase ad appeal or attractiveness (i.e. active, vivid language with personalized messages), while others increase ad believability or clarity (i.e. colorless language for impersonal presentations), showing that language played a role in the perception of the ad's qualities. The breadth of language research in advertising and marketing shows the important role that language takes in the effectiveness of advertisements' communication and convincing power. Researchers are aware that language is not simply a medium to present an idea for view, but also an influencer of thought with the capacity to affect consumers—advertising's goal—and it has been applied accordingly in the market.

2.1.7 The green market & the green consumer

A casual stroll down the grocery aisle would reveal a number of products advertised as "eco-friendly," "organic," "all-natural," or otherwise claim a place in the ecologically-conscious shopper's cart. Marketing and advertising efforts have turned ever greener, and there is no surprise as to why. Research shows that more than 75% of consumers report a preference for

green products (Saad 2006). Firms are increasingly interested in a “triple bottom line” (Elkington 1997), a phrase coined by John Elkington in 1994, arguing that companies should have three separate bottom lines, including the historically common measure of corporate profit, the “people account” of social responsibility, and the “’planet’ account” of environmental responsibility ("Triple bottom line," 2009). As Cronin et al point out, “as the key link between organizations and markets, marketers represent the lynchpin in moving firms toward a true triple-bottom line orientation," (Cronin et al. 2011).

As research has suggested that organizations move in the direction of marketing to include a measure of environmental responsibility, creating an environmental image for company or product (Banerjee, Gulas, & Iyer, 1995), research has been done to examine the effectiveness of environmental claims. Chan et al. (2006) explored how effective different types of environmental claims were in advertising high- (hotel) and low-involvement (fast food) services in China. The study found that for high-involvement services, environmental claims resulted in the higher favorability for both the advertisement and the brand, but not a higher purchase intent. For low-involvement services, on the other hand, environmental claims resulted in higher ratings for all three, attitude toward the advertisement, brand, and for purchase intent. Similar types of studies have been conducted to examine the effects of green advertising on other products. Phau and Ong (2007) conducted a mall intercept interviewing study in Australia, testing for the effects of different environmental brand messages for two clothing brands, one with an environmentally conscious identity (Body Shop) and one with no such identity (Colorado), on attitude toward the advertisement and perceived credibility of the message. The results showed that the green brand messages were seen as credible for the Body Shop and not for Colorado. Additionally, the attitudes toward the advertisements were more favorable for the Body Shop, the perceived green

brand. This suggests that environmental advertising can positively influence perceptions of products for brands with an environmentally conscious identity. Moreover, this study showed there was a significant correlation between a person's measured environmental commitment and their attitude toward the advertisement, suggesting that a consumer with an environmentally conscious identity may be more prone to have positive attitudes toward green advertisements.

As there seems to be a type of individual who feels more strongly about the environment, researchers have sought to understand such individuals. Minton and Rose (1997) examined the effects of a general attitude of environmental concern and social norms pertaining to a concern for the environment on consumer behaviors and behavioral intentions. The results were significant for all the consumer behaviors and the behavioral intentions for general attitude and social norms (what society expects of people and what people expect of themselves). That is to say, participants who had a higher general attitude of environmental concern, who felt society expected them to have environmental concern, or they felt a personal obligation toward environmental concern all were more likely to purchase products because they were recyclable or contained environmentally safe ingredients, search for information on environmental responsibility, choose to recycle, and respond with willingness to commit to environmental behavior politically and fiscally. This suggests that environmentally conscious consumers act in accordance with their view of environmental responsibility.

Research has shown that it is important that consumers feel not just a responsibility toward the environment, but also that they can have an effect on it. Kinnear and Taylor (1974) examined individuals to determine what variables described the ecologically concerned consumer. Significant variables were perceived consumer effectiveness (PCE - the belief that a consumer can personally have a positive effect on the environment), as well as understanding

and tolerance ratings from a personality test, with PCE having the highest effect. This variable was shown to be significant in the green consumer again in later research. In a survey of 1302 individuals nationwide, Roberts (1996) compiled a profile of the ecologically conscious consumer of the 1990s. Only 6% of variability was explained by demographics, with sex, income, education, and age being significant in the demographic only model. Attitudinal measures were also included, and perceived consumer effectiveness (PCE), was the best predictor of the eco-conscious consumer. In this model, including both demographics and attitudinal measures, education became insignificant, while liberalism became a significant variable. PCE, environmental concern, liberalism, age, and being female were positively correlated with ecologically concerned behavior, while income was negatively correlated.

Van Liere and Dunlap's (1980) research looks at a summary of evidence from preceding literature on environmentally concerned individuals by demographics. Research preceding 1980 showed age to have a negative association with environmental concern (i.e. older people showing less concern), with some exceptions. Reports on residence suggest a negligible positive relationship with environmental concern, with several contradictions. Findings on sex were inconclusive due to meager evidence. Political evidence showed that Democrats and liberals were more concerned about the environment than Republicans and conservatives, though with relatively weak associations. As this data is more than 30 years old, may not now describe individuals, as in the study mentioned previously, research suggests (J. A. Roberts, 1996) that the environmentally conscious consumer has changed over the years, and may continue to change.

In the intervening time since Van Liere and Dunlap's (1980) study, Diamantopoulos, et al. (2003) asked if demographic variables can still be linked to environmental consciousness. Their research summarized evidence from preceding literature with the resulting analysis showing

regressions for socio-demographic characteristics being related to individuals' socio-demographic characteristics, including gender, age, education level, and social class. Conversely, Tanner and Kast's (2003) study on determinants of green purchases of Swiss consumers found that green purchases were not significantly related to moral thinking, monetary barriers, or the socioeconomic characteristics of the consumers. Other studies, such as Shrum, et al.'s (1995) research, focused instead on providing a non-demographic-based profile of the green consumer, describing such a consumer as an opinion leader, a careful shopper, who seeks information on products and advertising, and can be skeptical of advertising. These studies paint the picture of a green consumer who may possibly be identifiable by demographic variables, who can be linked to a certain attitude of environmental concern, and who may be sensitive to environmental claims in advertisements.

Green advertisement messages, as suggested, may not always communicate as desired, and consumers may doubt the environmental claims that companies make in the promotion of their brand (Mohr, Eroglu, & Ellen, 1998). Research shows the "greenwashing" of the marketplace drives significant skepticism (Kangun, et al., 1991; Zinkhan & Carlson, 1995), and that consumers often become confused and cynical (Carlson, Grove, & Kangun, 1993; Davis, 1993). This research gives reason to ask how effective the messages from environmental marketing are, as well as what makes it effective. As the research above has shown a relationship between language and marketing and advertising, language plays a role in the communication of these advertisements to the green consumer. A relationship between the language used in this communication and the consumer's perception of green products should exist, and should be tied to their perception of the language used that communication itself.

2.2 Literature Review Summary

In summary, the literature review suggests that the history of the environmental movement has affected society and given rise to a need not only for the discourse involving it, but also for analysis of that discourse. As society has changed, so too has its language use. Corpus methods have been successful in helping researchers understand society's views of the environment. Current literature in the field of environmental corpus linguistics has examined a number of environmental terms, but the list certainly has not been exhaustive. Additionally, though collocation and frequency have been examined, previous studies have been limited in their size and scope, examining a small set of environmental terms, sometimes as low as a single word. Moreover, the corpora used in these studies have been more specific and much smaller than those corpora now available to us.

The effects of the green movement on language use have been shown in the corpora, but analysis of that data does not give clear indications about people's specific perceptions of the words. The depth and breadth of that association, as well as the relationship between different green words may benefit from a sociolinguistic approach. The research reviewed shows that certain demographic variables, including age, gender, as well as political and cultural values, can have an effect on language use and perception, yet no research has been done to show that in reference to environmental language. This pattern of differences in language use and perception may be similar in green language adoption, or at least suggests that there may be differences in the ways females and males, different age groups, or of different political ideologies view the developments of green language. Because terms may mean many things to many people, how strongly they are related to an ecological view of the world or the environmental movement and who sees them that way would bring further understanding to the effects of such movements.

According to the literature, as adjusting cultural approaches to advertising can be effective (Hornikx & O'Keefe, 2011), so too may adjusting the language to fit a person's ideological and demographic characteristics (Shrum, et al., 1995). In regards to skepticism, however, and particularly towards green products, much of it may be caused by the overuse of terms such as "environmentally friendly" and "natural" (Kärnä, Juslin, Ahonen, & Hansen, 2001). Additionally, consumers may avoid purchasing green products because they see them as having lower quality or holding ineffectual environmental claims (Ginsberg & Bloom, 2004). While an increasing amount of research has been done on environmental marketing (Cronin, et al., 2011; Phau & Ong, 2007), most of it has focused on a marketing methodology and not on the linguistic factors which the research indicated above shows as increasingly important to the field. Additionally, as the green consumer is affected by green marketing, so too can they be expected to be affected by the language used in that marketing. And as a person's perceptions of the terms used in marketing themselves become clear, those terms' place in the market becomes clear as well. Examining these elements of the field may determine what kind of an effect the language used in marketing a green product has on consumers' perceptions, how far their skepticism may run, and what about the individual may determine those perceptions.

2.3 Research questions

After reviewing the literature, several questions remain to be answered.

1. How are green terms currently used–with what collocates and in what frequency?
2. Do some words connote greenness more than others: in other words, can different levels of greenness be identified?

3. Is the level of greenness of a term significantly different based on a person's gender, age, political affiliation, or feelings toward the environment?
4. How do consumers perceive the effectiveness, the likability, and the environmental impact of different products when linked with green terms? Is there a difference between their perception of a product with a green term and a neutral term or a green term and the negation of an environmentally harmful term?
5. Are there any demographic identifiers that can be used to predict consumers' perceptions of these products?

These questions will be addressed in Chapters 3 – 5, followed by a discussion of conclusions, implications, limitations, and future research in Chapter 6.

3 Corpus Analysis

The purpose of this study is to examine environmental terms and their effect on people's perceptions. To achieve this goal, this chapter explores the first question of this study,

1. How are green terms used in corpora—with what collocates and in what frequency?

This analysis was done through a corpus analysis using several large corpora of the English language, including Google Books (Google, 2011), the Corpus of Historical American English (COHA) (M. Davies, 2010), and the Corpus of Contemporary American English (Davies, 2008). As the review of literature began with a look at the historical development of the environmental movement, this chapter studies the historical development of green terms by analyzing the change in frequency of certain "green" words over time. This change in frequency parallels the historical and political movements which have been described above and demonstrates the proliferation not only of the topic itself, but also of many of the lexical items created to discuss it. Since corpora are meant to represent language in a population through a sampling of texts, an analysis of lexical items in a corpora suggest the existence and use of these items by that population.

As mentioned previously, the use of the corpora goes beyond simply showing the change in the frequency of a linguistic token, but can also show relationships between words and ideas. After analyzing the frequency of environmental terms over time, this chapter examined collocates, the words frequently occurring near these terms. Using the patterns of association observable in the analysis of environmental collocates, it is possible to see their frequency and

change over time, which can demonstrate shifts in existing word usage, a “greening” of the lexicon, representative of changes in a world view. This chapter then discusses the implications of the frequency and collocate data presented. This will not only give a stronger foundation for understanding the topic at large, but will also be used in the construction of the experiments described in Chapters 4 and 5.

3.1 Corpus Methods

3.1.1 Procedures

In order to answer the question posed above, three corpora were used to examine the environmental tokens (see section 3.2), each using a different method. The first section uses both Google Books and COHA to examine the relative frequency of green words over time, comparing the words for patterns of change. The second section uses COHA to examine collocates of those green words to identify word associations and semantic relationships. The third section uses COCA to compare the most frequent collocates of the green terms over the last twenty years, showing any recent development in their associations.

3.1.2 Materials

The materials used were three large corpora. The first of the corpora used was Google Books, through Google labs NGram Viewer. This corpus contains over 5 million digitized books, nearly 4% of all the books ever published (Michel, et al., 2011),with some 155 billion words in English. The NGram Viewer retrieves the number of tokens of whatever string of characters are entered and displays their relative frequency over time, expressed as a percentage on the chart.

Relative frequency is calculated by dividing the number of tokens for each year by the total number of words for that year (Michel, et al., 2011). The particular dataset of Google Books used in this study displays data from 1800-2000. Google Books was used to analyze frequency of green words over this time period.

The other corpora used were the Corpus of Historical American English (COHA) and the Corpus of Contemporary American English (COCA), both developed by Mark Davies of Brigham Young University. COHA is the largest structural historical corpus of its kind, with over 400 million words drawn from more than 100,000 fiction, magazine, newspaper, and non-fiction texts (M. Davies, 2010). COCA is the largest freely-available corpus of English, with over 425 million words of text drawn equally from several sources, including fiction, spoken, magazine, newspaper, and academic texts (Davies, 2008). Both corpora use a sophisticated, multi-function interface, allowing for standard frequency and collocate searches, as well as advanced comparisons of frequencies and collocates, searches for multi-form words, syntactic elements, and other grammatical functions. Though these functions are available, the present study used the corpora only for frequency and collocate comparisons.

3.2 Tokens

As the present study does not seek to create a comprehensive study of all environmental terms, only a selection of environmental terms was used in this and the following experiments in Chapters 4 and 5. Environmental terms were collected through an examination of advertisements, products in stores and online, and research from relevant literature (Benz, 2000; Harré, et al., 1999; Myerson & Rydin, 1996), and selected based on personal observations of what words seem to be used in green marketing. This judgment was supported by the following

corpus analysis. Among the words chosen were both terms seen as beneficial to the environment and those harmful to the environment, as both should show an increase over time as discussion about the environment involves both. Additionally, the polarization of terms was necessary for subsequent experimentation, as shown in Chapters 4 and 5. The terms used are shown in Table 3.1.

Table 3.1 Study environmental terms

biodegradable	hybrid
botanical	industrial
decomposable	natural
ecofriendly	nontoxic
emissions	oil
environmentalism	organic
environmentally friendly	plant-based
free range	recyclable
fresh	renewable
fuel	smog
gas	solar
gasoline	sustainable
green	toxic
greenhouse	wind
harmony	

3.3 Frequency with Google Books and COHA (1800-2008)

3.3.1 Procedures

Each term in the list above was entered into the Google Books NGram Viewer and the subsequent chart was recorded. These charts were separated into groups based on the overall trends of the data by reviewing marked increases in frequency—similarly noted in Wang -- revealed in the charts as well as overall relative frequency changes to allow for easier comparison of terms. A review of the absolute and relative frequencies of each item as returned

from a COHA query of each is then given for comparison.

Sometimes anomalies such as an unexpected peak or valley or otherwise erratic behavior in a chart occurred. Especially when such was the case, an identical search in COHA was run and the chart from the NGram Viewer is accompanied by one from COHA for verification of the frequency behavior. These results were then summarized. (See Appendix A for trends of all words in this section.)

3.3.2 Results

Frequency trends for the terms fell into one of four categories—(1) words showing a general increase over time (starting before 1960s), (2) words showing a marked increase in frequency after the 1960s (when the political green movement began to gain greatest traction) (OED2, 1989; Papadakis, 1998), (3) words showing a general decrease over time, (4) words with other trends, and (5) words with no discernible pattern due to too low of a frequency of tokens returned. The separation of the first two groups in the 1960s was based on both historical political trends and apparent coinages during and after that time. The historical literature removed previously suggested increased political interest in the green movement beginning in the 1960s (see 2.1.1) which, according to other literature reviewed, might suggest a similar response in associated language use. The frequency data subsequently showed this for many words, including several words which first occurred at or after that time, as shown in the following sections.

Charts of the Google Books data give only a graphical representation, with relative frequencies in the form of percentages of the total n-grams available in during that year (shown on the left-hand side of the graph). The COHA tool presents this information more clearly. Each

section is summarized in a table, such as Table 3.2, which includes the data from the frequency charts from COHA (shown at the top of each chart in the FREQ and PER MIL rows).

3.3.2.1 Words showing an increase over time - starting before 1960

The patterns of increase in frequency for these words were more varied than those of the group after the 1960s. They shared a general increase in frequency over time, as shown for *non-toxic* in Figure 3.4 and Figure 3.5. Other words in this group included *fuel, hybrid, organic, plant-based, solar,* and *toxic*.

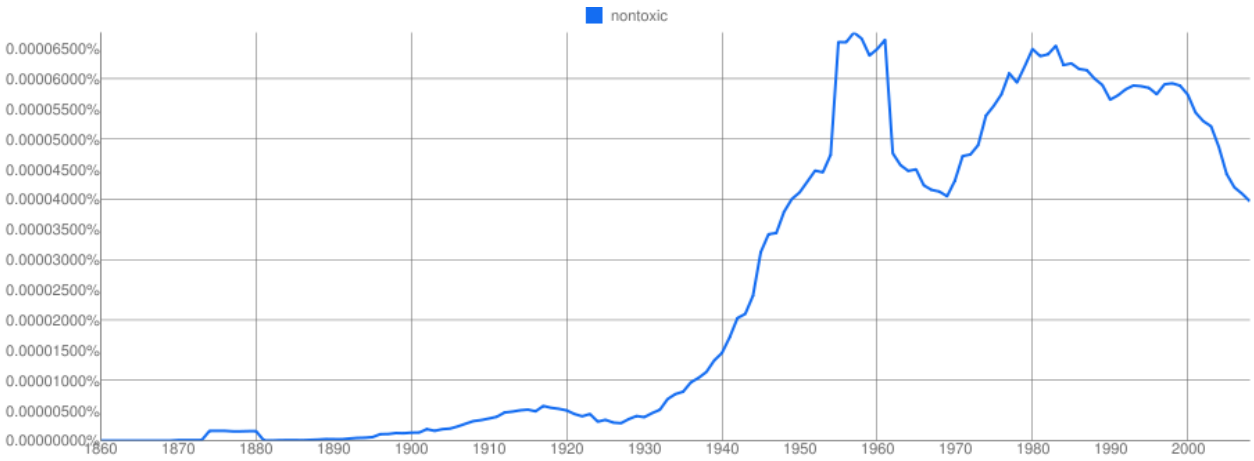


Figure 3.1 Google Books trend of 'non-toxic' from 1860 to 2008

The spike in frequency of tokens is not reflected clearly in the COHA data, perhaps due to a low number of total tokens.

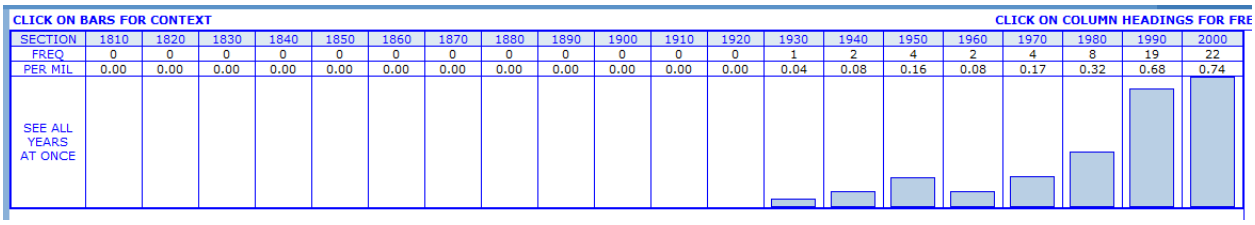


Figure 3.2 COHA trend of 'non-toxic' from 1800 to 2000

Within the group, other spikes in data occurred and were confirmed by COHA, though these words also showed a general increase in frequency, as demonstrated by *solar* in Figure 3.6 and 3.7.

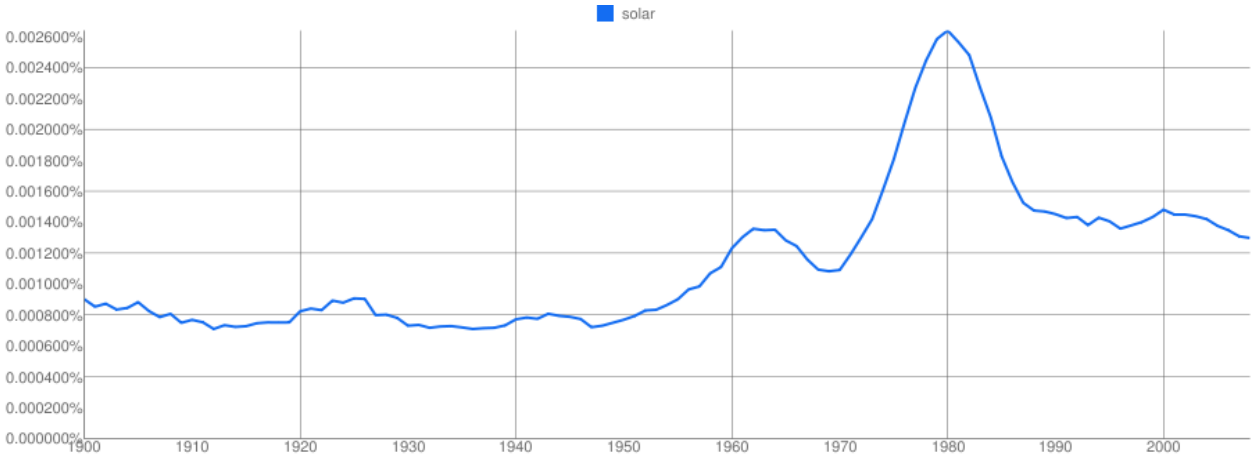


Figure 3.3 Google Books trend of 'solar' from 1900 to 2008

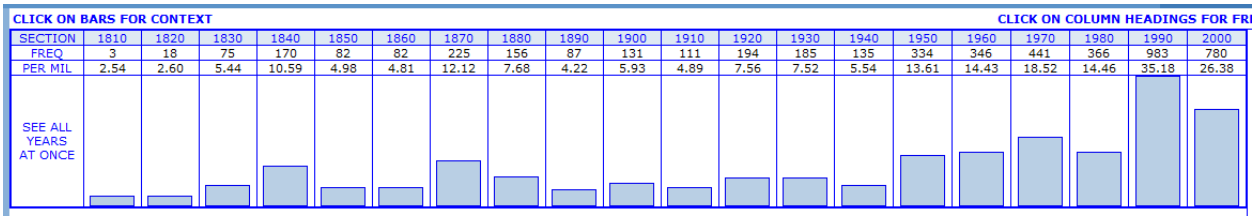


Figure 3.4 COHA trend of 'solar' from 1800 to 2000

Table 3.2 shows the frequency data in COHA, displaying the words all showing tokens occurring before 1960. In some cases, COHA data showed very low frequencies, as in *non-toxic* and *plant-based*. Each word with enough tokens shows an increase over time, with the first instance of the latest occurring word (*non-toxic*) in 1930.

Table 3.2 Raw and relative frequency of words showing increase over time (including before 1960) from COHA

	Date	1810	1820	1830	1840	1850	1860	1870	1880	1890	1900	1910	1920	1930	1940	1950	1960	1970	1980
fuel	Freq:	6	49	118	159	246	235	190	185	258	277	381	575	429	1000	724	785	1074	1063
	Per Million:	5.08	7.07	8.57	9.91	14.93	13.78	10.24	9.11	12.52	12.54	16.78	22.41	17.44	41.07	29.5	32.74	45.1	41.99
hybrid	Freq:	0	0	7	18	54	16	40	19	17	29	26	36	31	69	44	57	87	137
	Per Million:	0	0	0.51	1.12	3.28	0.94	2.15	0.94	0.83	1.31	1.15	1.4	1.26	2.83	1.79	2.38	3.65	5.41
non-toxic	Freq:	0	0	0	0	0	0	0	0	0	0	0	0	1	2	5	6	8	12
	Per Million:	0	0	0	0	0	0	0	0	0	0	0	0	0.04	0.08	0.2	0.25	0.34	0.47
organic	Freq:	0	34	62	343	221	258	405	279	257	364	311	483	249	463	374	223	484	230
	Per Million:	0	4.91	4.5	21.37	13.42	15.13	21.82	13.73	12.48	16.47	13.7	18.83	10.12	19.02	15.24	9.3	20.32	9.09
plant-based	Freq:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
	Per Million:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.08
toxic	Freq:	0	0	0	0	0	0	0	2	3	8	34	19	21	30	89	40	107	253
	Per Million:	0	0	0	0	0	0	0	0.1	0.15	0.36	1.5	0.74	0.85	1.23	3.63	1.67	4.49	9.99
solar	Freq:	3	18	75	170	82	82	225	156	87	131	111	194	185	135	334	346	441	366
	Per Million:	2.54	2.6	5.44	10.59	4.98	4.81	12.12	7.68	4.22	5.93	4.89	7.56	7.52	5.54	13.61	14.43	18.52	14.46

3.3.2.2 Words showing increase - starting after 1960s

Ten of the words from the list showed a sudden increase in frequency after or around the 1960s—*, biodegradable, ecofriendly, emissions, environmentalism, environmentally friendly, greenhouse, recyclable, renewable, sustainable*. These words differed from the words before the 1960s in two ways, with the first dramatic increase in frequency (more than tripling) or the first instance of the word occurring after 1960. Examples of these are given below. *Renewable* is shown in Figure 3.1 below.

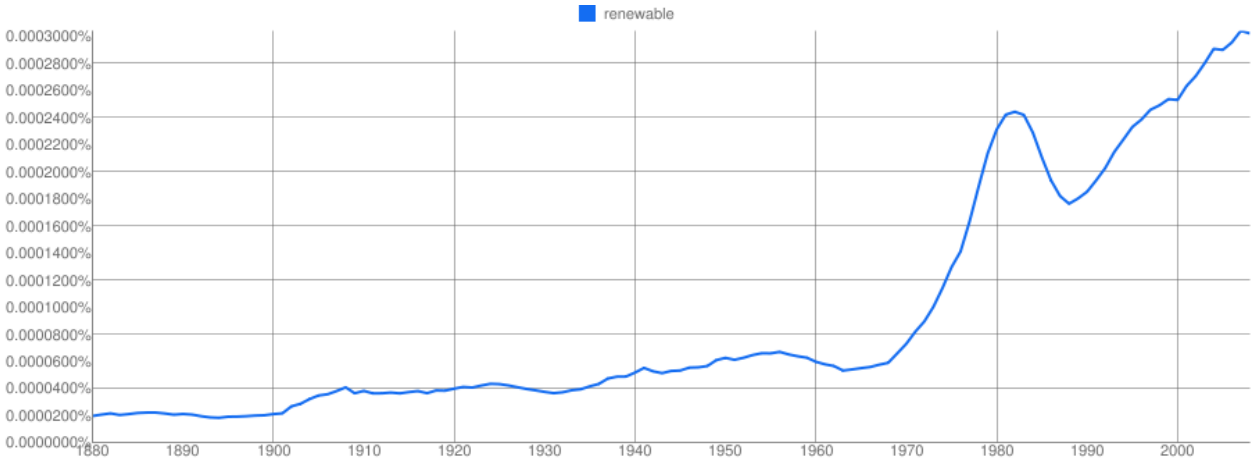


Figure 3.5 Google Books trend of 'renewable' from 1880 to 2008

The sudden increase in frequency in the 1980s was shown slightly differently in COHA, which gave a smoother trend of the increase, as shown in the Figure 3.2

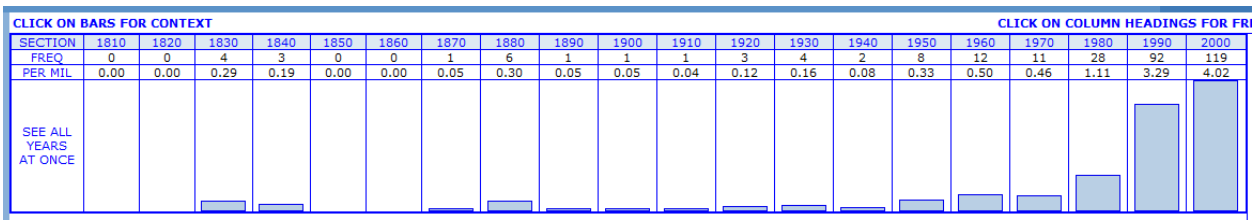


Figure 3.6 COHA trend of 'renewable' from 1800 to 2000

Their patterns tended to be fairly consistent, with a few variations. Some of the words showed an initial period of growth with some leveling off or dipping in recent years, as demonstrated by *environmentally friendly* in Figure 3.3

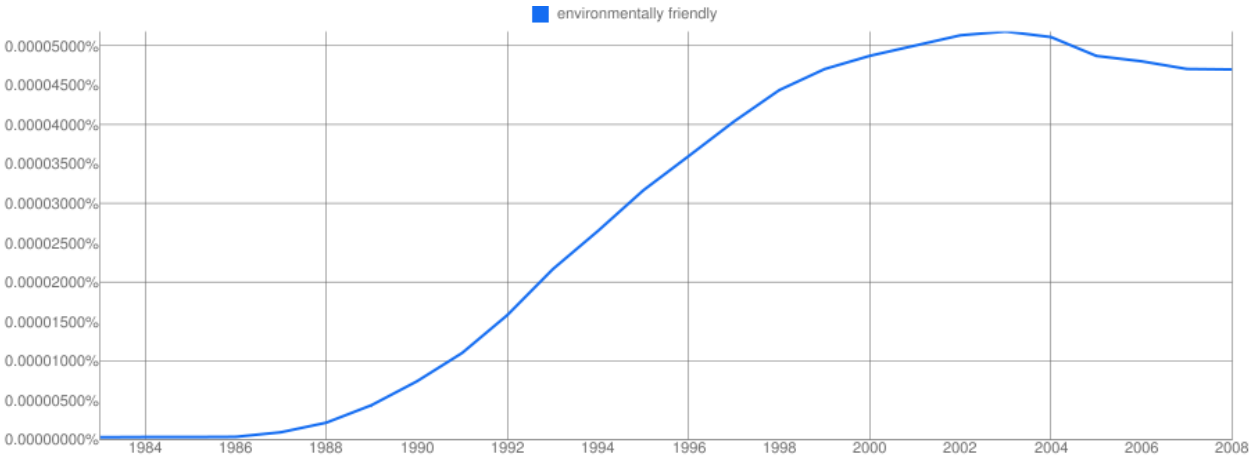


Figure 3.7 Google Books trend of 'environmentally friendly' from 1984 to 2008

The COHA data summarized in Table 3.3 shows that each of the words in this group either showed their first token in or after the 1960s (i.e. *biodegradable* showing its first token in the 1970s), or increased dramatically in frequency, at least more than tripling during one of the 10 year periods following that date (i.e. *greenhouse* showing an increase of 41 to 159 from 1960 to 1970, and *emissions* showing an increase from 126 to 650 tokens from 1980 to 1990).

Table 3.3 Raw and relative frequency of words showing frequency explosions after 1960 in COHA

	Date	1940	1950	1960	1970	1980	1990	2000
biodegradable	Freq:	0	0	0	8	8	18	16
	Per Mil-lion:	0	0	0	0.34	0.32	0.64	0.54

ecofriendly	Freq:	0	0	0	0	0	2	4
	Per Million:	0	0	0	0	0	0.07	0.14
emissions	Freq:	2	4	14	80	126	650	450
	Per Million:	0.08	0.16	0.58	3.36	4.98	23.26	15.22
environmentalism	Freq:	0	0	1	17	12	39	33
	Per Million:	0	0	0.04	0.71	0.47	1.4	1.12
environmentally friendly	Freq:	0	0	0	0	0	18	39
	Per Million:	0	0	0	0	0	0.64	1.32
greenhouse	Freq:	22	27	41	159	216	313	283
	Per Million:	0.9	1.1	1.71	6.68	8.53	11.2	9.57
recyclable	Freq:	0	0	0	1	4	27	25
	Per Million:	0	0	0	0.04	0.16	0.97	0.85
renewable	Freq:	2	8	12	11	28	92	119
	Per Million:	0.08	0.33	0.5	0.46	1.11	3.29	4.02
sustainable	Freq:	0	0	2	4	12	140	249
	Per Million:	0	0	0.08	0.17	0.47	5.01	8.42

3.3.2.3 Words showing decrease over time

Four words—*natural, harmony, botanical,* and *wind*—showed a general decrease over time, as demonstrated in Figure 3.8 and 3.9 for *natural*. Some of the words also suggested an increase in frequency in more recent years, however (see *botanical* in Appendix A, 8.1.1.3).

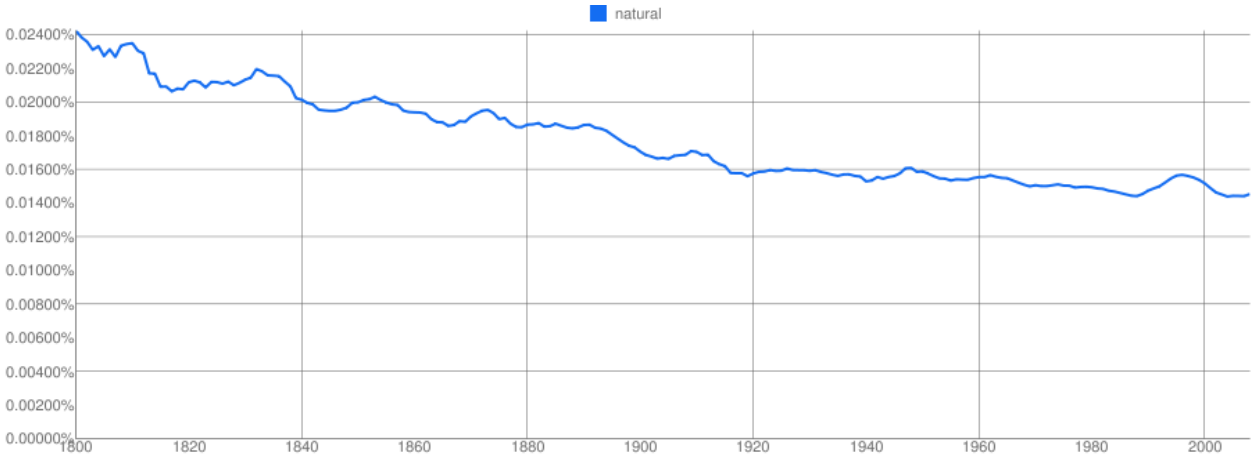


Figure 3.8 Google Books trend of 'natural' from 1800 to 2008

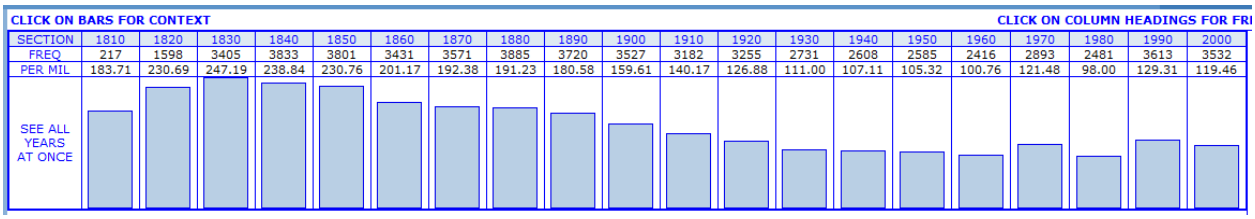


Figure 3.9 COHA trend of 'natural' from 1800 to 2000

The frequency and tokens per million from COHA are shown in Table 3.4. The tokens per million in the COHA data show a general decrease from the first half of the 19th century to the the middle of the 20th century except for *wind*. *Wind* shows a slight increase to the end of the 19th and beginning of the 20th century with a slight decrease till the end of the 20th century. *Botanical* also shows an increase in frequency at the end of the 20th century in the COHA data, perhaps due to the content of the COHA corpus (including magazines and newspapers highlighting *Botanical* in proper names), which is not reflected in Google Books (see Figure 8.26).

Table 3.4 Raw and relative frequency of words showing decrease over time in COHA

	Date	1810	1820	1830	1840	1850	1860	1870	1880	1890	1900	1910	1920	1930	1940	1950	1960	1970	1980	1990	2000
	F:	0	23	42	35	45	32	34	27	42	49	24	27	37	31	33	27	32	49	115	120
botanical	PM:	0	3.32	3.05	2.18	2.73	1.88	1.83	1.33	2.04	2.22	1.06	1.05	1.5	1.27	1.34	1.13	1.34	1.94	4.12	4.06
	F:	29	254	495	731	613	535	632	638	646	648	615	489	433	311	337	448	306	264	453	387
harmony	PM:	24.55	36.67	35.94	45.55	37.22	31.37	34.05	31.4	31.36	29.32	27.09	19.06	17.6	12.77	13.73	18.68	12.85	10.43	16.21	13.09
	F:	217	1598	3405	3833	3801	3431	3571	3885	3720	3527	3182	3255	2731	2608	2585	2416	2893	2481	3613	3532
natural	PM:	183.7	230.7	247.2	238.8	230.8	201.2	192.4	191.2	180.6	159.6	140.2	126.9	111	107.1	105.3	100.8	121.5	98	129.3	119.5
	F:	111	720	1625	1898	2054	2102	2284	2111	2928	2538	3082	3230	3093	2985	2697	2631	2708	2686	3747	3934
wind	PM:	93.97	103.9	118	118.3	124.7	123.3	123.1	103.9	142.1	114.9	135.8	125.9	125.7	122.6	109.9	109.7	113.7	106.1	134.1	133.1

F - *token raw frequency;* PM – *token frequency per million*

Table 3.5 Raw and relative frequency of words showing other trends over time in COHA

	Date	1810	1820	1830	1840	1850	1860	1870	1880	1890	1900	1910	1920	1930	1940	1950	1960	1970	1980	1990	2000
	F:	67	363	1251	1503	1624	1871	2178	1990	1925	2054	1961	1914	1992	1884	2063	1572	1681	1781	2509	3212
fresh	PM:	56.72	52.4	90.82	93.65	98.59	109.7	117.3	97.95	93.44	92.95	86.39	74.61	80.97	77.38	84.05	65.56	70.59	70.35	89.79	108.6
	F:	3	4	41	223	115	305	399	583	441	911	856	1340	1474	1506	1397	1628	2133	1787	2360	2398
gas	PM:	2.54	0.58	2.98	13.9	6.98	17.88	21.5	28.7	21.41	41.23	37.71	52.23	59.91	61.85	56.92	67.9	89.56	70.59	84.46	81.1
	F:	0	0	0	0	0	0	1	5	32	106	165	575	515	1124	471	305	816	485	397	348
gasoline	PM:	0	0	0	0	0	0	0.05	0.25	1.55	4.8	7.27	22.41	20.93	46.16	19.19	12.72	34.26	19.16	14.21	11.77
	F:	2	3	12	113	175	160	366	576	682	884	1730	2523	2562	2694	2021	1830	1530	1679	1171	955
industrial	PM:	1.69	0.43	0.87	7.04	10.62	9.38	19.72	28.35	33.11	40	76.21	98.35	104.1	110.7	82.34	76.32	64.24	66.32	41.91	32.3
	F:	0	0	0	0	0	0	0	0	0	1	0	0	0	4	39	75	169	61	113	96
smog	PM:	0	0	0	0	0	0	0	0	0	0.05	0	0	0	0.16	1.59	3.13	7.1	2.41	4.04	3.25

F - *token raw frequency;* PM – *token frequency per million*

3.3.2.4 Words with other trends

These words showed a more pronounced series of peaks and troughs, some resembling stock market trends—*oil* and *gas* (Figure 3.10)—and others with fewer peaks and troughs, but which were not easily identifiable in one of the categories above—*fresh* (Figure 3.8) and *smog*. Other words in this group were *gasoline* and *industrial*.

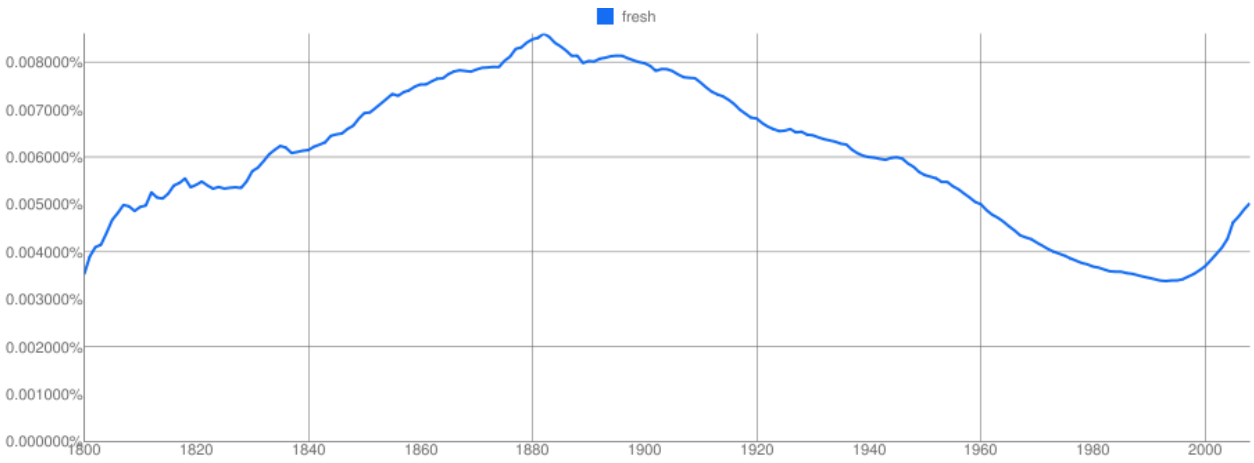


Figure 3.8 Google Books trend of 'fresh' from 1800 to 2008

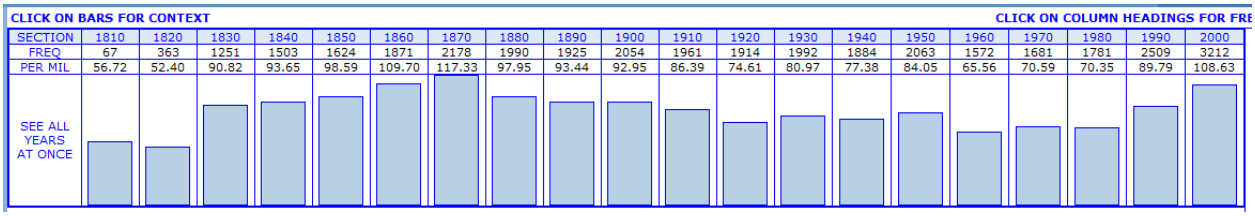


Figure 3.9 COHA trend of 'fresh' from 1800 to 2000

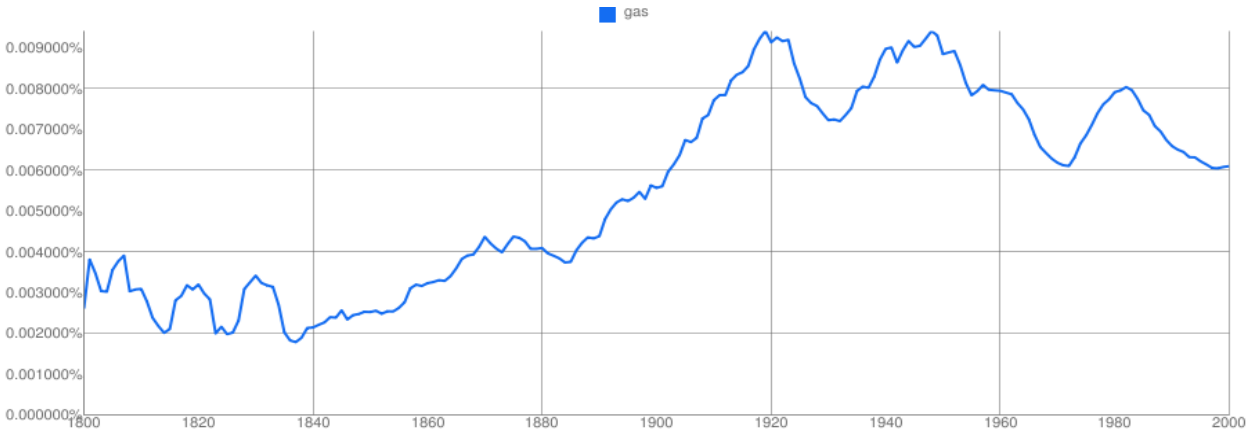


Figure 3.10 Google Books trend of 'gas' from 1800 to 2000

The more recent rise in frequency for *green* is notable as well (Figure 3.11) and parallels the increase seen above for *fresh* and several other words used in environmental contexts.

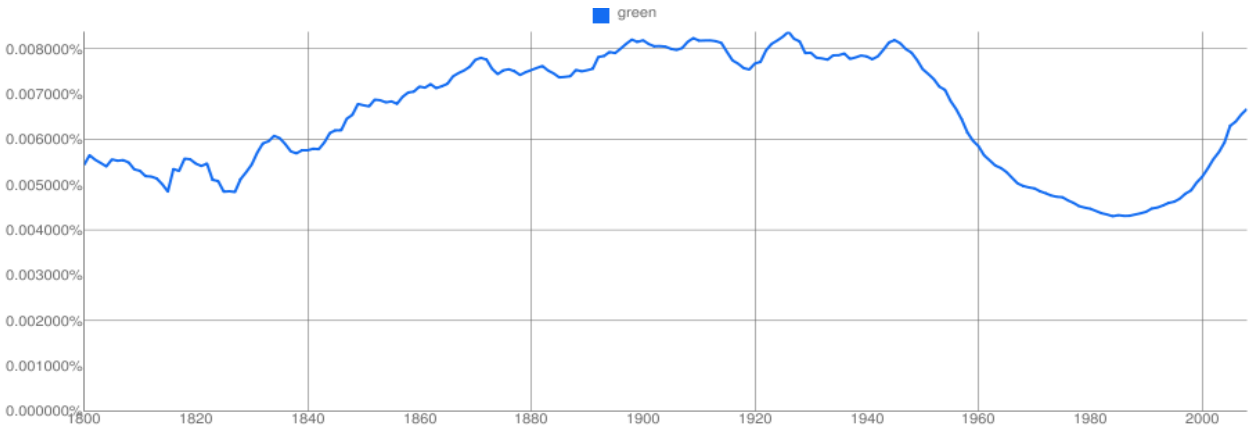
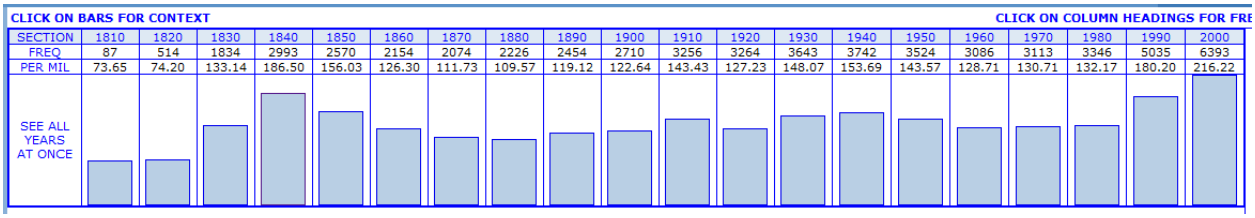


Figure 3.11 Google Books trend of 'green' from 1800 to 2008



CLICK ON BARS FOR CONTEXT — CLICK ON COLUMN HEADINGS FOR FRE

SECTION	1810	1820	1830	1840	1850	1860	1870	1880	1890	1900	1910	1920	1930	1940	1950	1960	1970	1980	1990	2000
FREQ	87	514	1834	2993	2570	2154	2074	2226	2454	2710	3256	3264	3643	3742	3524	3086	3113	3346	5035	6393
PER MIL	73.65	74.20	133.14	186.50	156.03	126.30	111.73	109.57	119.12	122.64	143.43	127.23	148.07	153.69	143.57	128.71	130.71	132.17	180.20	216.22

SEE ALL YEARS AT ONCE

Figure 3.12 COHA trend of 'green' from 1800 to 2000

3.3.2.5 Low Frequency Items

Two items—*free range* and *decomposable*—had low enough frequency that it was impossible to determine a trend. Both Google Books and COHA confirm a low frequency, in which small changes appear to be large aberrations. *Decomposable* is shown in Figures 3.13 and 3.14. Both are shown in Appendix A (8.1.1.5).

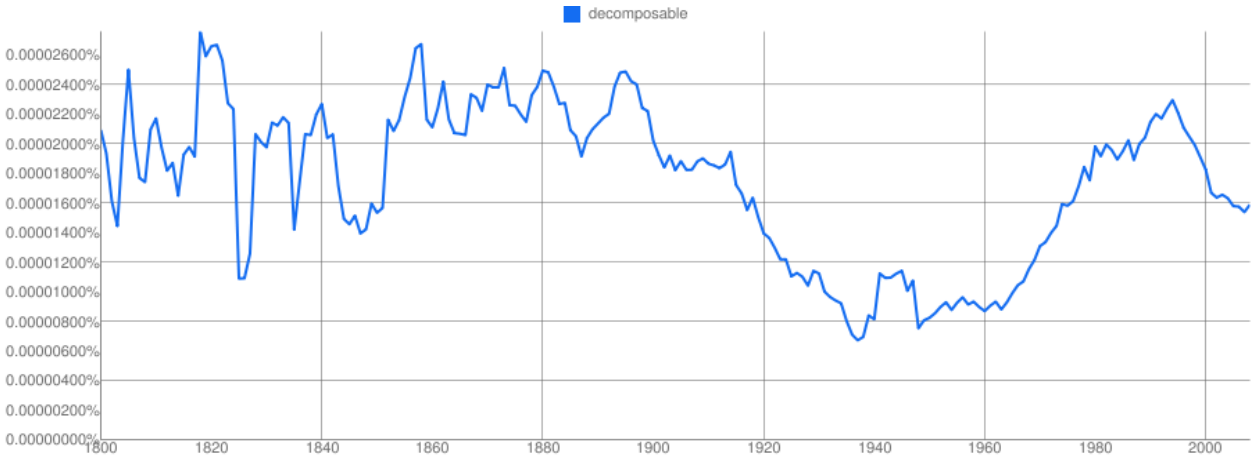


Figure 3.13 Google Books trend of 'decomposable' from 1800 to 2008

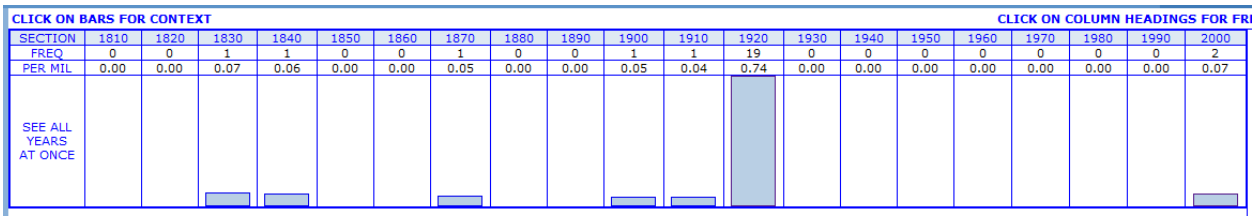


Figure 3.14 COHA trend of 'decomposable' from 1800 to 2000

3.3.3 Summary of frequency

The data from the two corpora show a variety of trends in frequency over time for the 29 terms. These trends are summarized in Table 3.6. The majority of the words show an increase over time, with about one third of them showing the first frequency explosion beginning in or after the 1960s.

Table 3.6 Grouping of words by frequency change

Increase (starting before 1960)	*Increase (starting after 1960)*	*Decrease*	*Other*	*Low Frequency Items*
· non-toxic · organic · plant-based · hybrid · toxic · fuel · solar	renewable biodegradable recyclable ecofriendly environmentally friendly sustainable environmentalism greenhouse emissions	· natural · harmony · botanical · wind	· fresh · green · gas · oil · gasoline · industrial · smog	· free range · decomposable

Several possibilities exist for the different trends seen in these terms. The group showing an increase starting before 1960 includes words perhaps used in a more scientific context. Thus, as science continued to progress, they too increased in frequency. Among those in the group showing an increase after 1960 are a number of coinages, which simply did not exist before that time period. These, such as *eco-friendly*, came in response to the growing social movement of pro-environmental behavior. Interestingly, most of these words seem to be longer and morphologically more complex than most of those in the other groups, and may represent the

growth of a specific lexicon for the environmental register. The low frequency items, on the other hand, may have been too specific to be found in high enough frequency in the corpora used. The group showing a decrease over time seemed to share a naturalistic context, being neither strictly scientific nor focusing specifically on the environmental movement. The group showing other trends contained two sorts of words, those sharing a definite usage with a non-environmental context (i.e. *green* and *fresh*) and words which are often associated with negative effects to the environment (i.e. *smog* and *gasoline*).

The advent and increase of many of these terms is as expected when considering the history of the environmental movement. Before the 1960s, the number of organizations and political entities which later drove the environmental movement did not exist. As green topics became more salient, new words entered the lexicon and others increased in use. Though the frequency data shows us this much, it cannot show semantic shifts with these terms alone. Thus follows an examination of the collocates of these words in a comparison of the period before the 1960s and of the period between 1980 and the 2000s.

3.4 Collocation in COHA (1930-60s and 1980-2000s)

3.4.1 Procedures

Using COHA, a unique collocate comparison of the 1930s-1960s and the 1980s-2000s was done for each of the words. That is to say that the COHA interface was used to display the column of collocates for each of the two time periods, showing the most frequently occurring tokens more unique to one time period than the other. Each query was run searching for collocates within four lexical items to the either side of the node, i.e. the italicized words in the

following portion of a sentence with the node sustainable, "…such as wild *lands and human needs*, sustainable *development and biosphere projects*, the new…" Function words (*and, the*), proper nouns (*Illinois*), and punctuation that the query may have returned were filtered from the data presented. The top ten collocates are shown in each table and the collocate lists were compared for unique items associated with the environment. Some node words (the search term, i.e. *greenhouse* in Table 3.8 below) return only a few collocates for a given time period. This occurs either because (a) the node word has few tokens during that time period, and thus few collocates are available, or (b) there are few unique collocates in that time period.

This time period was selected based on the frequency shown in the first group of words, which begin with the historical rise of the political green movement (see 2.1.1). The differences identified between the two collocate lists for each word (one showing 1930s-1960s and the other showing 1980s-2000s) suggest a change in usage by association, which can be used to interpret the perception of these terms as suggested in the research (i.e. Teubert 2001 in 2.1.5).

3.4.2 Results

3.4.2.1 Words showing an increase over time - starting before 1960

In the collocate comparison for words which showed a general increase over time, including the period before the 1960s, some items did not return enough tokens pre-1960, i.e. *greenhouse, plant-based*. Others showed notable differences, such as *organic, hybrid,* and *solar*. These differences are exemplified in table 3.5, where *organic* co-occurs with agricultural and food terms in almost all of the 10 highest occurring collocates for the latter period.

Table 3.7COHA unique collocate comparison (1930-1960s vs. 1980-2000s) for 'organic'

	Collocates (30-60s)	Tokens (30-60s)	Tokens (80-00s)	Ratio	Collocates (80-00s)	Tokens (30-60s)	Tokens (80-00s)	Ratio
organic	DISEASE	42	1	35.69	FOODS	1	41	48.25
	EDUCATION	23	0	23.6	GARDEN	0	27	32.6
	PHILOSOPHY	22	0	22.57	FARMERS	1	24	28.24
	FACTORS	18	1	15.3	BEER	0	21	25.35
	CHEMISTS	12	0	12.31	FARM	1	21	24.71
	SOCIAL	10	0	10.26	CERTIFIED	0	18	21.73
	UNION	10	0	10.26	INGREDIENTS	0	18	21.73
	LAW	22	2	9.35	VEGETABLES	1	17	20.01
	FIELD	9	0	9.23	GARDENING	1	16	18.83
	MAN	9	0	9.23	PRODUCE	2	31	18.24

3.4.2.2 Words showing increase - starting after 1960s

The majority of those words which had shown a frequency explosion since the 1960s did not have enough tokens in the 1960s to provide a comparison of collocates, i.e. *biodegradable, recyclable, ecofriendly, environmentally friendly, sustainable,* & *environmentalism*. This was not unexpected, as many of the words were not coined until during or after the 1960s with the first usages recorded in the Oxford English Dictionary as follows: *biodegradable* 1959, *recyclable* 1969, *ecofriendly* 1989, *environmentally friendly* 1971 (OED2, 1989). The other data, however, showed definite environmental coloring of the node word, as in *greenhouse* and *emissions.* The query for *greenhouse* shows environmental coloring in the latter period, returning items like *gases, emissions, effect, warming, reduce,* and *carbon*, shown in Table 3.3.

Table 3.8 COHA unique collocate comparison (1930-1960s vs. 1980-2000s) for 'greenhouse'

	Collocates (30-60s)	Tokens (30-60s)	Tokens (80-00s)	Ratio	Collocates (80-00s)	Tokens (30-60s)	Tokens (80-00s)	Ratio
greenhouse	NIGHT	3	2	1.27	GASES	0	131	158.16
	GARDEN	3	6	0.42	GAS	0	107	129.19
	GLASS	3	11	0.23	EMISSIONS	0	71	85.72
					EFFECT	2	92	54.14
					WARMING	0	29	35.01

		DIOXIDE	0	22	26.56
		ATMOSPHERE	0	21	25.35
		REDUCE	0	21	25.35
		FIRST	1	20	23.54
		CARBON	0	17	20.53

The query for *emissions* returned a number of terms related to the environment in the 1980-2000s, including *reduce, carbon dioxide, greenhouse,* etc., as shown in Table 3.4.

Table 3.9 COHA unique collocate comparison (1930-1960s vs. 1980-2000s) for 'emissions'

	Collocates (30-60s)	Tokens (30-60s)	Tokens (80-00s)	Ratio	Collocates (80-00s)	Tokens (30-60s)	Tokens (80-00s)	Ratio
emissions	RADIO	3	7	0.36	REDUCE	0	124	149.71
					CARBON	0	113	136.43
					DIOXIDE	0	87	105.04
					GREENHOUSE	0	71	85.72
					GAS	0	56	67.61
					CUT	0	52	62.78
					PERCENT	0	42	50.71
					REDUCING	0	38	45.88
					AIR	0	35	42.26
					REDUCTIONS	0	34	41.05

3.4.2.3 Words showing decrease over time

Some of the words which showed a decrease in frequency over time exhibited no patterns, such as *harmony* and *botanical*. *Natural* and *wind*, however, show some differences. For *natural* both time periods show collocates associated with the environment (*ecosystems* vs. *flora*), along with the word *environmental* itself in the 1980s-2000s, shown in Table 3.6. There also appears the occurrence of *ingredients*, which fits one area in the environmental movement's focus on green products in the latter decades.

Table 3.10 COHA unique collocate comparison (1930-1960s vs. 1980-2000s) for 'natural'

	Collocates (30-60s)	Tokens (30-60s)	Tokens (80-00s)	Ratio	Collocates (80-00s)	Tokens (30-60s)	Tokens (80-00s)	Ratio
natural	RUBBER	65	3	18.41	COUNCIL	0	61	73.65
	ABSOLUTELY	13	0	13.34	SYSTEMS	1	53	62.37
	GONE	13	0	13.34	ECOSYSTEMS	0	38	45.88
	OVERCOME	15	1	12.75	PERCENT	0	28	33.81
	PAINTED	15	1	12.75	CELLS	0	25	30.18
	SEQUENCE	15	1	12.75	INGREDIENTS	0	24	28.98
	SUPPOSE	41	3	11.61	ENVIRONMENTAL	0	22	26.56
	PRESS	12	1	10.2	CARE	1	22	25.89
	FLORA	11	1	9.35	FLUCTUATIONS	0	18	21.73
	PRINCIPLE	11	1	9.35	KILLER	1	18	21.18

For *wind*, the results were more pronounced, as shown in Table 3.7. The top unique collocates occurring in the 1980-2000s, *energy, turbines, farms, electricity, plants,* and *systems*, demonstrated ecological coloring.

Table 3.11 COHA unique collocate comparison (1930-1960s vs. 1980-2000s) for 'wind'

	Collocates (30-60s)	Tokens (30-60s)	Tokens (80-00s)	Ratio	Collocates (80-00s)	Tokens (30-60s)	Tokens (80-00s)	Ratio
wind	WARP	21	0	21.54	ENERGY	1	134	157.7
	HAULED	19	1	16.14	TURBINES	1	76	89.44
	TRADE	31	2	13.17	TURBINE	1	57	67.08
	RIGGING	15	1	12.75	FARMS	1	37	43.54
	PINK	12	0	12.31	ELECTRICITY	1	24	28.24
	SPRANG	14	1	11.9	PLANT	1	24	28.24
	ABRASION	11	0	11.29	SYSTEMS	1	24	28.24
	CRIED	11	0	11.29	GUSTED	1	22	25.89
	AFFAIRS	13	1	11.05	PLANTS	0	19	22.94
	KEEN	13	1	11.05	ASSOCIATION	0	17	20.53

3.4.2.4 Words with other trends

The words which showed other frequency trends were varied in their collocate comparisons. Some returned little in the way of patterns, especially those which drew many of their collocates from cooking magazines within the corpus, i.e. *fresh*. The query for 1980-2000s

for *green* returned several items from cooking magazines as well. These items were filtered from the list presented (Table 3.8), and potential environmentally related terms include *zone* and *fluorescent*, which differ from the 1930-1960s query. More notably, however, is the collocate *companies* which may suggest a developing ecological focus in the market. Several other terms, including *gas, oil, industrial,* and *smog*, also indicated an increase in environmental collocation.

Table 3.12 COHA unique collocate comparison (1930-1960s vs. 1980-2000s) for 'green'

	Collocates (30-60s)	Tokens (30-60s)	Tokens (80-00s)	Ratio	Collocates (80-00s)	Tokens (30-60s)	Tokens (80-00s)	Ratio
green	GLADE	73	3	20.68	FIDDLER	0	35	42.26
	FORM	16	0	16.41	ZONE	0	35	42.26
	LABOR	16	0	16.41	FEES	1	26	30.6
	QUALITY	16	0	16.41	PRODUCTS	0	24	28.98
	WILLOWS	16	0	16.41	PHOTOGRAPH	0	21	25.35
	LETTER	18	1	15.3	GABLES	1	19	22.36
	TELEPHONE	14	0	14.36	JEANS	1	19	22.36
					FLUORESCENT	0	16	19.32
					COMPANIES	0	14	16.9
					VINYL	0	14	16.9

3.4.2.5 Words with too low frequency

The queries for *free range* and for *decomposable* yielded no results due to no instances in the 1960s, similar to words like *sustainable* as explained above in 3.4.2.1.

3.4.3 Summary of collocation in COHA

The results for the green terms' collocate comparisons were grouped into three different types: those with low (including *too* low) frequency in the 1960s, those showing more environmental collocates in the 2000s than in the 1960s, and those showing no distinctive

patterns. The following summary groups these terms accordingly.

Those terms which had no or too few tokens in the 1960s always had more tokens in the 2000s. As pointed out above, this would be expected, as the frequency charts in 3.3, as well as the history of these words, predicted the creation of many newer terms in or after the 1960s. Many of these words are prevalent today. The following table summarizes these terms as found in each of the subsections of 3.4.2. Some of these words, such as *non-toxic*, *plant-based, free range,* and *decomposable* had relatively low frequency in all times, as suggested in section 3.3.

Table 3.13 Terms with low frequencies in the 1960s

	Increase (starting before 1960)	*Increase (starting after 1960)*	*Decrease*	*Other*	*Low Frequency Items*
Terms with low frequency	non-toxic plant-based	biodegradable recyclable ecofriendly environmentally friendly sustainable environmentalism			free range decomposable

Several terms had a number of collocates in the 2000s which were not seen in the 1960s that showed additional green connotations. Most of these terms were found to be in the categories of increasing frequency, as summarized in Table 3.10. The increase in number and greenness of the collocates suggests an environmental coloring of the terms themselves through the association drawn from co-occurrence (Hunston, 2002).

Table 3.14 Terms with environmental collocation in the 2000s

	Increase (starting before 1960)	*Increase (starting after 1960)*	*Decrease*	*Other*	*Low Frequency Items*
Terms with increasing greenness	organic hybrid toxic fuel	renewable greenhouse emissions	natural wind	gas industrial	

Most of the terms which showed no discernable pattern were found in the pool of words with other frequencies, with a few others in the decreasing group. For some of these words, there was likely no trend to be found. A few, however, such as *fresh*, *green*, and *oil*, drew most of the collocates from a single source type, cooking magazines, which may not have been representative of the use of the terms in all genres of speech.

Table 3.15 Terms showing no distinguishing patterns

	Increase (starting before 1960)	*Increase (starting after 1960)*	*Decrease*	*Other*	*Low Frequency Items*
Terms with no pattern	solar		harmony botanical	fresh green oil gasoline smog	

3.5 Collocation in COCA (1990-2010)

3.5.1 Procedures

The final portion of this analysis views collocates over the past 20 years in COCA. The top ten collocates are displayed in five year intervals starting at 1990 and going through 2009, along with a 20-year snapshot. Several significant and notable differences in items and frequency associated with the environmental movement are highlighted (see Appendix A, 8.1.2.1 for full range of data collected). This data gives a detailed view by collocation of how these terms have developed in the most recent decades. Rather than searching for unique collocates, as shown in 3.6, this query looks only at total collocates for each 5 year span, which shows increases and decreases of the frequency of words related to the search term. Increases in collocates that are related to the environment are associated with more frequent use of the search term in relation to the environment. Additionally, as this shows the most frequent collocates for the term during the time period, it describes the most common contexts for that word, showing its meaning by use in the corpora.

Due to the low frequency of collocates returned, the low frequency terms (see 3.3.2.5 and 3.4.2.5) were omitted from this section. For both of these low frequency terms, *free range* and *decomposable*, fewer than 3 occurrences of each collocate appeared in each given 5-year span, too low to show reliable patterns (see Appendix A, 8.1.3.5 for the section data).

3.5.2 Results

3.5.2.1 Words showing increase over time after 1960

Some data, like the example of *renewable* shown in Table 3.12, give a clear indication of environmental use, though may not show any clear change over the last 20 years.

Table 3.16 COCA collocates (with frequency) from 1990-2010—with 5 year increments—for 'renewable'

	1990-2010		1990-1994		1995-1999		2000-2004		2005-2009	
renewable	ENERGY	1985	ENERGY	167	ENERGY	266	ENERGY	630	ENERGY	801
	SOURCES	399	RESOURCES	63	SOURCES	63	SOURCES	108	SOURCES	169
	RESOURCES	226	SOURCES	48	RESOURCES	55	RESOURCES	61	POWER	93
	POWER	172	RESOURCE	32	TECHNO-LOGIES	35	TECHNO-LOGIES	58	FUELS	72
	TECHNO-LOGIES	170	TECHNO-LOGIES	26	RESOURCE	25	RESOURCE	38	ELECTRICITY	55
	NATIONAL	123	CONSER-VATION	22	USE	21	NATIONAL	34	NATIONAL	51
	RESOURCE	120	NATIONAL	19	EFFICIENCY	20	POWER	33	FUEL	47
	FUELS	116	POWER	17	POWER	19	EFFICIENCY	31	WIND	46
	LABORATORY	111	LABORATORY	15	LABORATORY	15	LABORATORY	31	LABORATORY	44
	EFFICIENCY	106	GUARANTEED	13	NATIONAL	15	SYSTEMS	28	EFFICIENCY	43

With other examples, change in frequencies of collocates show an increase in a specific concern of environmental thought, as demonstrated by the rise in the use of *carbon, greenhouse,* and *reduce* as collocates of *emissions*.

Table 3.17 COCA collocates (with frequency) from 1990-2010—with 5 year increments—for 'emissions'

	1990-2010		1990-1994		1995-1999		2000-2004		2005-2009	
emissions	CARBON	1074	REDUCE	162	TRADING	209	CARBON	239	CARBON	442
	GREENHOUSE	906	CARBON	161	REDUCE	202	GREENHOUSE	196	GREENHOUSE	426
	REDUCE	856	DIOXIDE	148	CARBON	192	REDUCE	195	GAS	375
	GAS	788	GREENHOUSE	92	GREENHOUSE	164	GAS	183	REDUCE	280
	DIOXIDE	636	REDUCING	86	DIOXIDE	138	DIOXIDE	134	DIOXIDE	206
	REDUCING	420	AIR	82	GAS	131	TRADING	131	PERCENT	171
	TRADING	390	CO2	81	REDUCING	97	REDUCING	98	CUT	138
	PERCENT	385	GAS	72	REDUCTIONS	72	REDUCTION	91	REDUCING	127
	CUT	283	CONTROL	72	REDUCTION	68	PERCENT	90	GLOBAL	82
	REDUCTION	274	CO	57	SULFUR	49	2	89	CO2	81

3.5.2.2 Words showing an increase over time - starting before 1960

While *organic* may not have changed much over the last 20 years in associated words, the rise of *produce* and *food* shown in the search indicates a potential increase in the market as *organic food* grew in importance.

Table 3.18 COCA collocates (with frequency) from 1990-2010—with 5 year increments—for 'organic'

	1990-2010		1990-1994		1995-1999		2000-2004		2005-2009	
organic	MATTER	934	MATTER	155	MATTER	339	MATTER	236	MATTER	199
	FOOD	373	COMPOUNDS	56	SOIL	120	FOOD	129	FOOD	153
	COMPOUNDS	351	MATERIAL	53	COMPOUNDS	114	PRODUCE	93	FOODS	119
	SOIL	321	CHEMISTRY	37	CARBON	96	FOODS	88	PRODUCE	105
	MATERIAL	301	VOLATILE	36	MATERIALS	94	MATERIAL	85	COMPOUNDS	102
	PRODUCE	283	CHEMICALS	36	MATERIAL	92	COMPOUNDS	75	SOIL	91
	FOODS	275	MOLECULES	33	VOLATILE	57	SOIL	75	PRODUCTS	81
	MATERIALS	237	PRODUCE	33	FOOD	57	FARMING	71	LOCAL	77
	CARBON	206	SOIL	32	FARMERS	56	PRODUCTS	68	NATURAL	74
	PRODUCTS	194	COTTON	28	FOODS	51	MOLECULES	67	COTTON	70

The collocates over the last 20 years showed a change in the use of *hybrid* as *cars* and *vehicles* jump to the top of the list suddenly in the 2000s. Prior to then, *hybrid* had fewer collocates associated with the environment and fewer collocate tokens in general.

Table 3.19 COCA collocates (with frequency) from 1990-2010—with 5 year increments—for 'hybrid'

	1990-2010		1990-1994		1995-1999		2000-2004		2005-2009	
hybrid	CARS	184	EXERCISE	62	SYSTEM	25	CARS	60	CARS	114
	CAR	122	BASS	33	CORN	19	VEHICLES	38	CAR	74
	VEHICLES	107	DURING	31	ELECTRIC	15	BASS	31	PLUG-IN	63
	ELECTRIC	93	FORM	15	CULTURAL	12	GAS-ELECTRIC	27	VEHICLES	58
	BASS	78	FES-LCE	13	FORM	12	HONDA	26	TOYOTA	42
	PLUG-IN	72	SEED	13	CULTURE	11	ELECTRIC	26	PRIUS	40
	TOYOTA	70	ACE	12	COMBINING	9	TECHNOLOGY	24	ELECTRIC	38

	PRIUS	65	ALONE	12	CREATED	9	TOYOTA	23	VEHICLE	28
	EXERCISE	63	TEAS	10	DEVELOPED	9	CIVIC	23	CIVIC	27
	VEHICLE	60	VARIETIES	10	CREATE	9	VEHICLE	22	VERSION	26

Other terms mirrored changes like those mentioned above or exhibited little in the way of patterns.

3.5.2.3 Words showing decrease over time

Several of the words which decreased over time showed no noticeable shift in collocate structure over the last two decades, i.e. *natural, botanical*. *Harmony* showed very little connection with the environment based on the collocates returned. *Wind*, however, showed an increase in association with energy resources, as shown in Table 3.16. In this example, frequency counts for the collocates *solar, power, energy,* and *turbines* all show an increase over time.

Table 3.20 COCA collocates (with frequency) from 1990-2010—with 5 year increments—for 'wind'

	1990-2010		1990-1994		1995-1999		2000-2004		2005-2009	
wind	POWER	972	BLOWING	282	BLOWING	252	POWER	322	SOLAR	431
	BLOWING	967	BLEW	189	BLEW	191	SOLAR	257	POWER	399
	SOLAR	967	COLD	173	RAIN	174	BLOWING	234	ENERGY	304
	RAIN	706	GONE	168	GONE	168	RAIN	172	TURBINES	220
	BLEW	672	RAIN	166	COLD	159	ENERGY	158	BLOWING	186
	COLD	624	BLOWS	110	BLOWS	128	BLOWS	151	RAIN	179
	ENERGY	615	SOLAR	109	SOLAR	127	BLEW	146	CHILL	170
	GONE	572	SPEED	103	HAIR	101	COLD	145	FARMS	157
	BLOWS	495	HAIR	98	GUST	99	GONE	129	COLD	140
	GUST	414	STRONG	94	WIND	92	GUST	113	BLEW	133

3.5.2.4 Words with other trends

While some collocates show no environmental patterns—*fresh, green, oil*—others showed a change in association, as with *gas*, where *emissions* and *greenhouse* increased in frequency over the last 20 years, shown below in Table 3.17. This difference may be due to the specific content of the corpora which contained the tokens of *fresh, green,* and *oil*; the major sources for these words in the COHA database were cooking magazines.

Table 3.21 COCA collocates (with frequency) from 1990-2010—with 5 year increments—for 'gas'

	1990-2010		1990-1994		1995-1999		2000-2004		2005-2009	
gas	NATURAL	4074	NATURAL	903	NATURAL	661	NATURAL	1127	NATURAL	1300
	OIL	3391	OIL	855	OIL	557	OIL	704	OIL	1126
	STATION	1792	STATION	396	STATION	375	STATION	474	PRICES	823
	PRICES	1648	PRICES	272	GREENHOUSE	200	PRICES	422	GREENHOUSE	544
	GREENHOUSE	1139	TEAR	240	TEAR	168	GREENHOUSE	253	STATION	519
	EMISSIONS	786	TAX	185	TANK	162	TEAR	196	EMISSIONS	375
	STATIONS	702	POISON	166	GAS	156	EMISSIONS	183	STATIONS	213
	TEAR	692	ELECTRIC	166	STATIONS	143	STATIONS	175	PRICE	165
	GAS	611	MASKS	155	EMISSIONS	131	ELECTRIC	170	TANK	163
	ELECTRIC	595	CHAMBER	155	ELECTRIC	131	GAS	154	GALLON	134

Other words such as *gasoline, industrial,* and *smog*, show little change over this period (see Appendix 8.1.3.4)

3.5.3 Summary of collocation in COCA

As seen in the COHA data comparing collocates from the 1960s and before to those from 1980 to the 2000s, the COCA data over the last two decades also revealed changes in usage. The collocates for the group in 3.4.2.1 with node words increasing after the 1960s consistently show environmental collocation, with some changes in use, but mostly maintaining the same general

collocates and collocate frequencies. Those collocates in the following group, with node words increasing generally over time, suggested a few more changes in meaning, some of which showed a dramatic change in focus. Only one of the terms in the section which showed a decrease over time showed an increase in environmental collocate usage, *wind*. The words showing other trends remained mostly stable throughout the period, with the notable exception of *gas*, as shown above.

3.6 Discussion

As discussed in the sections above, the patterns in the corpora have shown an increase in the usage of most environmental terms, many of which were newly coined within the last 60 years and have sharply risen over recent decades. Furthermore, collocates of the terms reviewed give the impression of an increase in the greenness of their usage, an ever-more present association with environmental matters, expressing a concern with an ecological worldview. Notably, though not all of the data presented showed an increase in frequency, or an increase in collocation with other environmental terms, in no case did a word show a *decrease* in the frequency of associated environmental terms.

This corpus data gives differences in the frequency and context of usage for green words, providing an understanding of the commonly associated words contained in the corpora. Identified within these texts are environmental terms that are both negative and positive, ones which may be associated with the cause of environmental problems as well as people's reactions to those problems. While this context shows an environmental connotation to these terms, it lacks the ability to compare how intensely green people perceive the terms. As recent data shows the saliency of the environmental quality of these words, experimentation should also show

whether individuals perceive these terms as having an environmental quality. The next analysis explores people's perceptions of these terms, distinguishing the level of environmental association for each word and also seeks to describe the demographics of those who view them as such.

4 'Green' List Experiment

. The overall goals of this study are to identify how environmental terms are used, perceived, and how they affect consumers. The previous chapter used large bodies of text to identify the change in usage of these words over time. The collocates from that portion of the study showed semantic relationships between the green words in the queries and other items associated with the environmental movement and suggest environmental meanings for those words. To examine perceptions of these words, this chapter focuses on how green words are perceived by individuals. Thus, the purpose of this chapter is to answer the following research questions:

2. Do some words connote greenness more than others; in other words, can different levels of greenness be identified?
3. Is the level of greenness of a term significantly different based on a person's gender, age, political affiliation, or feelings toward the environment?

The goal of the research discussed in this chapter is twofold: to flesh out the conclusions drawn from the corpus analysis presented above and to help create stimuli for the final experiment discussed in chapter 5. The researcher collected subjective ratings of the compiled list of green words from a group of participants. Doing so allowed for creating a list of words that represent a continuum of more and less "greenness.". Participants were asked to rate terms on whether they connoted a positive, negative or neutral effect on the environment. Though the results of chapter 3 demonstrated an increased use of many green words and their collocations

over time, this experiment examined how participants perceived the overall greenness of each of these words. It also provided confirmation of those patterns seen in the corpus analysis.

Furthermore, rater demographics were also examined to determine whether participants' age, gender, political affiliation and feelings towards the environment predicted an individual's perceptions of words associated with the environment, and perhaps even the environmental movement itself. The results of this analysis provided a more comprehensive picture of the interaction between environmental terms and people's perceptions than has been shown in previous research.

Also important to note is that this experiment generated a pre-rated list to be used in the experiment discussed in Chapter 5. As such, this experiment did not establish a comprehensive list of green terms and their ratings. It did, however, survey participants on words which may be seen as having a positive effect, a negative effect, or no effect on the environment.

4.1 Participants

Participants were asked to give demographic information as part of the survey, including gender, age, current city of residence and claimed hometown (as several respondents were university students away from their place of origin). Forty-nine individuals (24 males and 25 females) completed the on-line survey. Respondents' ages ranged from 18 to 73, with a mean age of 33. Participants reported both the location of their current residence (City, State) and of their hometown (in other words, where they spent the majority of their time from ages 0-18). Of the participants, 76% of the participants were currently located in the West with 49% also reporting a hometown in the West (Utah, Colorado, Wyoming, Montana, Arizona, Idaho). Locations outside the continental United States were categorized as "Non-Continental (Non-Cont) US" and

countries outside of the US (Germany, Canada) are shown as “Non-US”. Four participants declined to respond to their current location and five declined to report their hometown. A summary of the participants’ locations is shown in Table 4.1. All participants were speakers of English. It was reasoned that due to the world-wide saliency and international origins of the environmental movement, participants need not be native speakers of English, and a high level of English proficiency would suffice.

Participants were also asked to give which political party they most agreed with (Republican, Democrat, Libertarian, Green, Independent or Other). Of the respondents, 43% reported Republican political leanings, 12% Democratic and 31% Independent. One participant claimed Classical Liberal and four chose not to respond. A summary of the political leanings of the participants is given in Table 4.1.

Table 4.1 Participant location and political party

	Current Residence	*%*	*Reported Hometown*	*%*	*Republican*	*Democrat*	*Green*	*Libertarian*	*Independent*	*Other*	*Unknown*	*NEP average*
West (Utah, Colorado, Wyoming, Montana, Arizona, Idaho)	37	76%	24	49%	16	5		1	12	1	2	60.45
West Coast* (California, Washington)	3	6%	6	12%	1	1			1			62.80
Non-US (Germany, Canada)	2	4%	2	4%	1						1	66.43
South (Texas, Florida)	2	4%	3	6%				1	1			49.95
East (Virginia, Philladelphia, New York, Connecticut, D.C., Rhode Island)	1	2%	6	12%	1							55.95
Midwest (Ohio, Missouri)	0	0%	2	4%	1							64.85
Non-Cont US (Hawaii)	0	0%	1	2%								76.30

Unknown	4		5		1				1		1	65.97
Total	49		49		21	6		2	15	1	4	

**West Coast was separated from West based on US voting trends (CNN, 2008)*

Participants rated their environmental beliefs on the New Ecological Paradigm (NEP) scale (Dunlap, et al., 2000), which included 5 sub-scale scores and a total proenvironmental orientation score. A higher score shows greater pro-environmental orientation, or that a participant is more environmentally aware. Details of the NEP scale are given in section 4.4.

4.2 Materials

The survey was hosted on the web survey company Qualtrics.com, who provides free student accounts through a partnership with the university. The Qualtrics software hosts the survey with customizable features for question types, survey flows and logic, as well as visual presentation. The following figure shows an example of one question from the survey. Data from the survey was analyzed using JMP 9 statistical software.

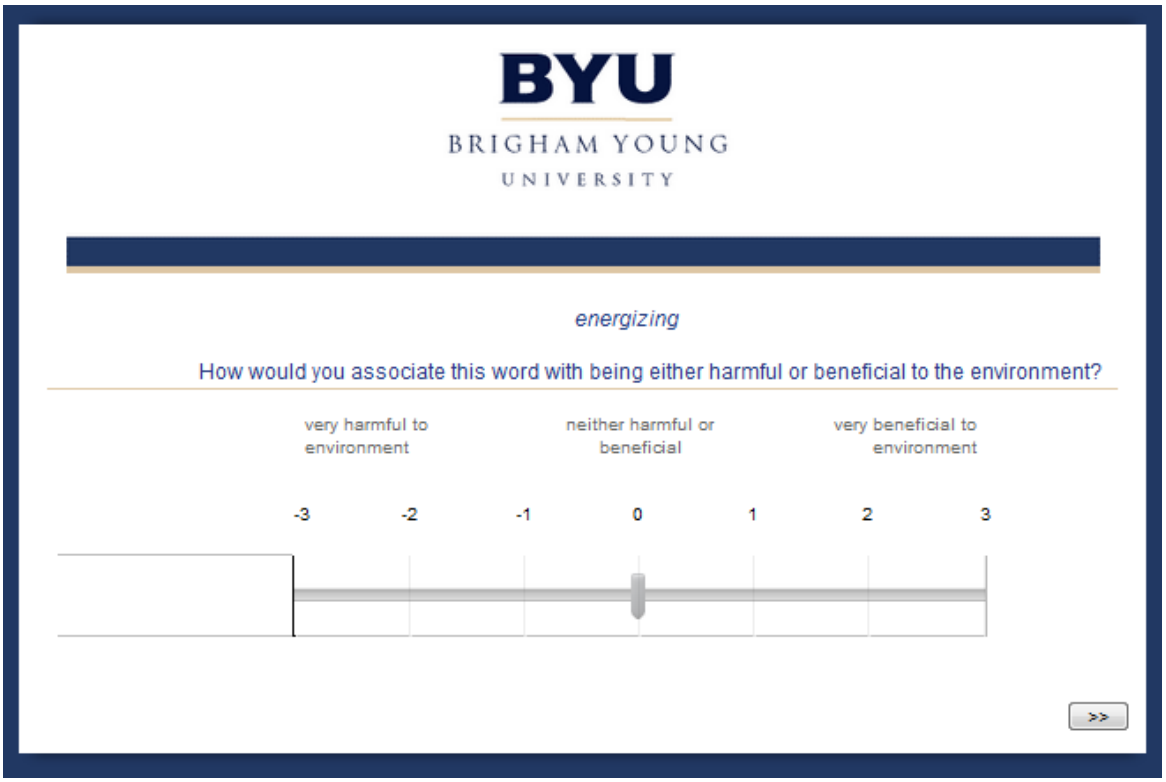


Figure 4.1 Qualtrics survey question screen shot

4.3 Stimuli

A list of 52 terms was compiled to be rated for their greenness. This list included environmental terms—those used in the corpus analysis--collected through an examination of advertisements, products in stores and online, and research from relevant literature (Harré, et al., 1999; Myerson & Rydin, 1996) as well as additional terms to serve as a neutral baseline for greenness ratings. Environmental terms were selected based on personal observations of what was commonly used in green marketing; other terms were selected from among those commonly found in marketing in general. The intent of the list was to include terms that would be perceived as beneficial to the environment (e.g. *green, environmental, eco-friendly*), harmful to the environment (e.g. *smog, industrial*), and neutral terms (e.g. *power, warrantee*). These terms are

shown in Table 4.2.

Table 4.2 Study environmental terms

Environmental terms from Ch. 3	biodegradable	hybrid
	botanical	industrial
	decomposable	natural
	ecofriendly	nontoxic
	emissions	oil
	environmentalism	organic
	environmentally friendly	plant-based
	free range	recyclable
	fresh	renewable
	fuel	smog
	gas	solar
	gasoline	sustainable
	green	toxic
	greenhouse	wind
	harmony	
Additional terms (includig non-green)	air freshener	mileage
	cleaner	MPG
	cotton	natural gas
	effective	performance
	electric	polyester
	energizing	power
	fluorescent	quality
	gasoline-electric	soft
	healthy	strong
	iron	tree
	less gas	warrantee

4.4 Survey

The list of terms were used in an on-line survey—a method used successfully in other linguistic research (Eddington & Elzinga, 2008)—in which participants were asked to rate each term in the list on a slider scale (-3.0 to 3.0) with extreme negative values indicating 'very harmful to environment' and extreme positive values indicating 'very beneficial to environment,' with 0 indicating 'neither harmful or beneficial' to the environment. Participants were

specifically asked the question, “How would you associate this word as being either harmful or beneficial to the environment?” A slider scale was used instead of discrete values because when piloting the survey several respondents reported quicker and easier responses with this measuring scale.

Participants also answered all 15 questions from the revised NEP scale, as revised and tested by Dunlap et al., (2000) developed to measure “proenvironmental orientation,” or a person’s worldview as it pertains to ecological matters and self. Thus, a person with high proenvironmental orientation may feel strongly that humans have a responsibility to protect the environment or that humankind can have a negative impact on the environment. Dunlap et al.’s revised NEP scale is based on Dunlap and Van Liere's (1978) New Environmental Paradigm Scale. The original scale was developed to address increasing environmental concerns in sociological research (Dunlap & Van Liere, 1978) and was used often in the research before the revised scale was released, including in the investigation of the opinions of consumers of varying degrees of environmental involvement on the appeal of green advertised products (Schuhwerk & Lefkoff-Hagius, 1995), and received passing dimensionality reviews a number of times (Albrecht, 1982; Dunlap & Van Liere, 2008; Stern, Dietz, & Guagnano, 1995). Though the original NEP scale is the most widely used environmental belief scale (Dunlap & Van Liere, 2008; Stern, et al., 1995) Dunlap et al. revised the scale to include a broadened range of the ecological worldview, to balance the set of pro- and anti-NEP items within the scale, and to replace outdated terminology (Dunlap, et al., 2000). The revised scale has been successfully used in a number of sociological studies, including Verplanken and Holland’s article on value-based decision making (2002) which showed that priming environmental values of those who held those values central to their self-concept resulted in environmentally friendly consumer choices.

Similarly using the scale to measure proenvironmental attitudes, Clark, Kotchen, & Moore (2003) found a significant model for altruistic environmental attitudes and proenvironmental behavior in participation in a green electricity program. The history of successful use of the scale in other studies suggests it will adequately measure participants' perception of the environment in the current study (See Appendix B, 8.2.1 for all NEP scale questions).

The scale is made up of a set of fifteen items, alternating between pro-NEP and anti-NEP statements, shown in the following examples:

Pro-NEP: "We are approaching the limit of the number of people the earth can support."

Anti-NEP: "Humans have the right to modify the natural environment to suit their needs."

Participants were asked to rate their agreement with each of these items on a seven point Likert scale and the reverse phrased (anti-NEP) questions were recoded so a more positive answer was associated with higher proenvironmental orientation. With a total of fifteen items, the NEP scale total score has a minimum of 15 and a maximum of 105. Participants' scores ranged from a low of 37 to a high of 78. These data for the total score are shown in Table 4.3 (see Table 4.1 for NEP ratings by location).

Table 4.3 Participant proenvironmental orientation & demographics

	NEP Score:	Lows	Highs	Means	SD
Gender	Male	43.80	78.00	59.24	10.88
	Female	37.00	77.40	60.90	10.48
Ag	Age 18-39	37.00	78.00	59.25	11.38

	Age 40+	45.30	76.60	61.70	8.73
Political Affiliation	Republican	43.80	78.00	58.45	10.37
	Democrat	47.10	77.40	68.83	10.99
	Green	NA	NA	NA	NA
	Libertarian	50.60	58.30	54.45	5.44
	Independent	37.00	76.60	59.58	11.01
	Other	37.00	76.60	59.57	11.00
	All Participants	37	78	60.09	10.60

4.5 Results

4.5.1 Research question 2

To answer the first question examined in this chapter, *Do some words connote greenness more than others: in other words, can different levels of greenness be identified?*, mean ratings and standard deviations were calculated for each of the terms rated and they were organized from lowest to highest mean. After consulting with a statistician, the best method for identifying the most green—or most beneficial to the environment—and the most ecologically harmful terms was determined to be a simple comparison of means. Means above 1.0 were considered most green and means below -1.0 were considered most 'harmful'. The most neutral terms were chosen by examining means close to 0 (-0.25 to 0.25) with standard deviations less than 1.0. Terms falling in these categories were considered for use in Experiment 2. Based on these ratings, several levels of "greenness" from harmful to neutral to beneficial were identified. These data are presented graphically in the box and whisker plot in Figure 4.2 and in Table 4.4.

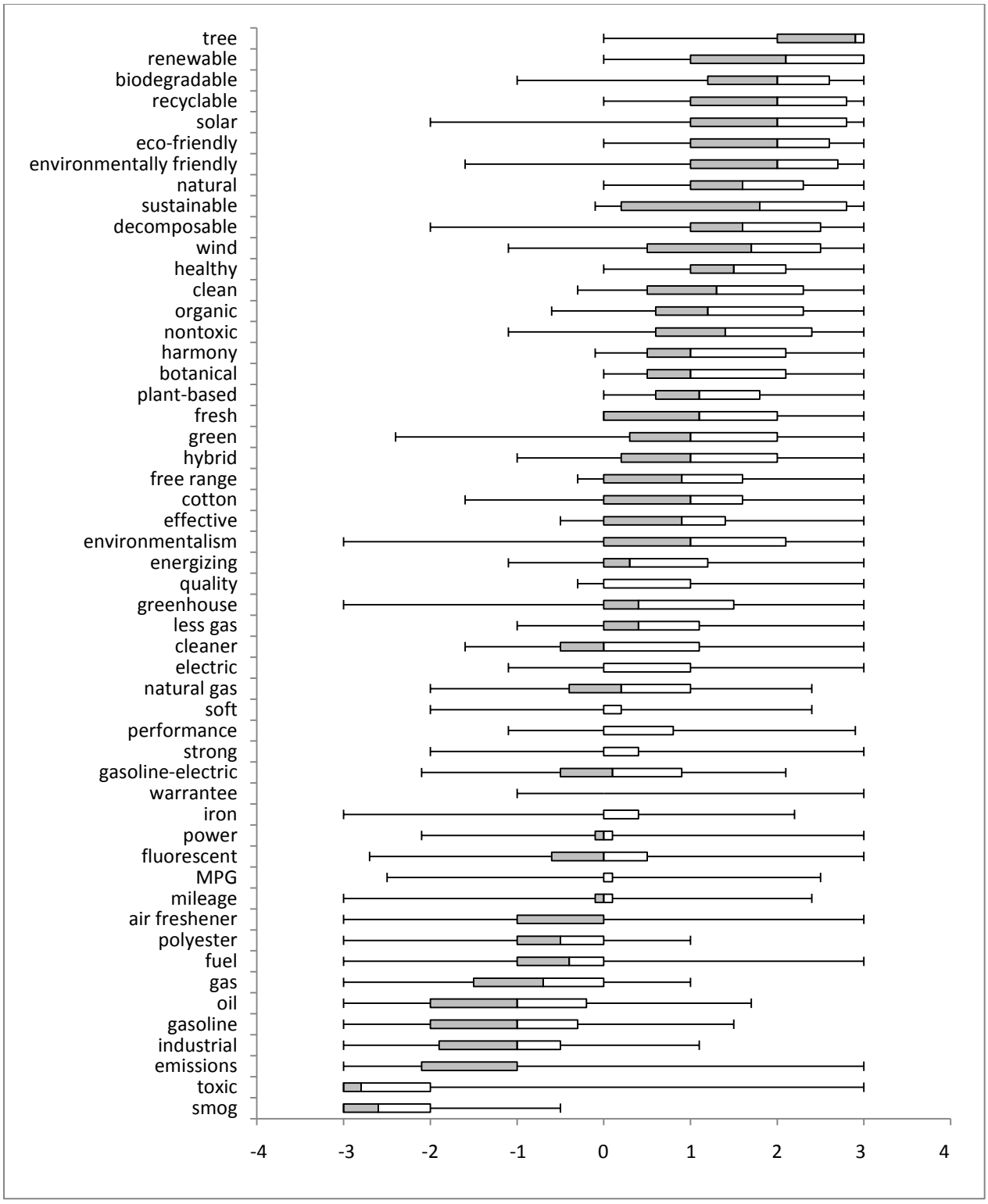


Figure 4.2 Box and whisker plots of green word ratings (min, max, quartiles, and means)

Table 4.4 Green word list means and standard deviations

	Word	Mean	StDev
Green	tree	2.34	0.99
	renewable	1.98	1.03
	biodegradable	1.85	0.99
	recyclable	1.84	0.93
	solar	1.80	1.13
	eco-friendly	1.78	0.99
	environmentally friendly	1.77	1.08
	natural	1.65	0.99
	sustainable	1.54	1.16
	decomposable	1.54	1.26
	wind	1.49	1.12
	healthy	1.48	1.07
	clean	1.40	1.09
	nontoxic	1.39	1.16
	organic	1.39	1.11
	harmony	1.31	1.09
	botanical	1.31	0.99
	plant-based	1.31	0.89
	fresh	1.18	0.97
	green	1.16	1.23
	hybrid	1.08	1.06
	free range	0.97	0.98
	cotton	0.91	1.03
	effective	0.85	0.98
	environmentalism	0.80	1.50
	energizing	0.72	1.04
	quality	0.62	0.89
	greenhouse	0.59	1.35
	less gas	0.58	0.93
Neutral	cleaner	0.40	1.24
	electric	0.35	0.96
	natural gas	0.34	0.93
	soft	0.31	0.78
	performance	0.31	0.89
	strong	0.29	0.84
	gasoline-electric	0.17	0.96
	warrantee	0.16	0.75
	iron	0.15	0.87
	power	0.15	0.96
	fluorescent	0.03	1.10
	mpg	0.02	0.85
	mileage	-0.03	0.89
	air freshener	-0.26	1.13
H	polyester	-0.51	0.71

	fuel	-0.51	0.93
	gas	-0.89	1.01
	oil	-1.06	1.00
	gasoline	-1.14	1.06
	industrial	-1.16	0.97
	emissions	-1.31	1.32
	toxic	-2.27	1.14
	smog	-2.41	0.68
	Average	0.572	1.019

Figure 4.2 shows the list of terms rated from greenest to least green. The whiskers to either side show the maximum and the minimum answers given while the boxes plot the first second and third quartiles based upon the ratings given. The middle line for each word gives the mean. This plot shows the neutral terms to have the least amount of variation within the first quartile while the green terms to have the greatest. These data are also shown in Table 4.4, which gives both means and standard deviations.

Though an analysis of descriptive data does not allow for conclusive comparisons, it does show a number of interesting trends within the green list data. Examining first the green data, we see a number of noteworthy contrasts and groupings. Among the highest rated words are those referring to physical processes, such as *biodegradable, recyclable, solar, decomposable,* and *wind*. These might be referred to as 'concrete' environmental terms, as opposed to the less concrete group, such as *renewable, eco-friendly, environmentally friendly, natural,* and *sustainable.* Clear definitions of these words are more difficult, as has also been shown in examinations of the use of such words in marketing claims (Scammon & Mayer, 1995). Another interesting comparison is *solar* (1.80) versus *wind* (1.49). Both are often associated with energy sources (see Appendix A, *wind*), yet solar is higher. This may indicate a closer association with "clean energy."

Examining the neutral words gives no unexpected results. The group, however, is

somewhat positively skewed. An explanation for this is unknown.

Looking at the negatively rated data, *smog* (-2.4) and *toxic* (-2.3) are rated as being the most harmful, roughly one whole point lower than the next lowest word, *emissions*. A comparison of some of the negatively rated data with the positive shows *polyester* (-.51) on opposite sides of the list mean from *cotton* (.91), suggesting that the man-made nature of polyester is viewed as more harmful to the environment than the grown cotton. Fuel words—*gasoline, oil, gas,* and *fuel*—are grouped on the harmful end of the scale, yet *natural gas* (.34) is rated positively.

4.5.2 Research question 3

For research question 3, "Is the level of 'greenness' of a term significantly different based on a person's gender, age, political affiliation, or feelings toward the environment?" a multiple regression analysis was run. Following the suggestion of a statistician consultant, models were selected with lowest Bayseian Information Criteria (BIC), the formula for which is used to calculate a value to describe the data adequately without using too many parameters and over-fitting the data. The dependent variables were a combined group of each rated term and independent variables of gender (male/female), age (numeric), location by political affiliation (Left/Right), and political affiliation in terms of Left/Right/Independent/Other (*left:* Democratic, Green; *right:* Republican, Libertarian), and NEP total score. Location of the participants by political affiliation was coded in terms of the participant's state's political activity in recent elections (CNN, 2008). These variables are summarized in Table 4.5.

Significant variables were then compared across groups looking for predictive trends. Participant residences and hometowns were left out of the analysis to avoid over-fitting due to

the number of variables already included in the analysis.

Table 4.5 Multiple regression variables with recoded values

Independent variables	*Dependent variables*
Gender	'green' ratings (*tree* to *less gas*)
Age	
Location by Political Activity (Left/Right)	'neutral' ratings (*cleaner* to *air freshener*)
Political affiliation (Left/Right/Independent)	
Total NEP Score	'harmful' ratings (*polyester* to *smog*)

The multiple regression of the 'green' group gave a significant model, $F(3,1466) = 64.0976$, $p < .0001$, R-square = .095. It yielded significant results for gender, $p < .0001$; political leanings (Independent versus Right), $p < .0001$; and NEP total score, $p < .0001$. In this model, the females (*M* 1.6) rated green terms higher than males (*M* 1.0) did. Independent (*M* 1.1) participants rated the terms significantly lower than politically right (*M* 1.4) participants. Additionally, the NEP scale total score was positively correlated with green word ratings. The significant terms are summarized in Table 4.6

The multiple regression of the 'neutral' group gave a significant model, $F(1,583) = 9.71$, $p = .0019$, R-square = .016. It yielded significant results for political leanings (Independent (*M 0.8)* versus Right & Left (*M 1.5)*), $p = .0019$. In this model, only political leaning was correlated with the ratings of neutral terms. Independent participants rated the neutral words lower than both politically right and politically left participants, similar to the results for the 'green' words.

The multiple regression of the 'harmful' group gave a significant model, $F(2,420) =$

25.13, p < .0001, R-square = .107. It yielded significant results for age, p < .0001; and total NEP scale, p < .0001. In ratings of harmful words, age was positively correlated with the ratings, suggesting less extreme ratings by older participants. The NEP scale shows a negative correlation, with harmful words being rated lower as the NEP rating increases.

Table 4.6 Summary of significant terms' beta-values for multiple regression

	β Age	*β Gender*	*β Location by polit. affiliation (left/right)*	*β Political affiliation (left/right/ind.)*	*β Total NEP score*
Green	---	0.56**	---	-0.18** (I-R)	0.014**
Neutral	---	---	---	-0.13* (I-R&L)	---
Harmful	0.016**	---	---	---	-0.027**

*p<.005 for indicated *β*-value
**p<.0001 for indicated *β*-value

4.5 Discussion

The results from this experiment suggest similar results to the corpus analysis in Chapter 3. As the corpus data suggests, words found with environmental collocates and environmental terms which are rising in use over time are actually perceived as being different from neutral, non-environmental terms. This adds support to the conclusions drawn in the corpus analysis.

Moreover, the experiment revealed a range of perceived environmental qualities associated with the various terms. Though no obvious breaks in the data occurred, different

levels of perceived “greenness” were identified. This generated the pre-rated list from which prompts were used in the experiment in Chapter 5.

The multiple regression analysis initially did not reveal the same pattern for each level of greenness. Political affiliation was significant for both the green words and for the neutral words, though with different comparisons of variables within the statistical terms. Age was significant for the rating of harmful words, showing older participants to rate terms less extremely than younger participants, while gender was a significant predictive factor for the ratings of green words, showing females to rate them more positively than males.

Most interesting among the models, however, was the shared significant term between the green and harmful words. Both models showed the total NEP scale score to be predictive of those terms’ ratings. Participants with a higher NEP score rated the green words more positively, while the same people rated the harmful words more negatively, albeit with relatively low coefficients (values less than .03 for both). This suggests that having a proenvironmental worldview does affect a person’s perception of environmental terms, and does so as would be predicted, making more extreme the ratings of those items seen as being both harmful and beneficial to the environment. This suggests a relationship between the way people see the world and the way they see their language.

It is important to note that although statistical significant models were generated, the models may not be practically significant. With such low R-square values, especially with the green and neutral terms (green = .073, neutral = .016, harmful = .12), predictive power of the rating of environmental terms is questionable. The true value of this data, however, is its application for the experiment discussed in the following chapter.

5 Product Ratings Experiment

This study's goal is to examine the effects of green words on consumer's perceptions of products. This chapter contains the final experiment of the study and answers the following questions:

4. How do consumers perceive the effectiveness, the likability, and the environmental impact of different products when linked with green terms? Is there a difference between their perception of a product with a green term and a neutral term or a green term and the negation of an environmentally harmful term?
5. Are there any demographic identifiers that can be used to predict consumers' perceptions of these products?

The experiment in this chapter answered these questions by eliciting and then comparing ratings of different products paired with terms which differed in their level of greenness. Further analyses were run to examine whether specific demographic variables (gender, age, political affiliation, and feelings about the environment) affected those ratings.

The corpus analysis in Chapter 3 demonstrated the pervasiveness of these environmental terms, while Chapter 4 established participants' perceptions of the level of greenness of various terms. This chapter builds on these findings by examining how these perceptions affect marketing choices. As words close in proximity in a corpus tend to show semantic relationships (Biber, Conrad, & Reppen, 1998) and color each other, so too can terms associated with a real-world object color our perception of that thing. This has been shown in marketing research to be

the case (Saylor & White, 2007).

There is, however, the element of skepticism that comes into play. Research suggests that consumers are often wary of the environmental claims that companies make in the promotion of their brand (Mohr, et al., 1998). There tends to be an additional measure of skepticism due to the sheer amount of greenwashing, or overuse of green language in marketing (Kangun, et al., 1991), often leading consumers toward cynicism and confusion (Carlson, et al., 1993; Davis, 1993). So what words make consumers feel that something is more attractive, worth buying, or even better for the environment at all? This present chapter seeks to answer that question.

5.1 Participants

Seventy-six individuals (20 males and 56 females) completed the on-line survey (incomplete responses were discarded). Respondents' ages ranged from 21 to 61, with a mean age of 27.8. Participants were asked to give both the location of their current residence (City, State) and of their hometown. Of the participants, 78% of the participants were residing in the West (Utah, Colorado, Arizona, Idaho, Montana, Nevada) with 50% reporting a hometown in the West. Locations outside of the US (Russia, Bulgaria, Canada) are shown as "Non-US". One participant declined to respond to their current location and four declined to report their hometown. A summary of the participants' locations is shown in Table 5.1. All participants were speakers of English.

At the conclusion of the survey, participants were asked to indicate if they were familiar with this research project. Of the 76 respondents, 13 reported they were, 12 gave no response, and 51 responded that they were not familiar with it. This was done in order to track who might have participated in Chapter 4's experiment. This variable was included in the multiple

regression analysis for this experiment and was a significant term in two models, effectiveness ratings for cleaning products ($\beta = 0.72$, $p=.013$) and environmentalness ratings for personal care products ($\beta = 0.55$, $p=.020$), out of the twelve models. The term, however, was less significant and had a lower coefficient than the other significant terms in the analysis (see 5.4.2 and 5.4.3). Thus, the effect of familiarity of the research on the overall study is negligible.

Participants were also asked to give which political party they most agreed with (Republican, Democrat, Libertarian, Green, Independent or Other). Of the respondents, 39% reported Republican political leanings, 5% Democratic and 30% Independent. Three participants claimed Libertarian, five chose other, and eleven chose not to respond. A summary of the political leanings of the participants is given in Table 5.1.

Table 5.1 Participant location and political party

	Current Residence	*%*	*Reported Hometown*	*%*	*Republican*	*Democrat*	*Green*	*Libertarian*	*Independent*	*Other*	*Unknown*	*NEP average*
West (Utah, Colorado, Arizona, Idaho, Montana, Nevada)	59	78%	38	50%	26	3		3	14	7	5	60.43
West Coast* (California, Washington, Oregon)	3	4%	6	14%		1			2			63.20
Non-US (Canada, Russia, Bulgaria)	2	3%	11	8%						2		73.86
South (Texas, North Carolina, Tennessee, Florida, Georgia)	2	3%	6	8%					2			64.80
East (Virginia, New York, D.C., Rhode Island)	1	1%	4	5%					1			61.33
Midwest (Ohio, Missouri,	8	11%	7	9%	3				3	2		68.39

Michigan)												
Unknown	1	1%	4	5%					1			59.80
Total	76		76		30	4	0	3	23	11	5	

*West Coast was separated from West based on US voting trends (CNN, 2008)

As in the experiment discussed in Chapter 4, participants rated their environmental beliefs on the New Ecological Paradigm (NEP) scale (Dunlap, et al., 2000). The NEP scale total score has a maximum of 105 and a minimum of 15. Participants' scores ranged from a low of 37 to a high of 90, with an average of 63.14, as shown in Table 5.2. This scale is explained in Chapter 4.

Table 5.2 Participant proenvironmental orientation

Environmental Opinions:	Low	High	Means	SD
Total NEP Score	37	90	63.14	10.79

5.2 Materials

The survey was hosted on the web survey company Qualtrics.com, and used an advanced logic for prompt selection and randomization, which will be described in the following section of the chapter. The following figure shows an example of one prompt from the survey. Questions asked about the prompt will be presented in the following section as well. Data from this survey was analyzed using JMP 9 statistical software.

Figure 5.1 Qualtrics survey prompt screen shot

5.3 Procedures

5.3.1 Stimuli

Of the 52 items rated in Chapter 4, nine were chosen to create the prompts for this experiment. Using the levels of "greenness" identified in that chapter as well, these terms were set in groups of three—beneficial, neutral, and harmful—to be combined with stimulus products

which were presented to participants. The three stimulus product types chosen were automobiles, personal care products, and cleaning products. These were chosen because they are products often seen in the marketplace associated with environmental terms. These words were arranged as shown in Table 5.3.

Table 5.3 Words used in stimuli by product type

Green Level	*Automobile*	*Personal Care Product*	*Cleaning Product*
green	'eco-friendly'	'natural'	'environmentally friendly'
harmful	'emissions'	'toxic'	'industrial'
neutral	'performance'	'strong'	'power'

Though many words were available from each level of the pre-rated list, these were chosen as some of the most linguistically plausible pairings with their respective products. Referring to a cleaning product with 'emissions,' a cleaning product causing 'smog,' or a 'biodegradable' automobile seemed ineffective and poor judgment in the design of the prompts.

Not only were three separate product types identified, but three different products within each product type were selected for use. These products were as follows: *car, truck,* and *SUV* for Automobiles; *deodorant*, *conditioner,* and *hand soap* for Personal Care Products; and *bathroom cleaner, laundry detergent*, and *dish soap* for Cleaning Products. Each of these products was paired with each one of the stimulus words associated with its product type, for a total of 27 different combinations of words. A summary representation of this is shown below in Table 5.4.

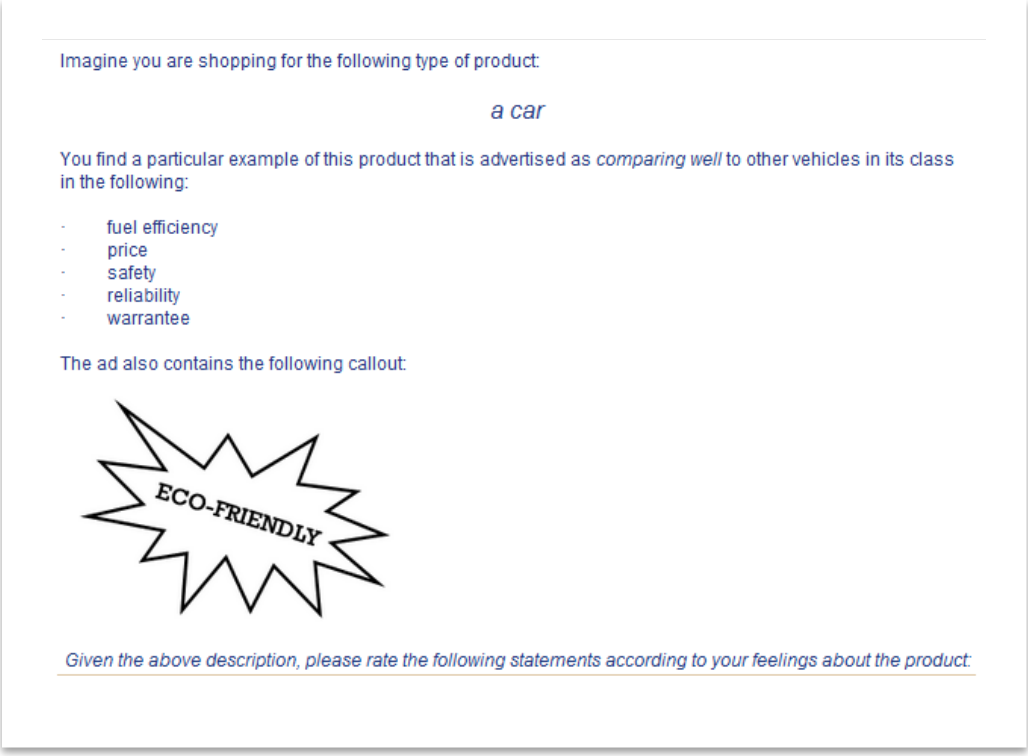


Figure 5.2 Framing of stimulus for automobiles

In presenting these product-word combinations to participants, a frame of some sort was necessary. This frame consisted of setting the assumption for the participant that he or she would be shopping for a product of the type presented, followed by the presented product and then a short description of its "comparing well" to other products of its type. These frames were not varied within a product type, as research has shown product framing to have an effect on consumer ratings (Buda & Zhang, 2000). A short list of qualities describing the products was also listed, serving to normalize perceptions of other qualities which have been shown to affect product ratings (Render & O'Connor, 1976). After the short list of qualities, the "green," "harmful," or "neutral" term was shown in the form of a callout, described as part of the packaging or advertisement of the product. Example prompts are shown in Figures 5.1-5.3.

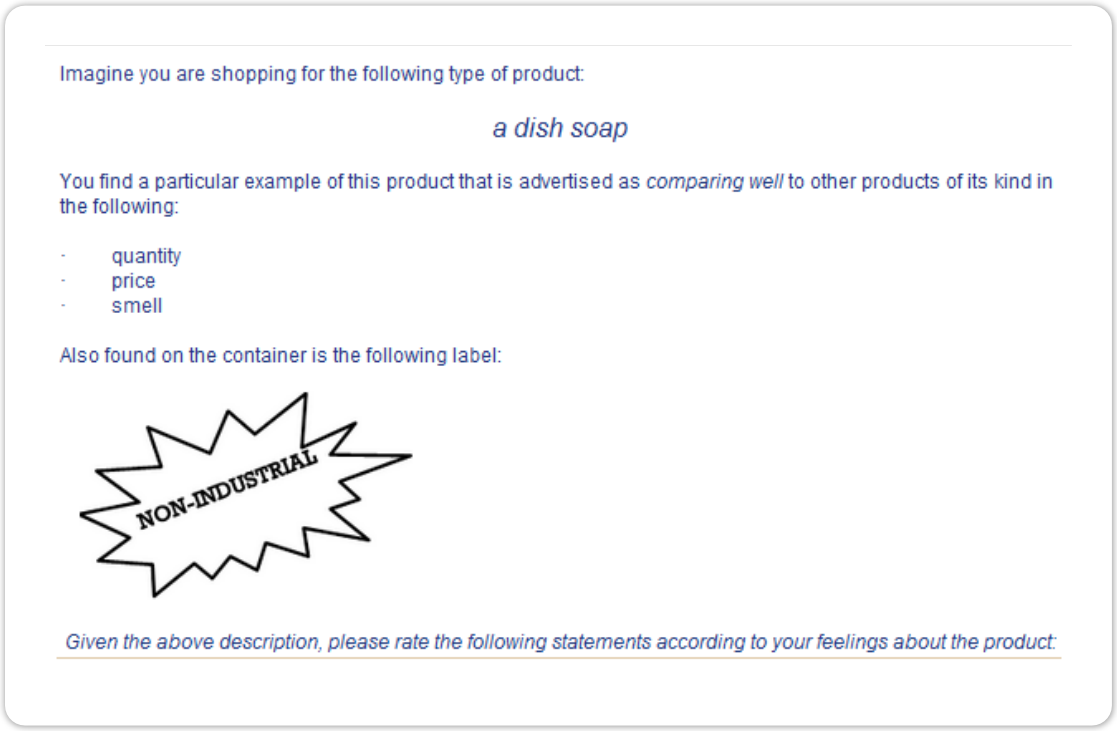
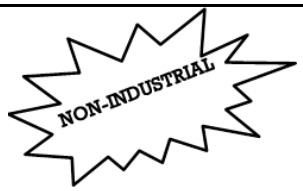
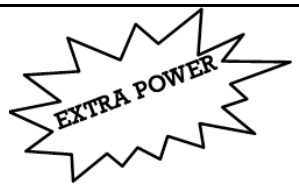


Figure 5.3 Framing of stimulus for cleaning products

In the pairing of the environmental terms with the products, some difficulty arose with the best method to present the "harmful" words. Products are often marketed not just with an enumeration of their qualities, but also with a description of their freedom from negative elements. Grocery stores contain a myriad of examples like "low-fat," "sugar free," or "no preservatives." Those terms found as negative were similarly paired with a negating statement, as shown in Table 5.4.

Table 5.4 Word stimuli and product matrix

Green	*Automobile*			*Personal Care Product*			*Cleaning Product*		
	Car	***Truck***	***SUV***	***Deodorant***	***Conditioner***	***Hand Soap***	***Bathroom Cleaner***	***Laundry Detergent***	***Dish Soap***

Level									
green									
harmful									
neutral									

Note that this product presentation differs from concept testing, questions posed to participants to evaluate and refine ideas for new products,(Moore, 1982) and more current marketing research such as choice modeling (Ozer, 1999) or conjoint analysis (Cattin & Wittink, 1982), which aims at maximizing the likability of a product based on a series of preferences chosen by participants. Instead, by limiting the variation of attributes to one—the word representing the level of greenness—the effects of that word—and thus, the associated perception—is isolated. This is done across a variety of products to increase comparative power, as well as to allow for the exploration of interactive effects.

5.3.2 Survey

The survey was administered online and participants were presented randomly with one of the 9 possible products paired with one of the three possible words for that product. Survey

logic was used to create the effect of a Latin-square design, where each participant saw each product and each word only once. The order of each of these variables was randomized.

After viewing the stimulus, each participant was asked to answer questions about the product, rating it in four quality areas gathered and slightly altered from product evaluation research (Buda & Zhang, 2000): attractiveness, buyability, effectiveness, and environmental quality. Each quality rating was made up of three questions using semantic differential scales such as *like/dislike*, *good/bad* (Buda & Zhang, 2000; Ditto & Lopez, 1992),given on sliding scales, as shown in Figure 5.4. The questions presented are shown in Table 5.5.

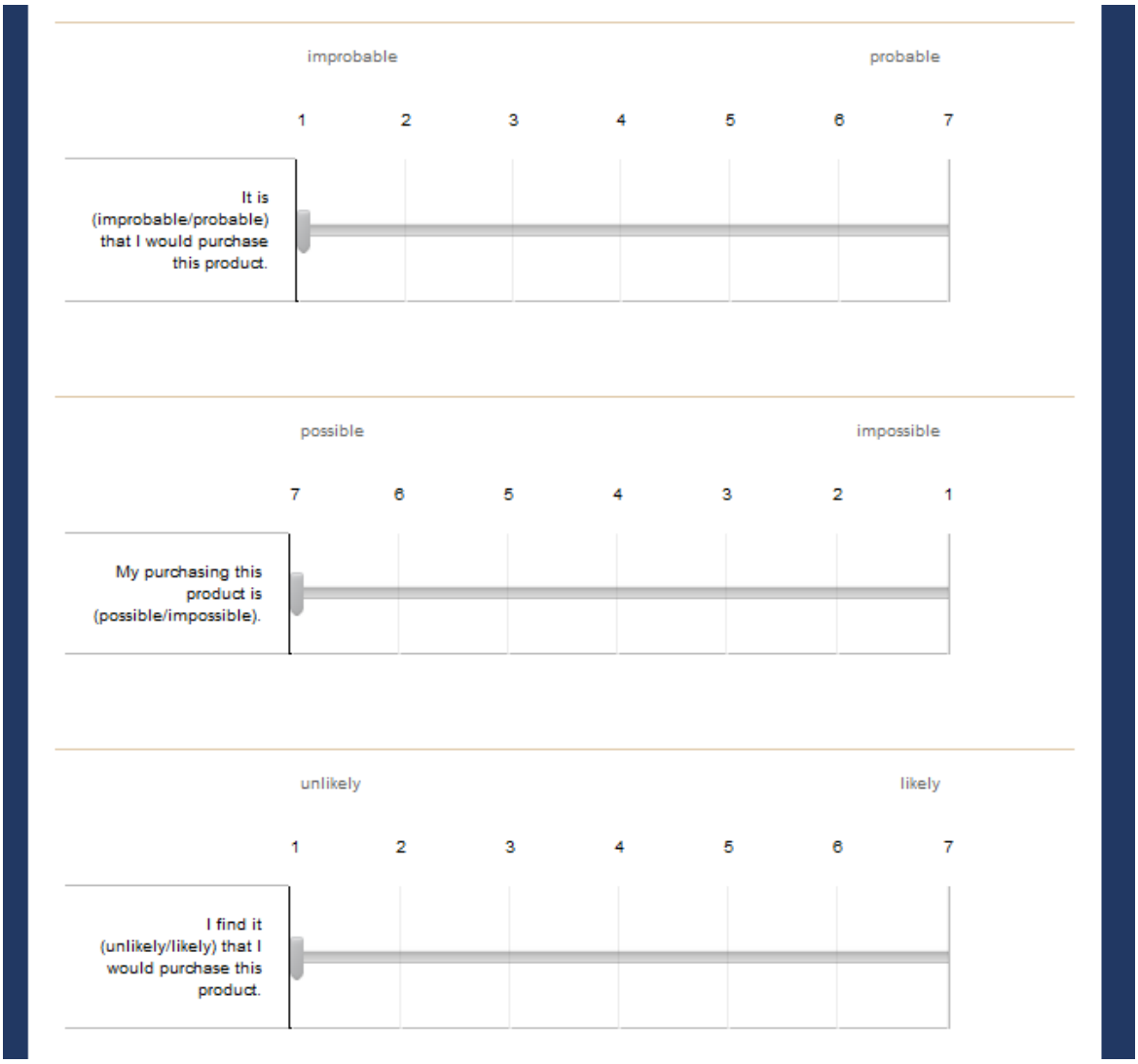


Figure 5.4 Qualtrics survey question screen shot

Table 5.5 Questions for product ratings of attractiveness, buyability, effectiveness, environmentalness

Question Type			
Attractiveness	I find this product (unlikeable/likeable).	This product appears (good/bad) to me.	I find this product (unappealing/appealing).

Buyability	It is (improbable/probable) that I would purchase this product.	My purchasing this product is (impossible/possible).	I find it (unlikely/likely) that I would purchase this product.
Effectiveness	I am (certain/not certain) that this product performs as expected.	I feel (unsure/sure) that this product performs well.	I am (confident/not confident) that this product performs well.
Effects on Environment	I feel this product's effect on the environment is (bad/good).	This product is (damaging/not damaging) to the environment.	This product has a (harmful/beneficial) effect on the environment.

Following the ratings of the products, participants were asked to fill out their demographic information, including the NEP scale as described in Chapter 4. The data was then analyzed with a multiple regression of ratings for product groups by demographics, product type, and green words.

5.4 Results

5.4.1 Multiple regression

A multiple regression was run on each product within each product type testing for possible effects. Dependent variables were the ratings for each question type (Attractiveness, Buyability, Effectiveness, Environmentalness) separated by product type (Automobile, Personal Care Products, Cleaning Products) with independent variables of gender, age, location by political activity, political affiliation, familiarity with this topic of study, and total NEP score. As explained above (5.1), familiarity with green studies was included as a variable to account for those participants who may have taken the previous survey rating environmental terms.

Table 5.6 Multiple regression variables

Independent variables	*Dependent variables*
Green word (*green, negated harmful, neutral*)	Attractiveness (by *Auto, Personal Care, Cleaning Products*) Buyability Effectiveness Environmentalness
Specific product (i.e. *car, truck*, or *SUV*)	
Gender	
Age	
Location by political activity (Left/Right)	
Political affiliation (Left/Right/Other)	
Familiarity with green study	
Total NEP score	

The multiple regression models were run using all-possible models and selected using the lowest Bayesian Information Criterion (BIC) value, used to calculate a value to describe the data adequately without using too many parameters. Where two values' difference was negligible, the model with more significant variables was chosen. The following sections describe the models, separated by product group, and special note is made where demographic variables are found to have a significant effect.

5.4.1.1 Multiple regression of automobiles data

For automobiles, the effect test of the multiple regression for attractiveness ratings only showed the product type (*Truck & SUV* versus *Car*) to be significant (R^2=.06, F(1,255)=13.8, p<.0003), predicting a negative relationship with the ratings (β = -1.10, p<.0003).

The test for buyability ratings revealed the same pattern for product type (*Truck & SUV* versus *Car*) to be significant (R^2=.10, F(1,255)=25.8, p<.0001), predicting a negative relationship with the ratings (β = -1.58, p<.0001).

The regression for effectiveness ratings showed the level of word (*green* versus *negated harmful & neutral*) as marginally significant (R^2=.02, F(1,255)=3.99, p<.05), predicting a negative relationship with the ratings (β = -0.55, p<.05).

The regression for environmentalness ratings were significant (R^2=.14, F(2,224)=18.3, p<.0001), showing both the level of word (*neutral* versus *negated harmful & green*) (β = -1.34, p<.0001) and the individual auto product, much like the comparisons above, (*SUV & Truck* versus *Car*) (β = -0.88, p<.001) significantly predicting a negative relationship with the ratings.

None of the Automobile models returned significant results for any of the demographic information. Note that the data summarized in Table 5.7 only contains significant terms.

Table 5.7 Multiple regression summary for Automobiles

Question type & significant variables	R^2	*df*	*F*	*β*	*p*
Attractiveness	.06	1	13.8		.0003
product type (truck & SUV-car)				-1.10	.0003
Buyability	.10	1	25.8		.0001
product type (truck & SUV-car)				-1.58	.0001

Effectiveness	.02	1	3.99		.05
level of word (green-negated harmful & neutral)				-.55	.05
Environmentalness	.14	2	18.3		.0001
level of word (neutral-negated harmful & green)				-1.34	.0001
product type (SUV & Truck-Car)				-.88	.001

5.4.1.2 Multiple regression of personal care products data

For personal care products, the multiple regression for attractiveness ratings was significant (R^2=.11, F(1,225)=13.4, p<.0001), with one significantly predictive experimental term, the green word level (*neutral* versus *negated harmful & green*) (β = -1.26, p<.0001), and one marginally significantly predictive demographic term, participants' political affiliation (β = -.78, p=.016). The variable for political affiliation suggests that participants reporting either Independent or Right affiliation were somewhat more likely to rate the attractiveness of an item lower than a participant reporting either Left or Other affiliation.

The model for buyability ratings revealed the same pattern for green word level (*neutral* versus *negated harmful & green*) to be significant (R^2=.06, F(1,256)=13.2, p<.0003), predicting a negative relationship with the ratings (β = -1.15, p<.0003).

The regression for effectiveness ratings showed no significance.

The regression for environmentalness ratings were significant (R^2=.22, F(2,224)=21.5, p<.0001). Neutral words were significantly negatively predictive (β = -2.09, p<.0001) while green words were significantly positively predictive (β = 1.61, p<.0001). Additionally, familiarity with green research was marginally positively predictive (β = 0.51, p=.018), suggesting that persons who had some familiarity with this type of research responded slightly

more positively for the environmentalness of personal care products than those who had none.

Table 5.8 Multiple regression summary for Personal Care Products

Question type & significant variables	R^2	*df*	*F*	*β*	*p*
Attractiveness	.11	1	13.4		.0001
level of word (neutral-negated harmful & green)				-1.26	.0001
political affiliation (Ind & Right-Left & Other)				-.78	.016
Buyability	.06	1	13.2		.0003
level of word (neutral-negated harmful & green)				-1.15	.0003
Effectiveness	--	--	--		--
Environmentalness	.22	2	21.5		.0001
level of word (neutral)				-2.09	.0001
level of word (green)				1.61	.0001
Familiarity with green research				.51	.018

5.4.1.3 Multiple regression of cleaning product data

For cleaning products, the multiple regression for attractiveness ratings were significant (R^2=.12, F(1,226)=29.4, p<.0001), showing level of word (*negated harmful* versus *green & neutral*) predicting a negative relationship with the ratings, meaning that negated harmful words resulted in lower ratings of attractiveness than green and neutral words (β = -1.41, p<.0001).

The test for buyability ratings returned a significant model (R^2=.11, F(1,226)=26.9, p<.0001), similarly showing a significantly predictive relationship for word level (*negated harmful* versus *green & neutral*), also with a negative relationship, meaning that negated harmful words resulted also in a lower ratings than green and neutral words (β = -1.30, p<.0001).

The regression for effectiveness ratings were significant (R^2=.06, F(2,226)=15.0,

p<.0001), also with word level (*negated harmful & green*versus *neutral*) showing a negative predictive relationship, suggesting that negated harmful and green words caused lower ratings of effectiveness than neutral words (β = -1.04, p<.0001).

The regression for environmentalness ratings were significant (R^2=.31, F(2,224)=33.2, p<.0001). As with environmentalness ratings for personal care products, neutral words were significantly negatively predictive (β = -2.22, p<.0001) while green words were significantly positively predictive (β = 2.49, p<.0001). Of the demographic variables, gender showed a significantly negative predictive relationship (β = -.53, p=.02).

Table 5.9 Multiple regression summary for Cleaning Products

Question type & significant variables	R^2	*df*	*F*	*β*	*p*
Attractiveness	.12	1	29.4		.0001
level of word (negated harmful-green & neutral)				-1.41	.0001
Buyability	.11	1	26.9		.0001
level of word (negated harmful-green & neutral)				-1.30	.0001
Effectiveness	.06	2	15		.0001
level of word (negated harmful & green-neutral)				-1.04	.0001
Environmentalness	.31	2	33.2		.0001
level of word (neutral)				-2.22	.0001
level of word (green)				2.49	.0001
Gender				-.53	.02

5.4.1.4 Summary of multiple regression findings

In the automobile group, trucks and SUVs were rated lower than cars in attractiveness, buyability, and environmentalness. Effectiveness was rated lower for green words and

environmentalness was rated lower for neutral words. Environmentalness, with two terms (level of word and product type) had the highest correlation (R^2 = .14) with the others also relatively low (buyability R^2 = .10, attractiveness R^2 = .06, and effectiveness R^2 = .02). Perceptions of automobile type are more important than the other tested factors in ratings.

In the personal care products group, both attractiveness and environmentalness were rated lower for neutral words. Attractiveness (R^2 = .11) was also rated lower for Independent and Right political affiliations versus Left & Other. Buyability (R^2 = .06) was rated neutral words than for the negated harmful and green words. Environmentalness ratings (R^2 = .22) were not just lower for neutral words, but were higher for green words and for those familiar with the green research. Effectiveness had no significant variables.

Cleaning products' attractiveness (R^2 = .12) was rated lower for the negated harmful terms, as was buyability (R^2 = ..11). Effectiveness (R^2 = .06) ratings were also lower for negated harmful words and green words. Like personal care products, environmentalness ratings were lower for neutral words and higher for green words. Additionally, females rated cleaning products higher than males for environmentalness. Environmentalness correlations for this group were the highest (R^2 = .31).

In each group, the level of greenness of the term had an effect on the ratings of the products. In several cases, neutral words were shown to cause less favorable ratings for product attributes. Interestingly, in most cases, green words were rated alongside the negated harmful words, showing little difference; however, this placed these two types of words in opposition to the neutral terms, showing some favorability in attractiveness and buyability for the environmental terms. For both personal care and cleaning products, however, green words were very positively associated with environmentalness ratings. Notably, however, this did not

increase the appeal of the products or participants' desires to purchase them. This suggests that environmental terms cause environmental perceptions of associated products.

5.5 Discussion

To examine the effects of green words on consumer's perceptions of products, this chapter focused on answering two questions, *4. How do consumers perceive the effectiveness, the likability, and the environmental impact of different products when linked with green terms? Is there a difference between their perception of a product with a green term and a neutral term or a green term and the negation of an environmentally harmful term?* and *5. Are there any demographic identifiers that can be used to predict consumers' perceptions of these products?*

5.5.1 Automobiles discussion

The multiple regression analysis addresses both questions, looking both at the experimental and the demographic variables. In the multiple regression analysis for the Automobile group, product type was significant for attractiveness, buyability, and environmentalness, in each case, trucks and SUVs were rated more favorably than cars. In addition to the auto type variable, environmentalness ratings were predicted by the level of word, in which neutral words were actually shown to be more predictive of positive ratings than the negated harmful words and green words. This may suggest skepticism with automobile's claims of environmental friendliness, as some research has suggested might be the case with the marketing of green products (Kangun, et al., 1991; Zinkhan & Carlson, 1995). Analysis also showed green words to predict lower effectiveness ratings than the negated harmful and neutral words. No significance with a desire to buy the automobile but positive results from the regression on environmentalness ratings may be expected based on research on high- and low-involvement services in the literature (Chan, et al., 2006), which showed consumers seeing green high-involvement services

more favorably, but not being more interested in purchase of the service.

5.5.2 Personal care products discussion

Attractiveness for personal care products was somewhat dependent upon the participant's political affiliation, though its level of significance was much less than the other predictive factor, green word level. Political affiliation was the only truly demographic factor for this product group that was found to be significant. As a control, familiarity with this research was shown to be somewhat likely in predicting a more positive response for environmentalness.

5.5.3 Cleaning products discussion

All four of the rating types for cleaning products showed significance for the level of word used, which may suggest that they are the most susceptible to green marketing. The results suggested that green and neutral words were more beneficial in perceptions of the product as attractive and buyable. A green term or a negated harmful term, however, had the opposite effect on perceptions of effectiveness, which suggests that consumers perceive cleaning products as less effective when they are green. Interestingly, cleaning products are seen to be harmful to the environment unless marketed with an environmental term, and if that term is positively green, then the product is perceived as being environmentally friendly. The only demographic value found to be significant was gender, in the environmentalness ratings, predicting females would rate cleaning products more positively than males.

5.5.4 Summary of discussion

In answering the question, "*How do consumers perceive the effectiveness, the likability, and the environmental impact of different products when linked with green terms? Is there a difference between their perception of a product with a green term and a neutral term or a green term and the negation of an environmentally harmful term?"*

While the analysis for the automobiles showed that the type of automobile presented mattered most (i.e. was significant in three of the four question types—attractiveness, buyability, and environmentalness ratings), the analysis for personal care and cleaning products showed that the greenness of the term mattered most (for three of the four question types in personal care products and all four in cleaning products). The difference between reactions to automobiles versus cleaning products and personal care products is similar the research shown in high- and low-involvement services (Chan, et al., 2006), where both types of services were seen more favorably green, but only the low-involvement (the cleaning products and the personal care products in this case) were more likely to be purchased based on environmental advertising. Interestingly, only the effectiveness ratings for the personal care products were not found to have a significant term in the analysis. Cleaning product ratings showed that products with green or negated harmful terms were perceived as being less effective than those with neutral terms.

Most notably, for each product group, the environmentalness ratings were significantly higher for the green and the negated-harmful terms than for the neutral terms. For two of the product groups, personal care and cleaning products, ratings were also significantly higher for green terms than for negated-harmful terms. Though the effect of the terms on other questions was not consistent, it was consistent in this. The data would suggest that when a product is marketed with green terms, it is perceived as being more environmentally friendly, given no other knowledge of the product.

In answer to the question, *Are there any demographic identifiers that can be used to predict consumers' perceptions of these products?*, the only significant variables in the multiple regression analysis were *gender* and *political affiliation*, and that in only one rating each, which may not be unexpected, considering that although the majority of research on demographic variables on the green consumer suggests more variables should be significant(J. A. Roberts, 1996; Van Liere & Dunlap, 1980), studies also point out that several pieces of research show variation in these results (Van Liere &

Dunlap, 1980). *Familiarity with the green research*, which could have caused an effect on product ratings, was significant in one rating as well. These results for control factors were not as consistently significant as the results for the experimental variables, which were ratified in the following factorial analysis. As significant demographic identifiers were so scant, no reliable variables were identified for the overall prediction of consumer's perceptions of these products.

6 Conclusions and Future Work

6.1 Conclusions

6.1.1 Question 1

How are green terms used in corpora–with what collocates and in what frequency?

Green language is now an undeniable part of the social lexicon. As demonstrated in this study, the trends of the change in environmental term usage show an increasing prevalence for many words, a change in the lexicon to adapt to growing needs for the discussion of the environmental worldview. Many of the historical events in the environmental movement, such as post-nuclear reactions (Worster, 1977) and post-1960s influx of political and non-profit environmental organizations (Galtung, 1986; Papadakis, 1998), are reflected in the change in language, causing increases in frequency (i.e. *solar*), as well as new (i.e. *eco-friendly*) and changed (i.e. *greenhouse*) words. Not all words in the corpora showed this, with certain words maintaining relatively the same word associations, though each exhibited some kind of changing pattern in frequency, often over significant periods of time. Others were found to be increasingly collocated with other eco-language. Growth of this kind is just a reaction of the changes that occur more deeply inside the values of society or in the circumstances surrounding speakers (Keller, 1994). As green language becomes more salient, it shows an increased importance of green topics in the minds of its speakers. The trend is clear. Whether by actions or just by words, the environmental movement is growing, and it does not just stem from environmentalists.

6.1.2 Question 2

Do some words connote greenness more than others: in other words, can different levels of greenness be identified?

Whether skeptical of the claims of the environmental movement or supporters, those who

engage in discourse about it add to the trend shown in the corpora, which ultimately adds to the social awareness of the topic, reinforcing the associated linguistic items. This has had a measurable impact. Though no comparison exists for green term ratings, those terms that we might expect to see as green from the corpus data were actually rated as such. The gradation in different terms' greenness ratings, even with non-environmental terms to serve as distractors, showed differences in the levels of perceived greenness of those terms. These words covered the entire range of the scale, from those seen as very harmful to those seen as uninvolved to those seen as being very beneficial to the environment.

6.1.3 Question 3

Is the level of greenness of a term significantly different based on a person's gender, age, political affiliation, or feelings toward the environment?

Notably, it seems that differences in greenness of terms were perceived by participants in general, but that those expressing more extreme opinions on the environment have a slightly stronger reaction to green words, their ratings of the words matching their orientation of environmental worldview. Additional demographics had an effect. Age had a positive effect on harmful ratings (older meant less extreme). Gender did have a positive effect on green ratings (females rated green terms higher). Political affiliation had a negative effect on both green and neutral ratings, where right-affiliated participants rated green lower than Independents, and both right- and left-affiliated participants rated neutral words more negatively. Location by political activity didn't have an effect. No research specifically on green terms and demographic variables exists for comparison, but demographics have had significant effects on people's language use and perception, including age (Cameron, 2005; Parks & Robertson, 1998; Trudgill, 1972), gender (Lai, 2007; Trudgill, 1972), and political forces (Bilaniuk, 2003; Chand, 2011).

The environmental concern ratings from the NEP scale were significant for both green and harmful terms. Those participants who landed higher on the NEP scale rated them more extremely on

either side. These results show people with a certain worldview perceiving language a certain way and suggest that the way individuals see the world is reflected in the way they view language terms. It seems to be a reversal of the Sapir-Whorf hypothesis (Whorf, 1956) and to echo some of what Lakoff suggests with the Dyirbal people; as their demographics changed, they saw the world differently and it affected their use of language (1990).

6.1.4 Question 4

How do consumers perceive the effectiveness, the likability, and the environmental impact of different products when linked with green terms? Is there a difference between their perception of a product with a green term and a neutral term or a green term and the negation of an environmentally harmful term?

As it turns out, people really do think *eco-friendly* has something to do with *good-for-the-environment*. Interestingly, topping the list of those good-for-the-environment words was not a coinage (*biodegradable*), a color (*green*), or a creative use (*eco-friendly*); though political, environmental, and corporate groups drive much of the environmental movement and its language use, their *sustainable* words could not take the top place of nature's own *tree* in the greenness ratings.

Markets do, however, benefit from green language use. As demonstrated by the collocation in the corpora, much of the language development is at least associated with, if not driven by, the market's attempt to provide products which sell and thus become increasingly *green* (see Table 3.12). Of all the characteristics of products and participants alike, the most consistently significant result was the level of greenness of the associated word. This was especially the case for the personal care products and the cleaning products. These types of products may be more probably associated with greenness and sustainability than automobiles. Other possibilities lie in choices for specific products in a product type that are more opinion and preference based—i.e. a person's choice of an automobile is more driven by their like or dislike of a car versus an SUV—or because the choice is fundamentally different based on requirement—a person requires only one automobile to drive, yet requires each of the personal care and

cleaning products for normal use. Some research in marketing focuses on these non-durable, everyday items because of the differences in the effects of advertisements on perceptions of the two different classes of products (Minton & Rose, 1997). Differences in the desire to purchase high- (automobile) versus low-involvement (cleaning) products have been accounted for in the literature (Chan, et al., 2006) and may explain the effect. Despite this, not only were personal care and cleaning products rated higher on environmentalness ratings for green words—and negated harmful words were rated almost as high—but each product type, including automobiles, was rated significantly higher for environmentalness. In short, when someone tells a consumer that a product is green, they believe it.

6.1.5 Question 5

Are there any demographic identifiers that can be used to predict consumers' perceptions of these products?

While a number of studies have explored the demographic and attitudinal profile of the green consumer, they did not provide a consistent description of what variables make up that consumer (Diamantopoulos, et al., 2003; Minton & Rose, 1997; J. A. Roberts, 1996; Van Liere & Dunlap, 1980). This research adds to the inconsistency rather than solving it. The only two demographic variables that were found to be significant were gender and political affiliation, and those only in one rating for one product each; females rated cleaning products higher for environmentalness and politically independent- and right-affiliated participants rated personal care products lower for attractiveness than left- and other-affiliated participants. Although several other studies suggested that environmental concern ratings affected product perceptions (Minton & Rose, 1997; Phau & Ong, 2007), ratings from the NEP were not significant at all in the analysis. Potential causes for the lack of significant demographics are discussed in the following limitations section. Based upon the research, there are no consistent demographic variables that can predict an individual’s ratings of green products.

6.2 Implications

This research has potential practical applications to marketers and advertisers. As adjusting cultural approaches to advertising can increase its effectiveness (Hornikx & O'Keefe, 2011), adjusting the language of advertisements to fit ideological and demographic characteristics can also increase effectiveness (Shrum, et al., 1995). As green language has been positively identified as a factor in some products' values, and especially in the status of the product as being environmentally friendly, marketers can use the information to more convincingly present their products. This research shows that if you call a product green, people think it's green. This does not necessarily mean that the product is more desirable or likeable, however, and factors beyond the piece of language used to describe the product may have a greater effect, as in high-purchase products like automobiles. Likely, consumers need a greater amount of information for such high-involvement purchases.

Marketers should understand that the reaction to green terms and products differs by the genre of products, and that some words may have a greater effect on certain products than on others. Exploring those differences can lead to more effective use of language in advertisement of products. Additionally, as framing has been shown to have an effect in the persuasiveness of messages (Kolandai-Matchett, 2009; Maheswaran & Meyers-Levy, 1990), something of message-framing may exist within terms themselves, as suggested by differences between green and negated-harmful terms, which could be used effectively in the presentation of products. Sensitivity to the language used to market or describe products can have an incredible effect, as shown in recent news regarding lean, finely textured beef, or boneless lean beef trimmings, now commonly known as "pink slime," which has taken a hit from public and private parties alike (Blaney, 2012; Haggerty, 2012). The beef trimmings, processed to remove bone and fat and used as an additive in ground beef, never suffered

from the negative attention until the coinage was quoted in a 2009 New York Times article (Choi, 2012). As in the case of “pink slime,” how products are referred to can have a drastic effect on their success, or demise, in the marketplace.

Marketing should be done with some responsibility, however, as on the legislative side, governments have already begun regulating environmental claims made by corporations, as in the Federal Trade Commission’s “Green Guides” ("Federal Trade Commission's Green Guides," 2012), and other researchers have recognized the need for regulation of such claims (Morris, et al., 1995; Scammon & Mayer, 1995). Legal entities are aware of the power of language in advertising, as suggested by US laws regulating tobacco’s advertising (Mundy & Etter, 2009). This research has the potential to support consumer protection, as consumers can often be deceived (Cason & Gangadharan, 2002; Seo & Scammon, 2010) by false claims.

Beyond the legal implications are the political. Though the findings of the research only showed political standing to be marginally predictive of language perception, the relationship could be valuable in understanding constituencies. Language used in green politics can be seen as more extreme depending on the constituent’s demographics, including also their beliefs about the environment. With additional research, this relationship may also lead to possibilities for understanding individuals’ political environmental views based upon the language they use.

There are also theoretical implications of the research. Language change principles as discussed by Keller (1994) are supported by the corpus study, as well as the experiments showing the perception of language and the effects of that language on perceptions of the world. As the corpus data has shown green language’s increase over time, research in green marketing and advertising has shown an increased interest in environmental products. Moreover, green terms are perceived as having an effect on the environment, beneficial or harmful, depending upon the term, and these terms help shape the thoughts of individuals regarding products, or things in the world. It seems that both the “organismic”

and the “mechanistic” are at play in this shift, and that the movement toward environmental consciousness is one both naturally shifting in reaction to the circumstances surrounding speakers (i.e. a growth in interest in the environment) and changing based upon expressed intentions of those speakers (i.e. increasing green marketing that affects people’s perceptions).

This is related to the relationship between language and thought. Though not directly affecting the debate on linguistic relativity and the Sapir-Whorf hypothesis (Whorf, 1956), the research suggests that the differences in language perception can be accounted for by speaker demographics and world view (as in the NEP scale), following some of the points Lakoff (1990) makes about Dyirbal. Moreover, sociolinguistic research describing the relationship between demographics and language perception has been affirmed, showing that some demographic variables can have an effect, albeit marginal, on people’s perceptions of language (Lai, 2007; Parks & Robertson, 1998).

Results also affirm that corpus methods can be used effectively to view the connection between linguistic trends and social trends. Massive unstructured corpora such as Google Books also seem to parallel large structured corpora like COHA in their data. These large corpora that are now available to us give us the ability not only to view frequencies and changes in time, but also allow us to make judgments about semantic value based upon collocation. Usage of corpus data in speaker perception tests can offer verification of these judgments.

This research also shows than an increase in language related research in marketing could be beneficial. Most marketing studies tend not to focus solely on linguistic factors, which may not allow for a complete enough understanding of language to optimize the choice of terms in the promotion of products. Focusing on the linguistic terms themselves can reveal what is not effective (i.e. green terms to increase automobile buyability) and what is effective (i.e. green terms to increase cleaning product buyability, or creating a product image of environmental quality).

6.3 Assumptions and Delimitations Summary

Several assumptions were made and delimitations exist in the course of this study. In the first section of the study, the corpus approach was necessarily limited in scope to a selection of words from the body of all potential green words. It was assumed that these words represented a portion of those used in green marketing, though they were gathered based on observation and were not a truly random sampling.

In the following portions of the study, participants and methodology were limited by additional restraints and assumptions. The population used for both surveys was somewhat limited, as evidenced in the description of their statistics. Both the gathering method through social contacts, media, and university personnel limited the population represented to a smaller subset of the whole. Additionally, an online survey was chosen for the convenience of sampling, but along with it went several limitations. It is assumed that the participants took the survey following the given guidelines, but the nature of online surveys does not allow for extraneous variable control. Moreover, access to a computer and the ability to access the internet were both requirements for participation in the study. In the study of products and green words itself, the combination of products with environmental terms was arbitrary and done based on what fit best with potential advertisements, while still maintaining a representation of the different levels of greenness identified in Chapter 4. In future research, this limitation may be avoided. Similarly, though the framing of the products was controlled, the situation did not adequately represent the advertising and purchasing experience. This was done by design, to limit the effects of confounding variables, though it limits the practicality of the application of the results.

Additionally, though the analysis of the data in Chapters 5 did show some relationship between demographics and the ratings of products, the literature suggested that there should have been more conclusive effects (Diamantopoulos, et al., 2003; Van Liere & Dunlap, 1980). This may have been due to a low number of participants, which, though enough to give significance on the experimental

variables, may not have been enough to account for demographics due to the high number of variables included in the analysis. With additional participants, the results may have revealed a better picture of the green consumer.

6.4 Recommendations for Future Research

The present study examines dominantly words which most people would probably agree are associated with the environment. As seen in the corpus data, there are many common words which are associated with the words examined that may not be so quickly associated with ecological matters. An examination of what we might call "peripheral" environmental words, including some of the collocates found in Chapter 3 along with additional words that may be associated with green language more loosely, might suggest the process by which green language develops. Environmental terms may cause something of a bleeding effect, causing these peripheral words to absorb some of their greenness. One example of this is the word *organic* as a node with, with *garden* as a collocate. *Garden* may not necessarily be associated with the environment or environmental friendliness, though *organic* notably is. In today's culture, however, gardens are seen more and more as a natural way to grow food, and those who grow gardens are more likely to care about the environment, or at least care about health, which may also be linked to environmental concern. Trending the collocation of a "peripheral" word like *garden* may show this bleeding effect by an increase in the frequency of green collocates itself, and would suggest trends of deepening environmental awareness in society. Future studies should examine the perceived greenness of these words, as well as their effect on consumer product perception, and should also use more subtle approaches such as timed choice and association tasks.

Though the corpora used in this experiment were large, they did not contain every genre of text where these words are used. One might expect to see words like *botanical* less often in news and

literature than one would on the grocery aisle. Including additional corpora of brand names, slogans, advertising labels, and other ad copy might show a different trend than the one shown in the corpus study. The addition of this and other corpora might explain some of the "other" trends shown in the data.

Additionally, an examination of more "core" environmental words in addition to the peripheral words would be extremely beneficial in the application of this work within marketing, policy, and academics. By creating a more exhaustive list of terms rated for their greenness, academic organizations, companies, policy-makers, and other entities interested in the environmental movement would be able to draw clearer conclusions about people's perceptions of the terms. In addition, a corpus of these words with ratings over time would allow a better understanding of the green movement and social perceptions of it, analysis of which may lead to a better understanding of overall linguistic change.

To add to the understanding of what makes green words, a discussion of the linguistic makeup of these words would be beneficial. An examination of morphological and phonological descriptions of green words may reveal patterns as to how these words are developed, where they originate from, and provide parallels to other linguistic processes. As part of this study, a comparison between the development of these words and words which have undergone lexicalization would be telling.

In order to understand the role of language in marketing more fully, future research should include additional methodologies. A more exhaustive comparison of parings of various green terms with products (i.e. *environmentally friendly* soap vs. *eco-friendly* soap vs. *earth-friendly* soap, etc.) would be able to show the relationship between differently rated green words and their associated product ratings; would there be a positive linear relationship between greenness ratings of a word and greenness ratings of a product? Likewise, using a wider variety of products could provide valuable information for marketers and linguists alike. Application of a method like conjoint analysis (Cattin &

Wittink, 1982) to a more linguistically focused product rating would show the importance of the linguistic item in comparison to the other characteristics of the product.

6.5 Conclusion Summary

Language is changing as a response to the broadening environmental awareness, but also a mode of dissemination to the environmental awareness. Lexical items are seen as associated with this social movement in the minds of speakers, though it is not obvious specifically what types of people will perceive environmentalness in language and in the world, as in the case with green language and product ratings. Maybe this is because the green movement is broadening, and people from different demographics are exposed increasingly to the language of the environmentally concerned such that it affects their external perceptions of the world (i.e. of products) but not their internal beliefs (i.e. as measured by scales like the NEP). One thing is for certain; language is a powerful tool, and it influences our perceptions of the world.

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8 Appendix

8.1 Appendix A Data for Ch. 3 Analysis

8.1.1 Frequency in GoogleBooks and COHA

8.1.1.1 Words showing increase - starting after 1960s

'renewable'

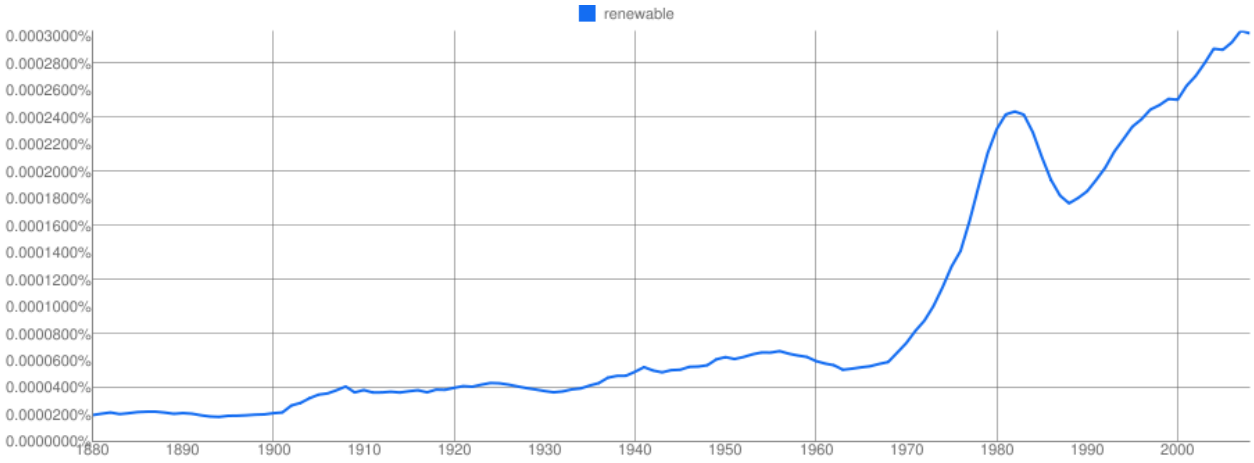

Figure 8.1 Google Books trend of 'renewable' from 1880 to 2008

CLICK ON BARS FOR CONTEXT — CLICK ON COLUMN HEADINGS FOR FR

SECTION	1810	1820	1830	1840	1850	1860	1870	1880	1890	1900	1910	1920	1930	1940	1950	1960	1970	1980	1990	2000
FREQ	0	0	4	3	0	0	1	6	1	1	1	3	4	2	8	12	11	28	92	119
PER MIL	0.00	0.00	0.29	0.19	0.00	0.00	0.05	0.30	0.05	0.05	0.04	0.12	0.16	0.08	0.33	0.50	0.46	1.11	3.29	4.02

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Figure 8.2 COHA trend of 'renewable' from 1800 to 2000

'biodegradable'

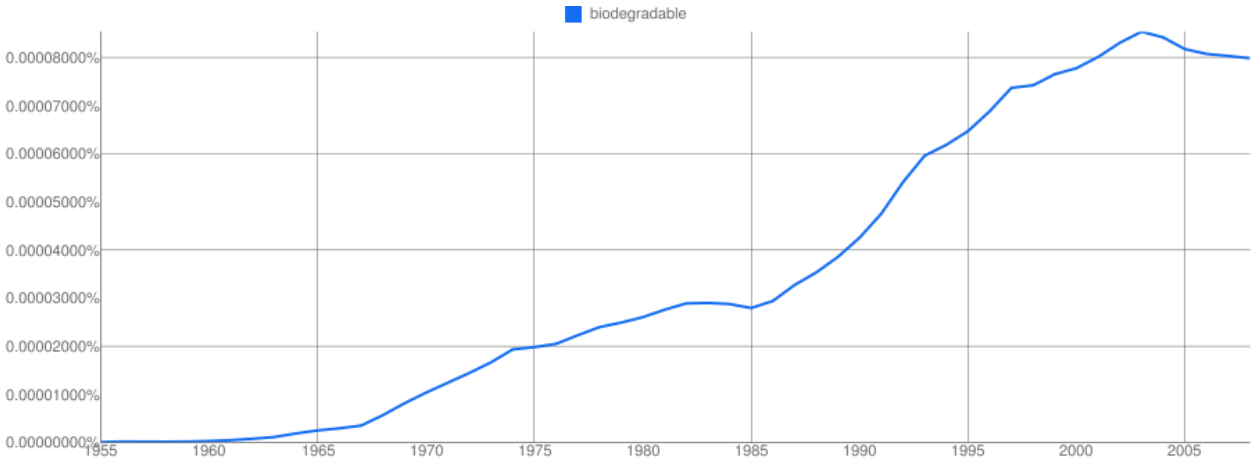

Figure 8.3 Google Books trend of 'biodegradable' from 1955 to 2008

'recyclable'

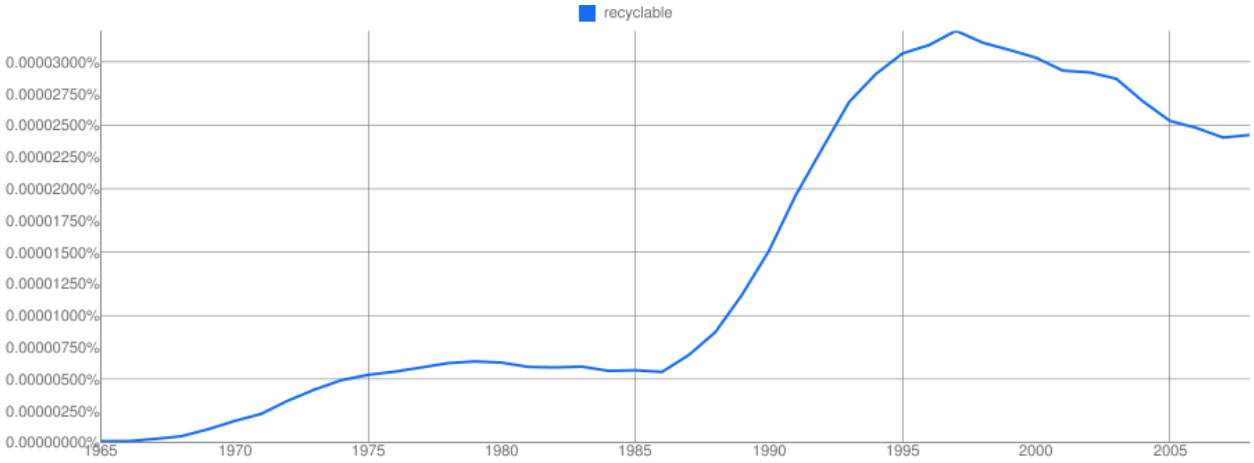

Figure 8.4 Google Books trend of 'recyclable' from 1965 to 2008

'ecofriendly'

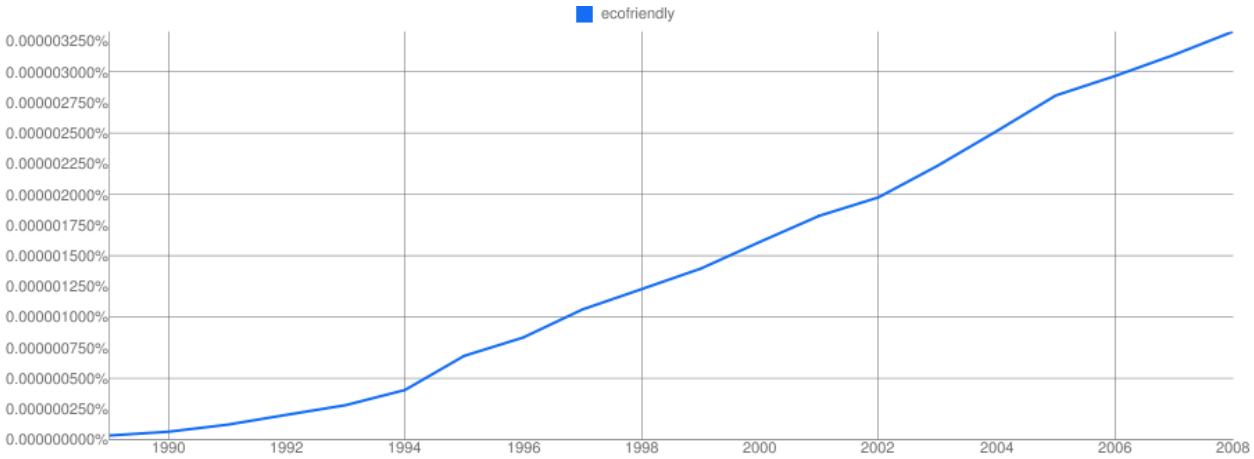

Figure 8.5 Google Books trend of 'ecofriendly' from 1988 to 2008

'environmentally friendly'

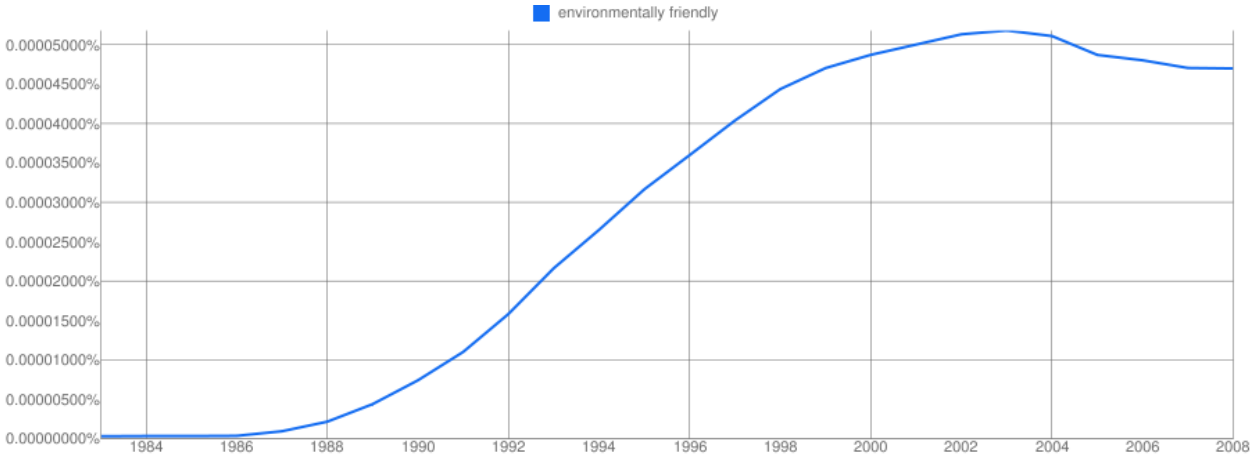

Figure 8.6 Google Books trend of 'environmentally friendly' from 1984 to 2008

'sustainable'

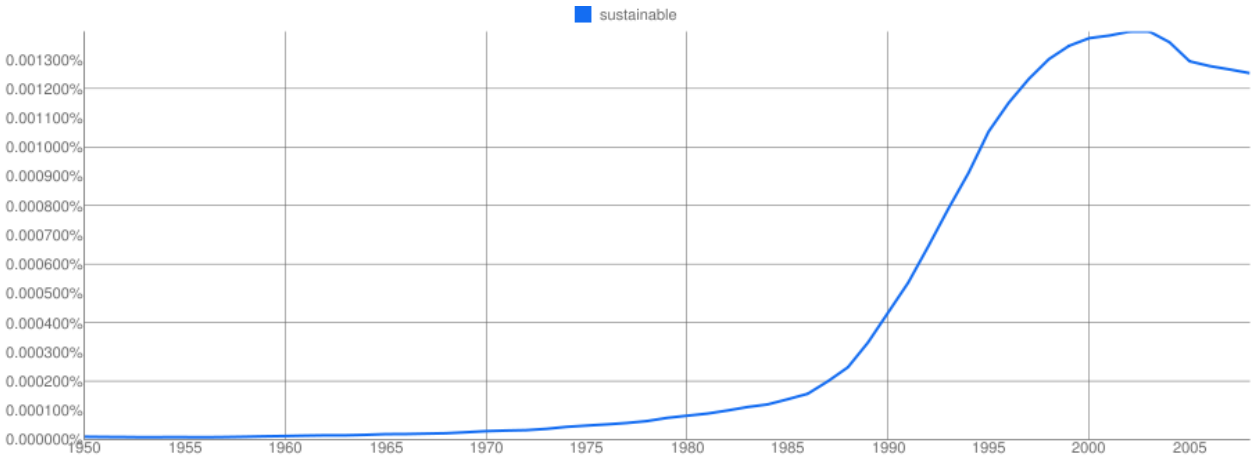

Figure 8.7 Google Books trend of 'sustainable' from 1950 to 2008

'environmentalism'

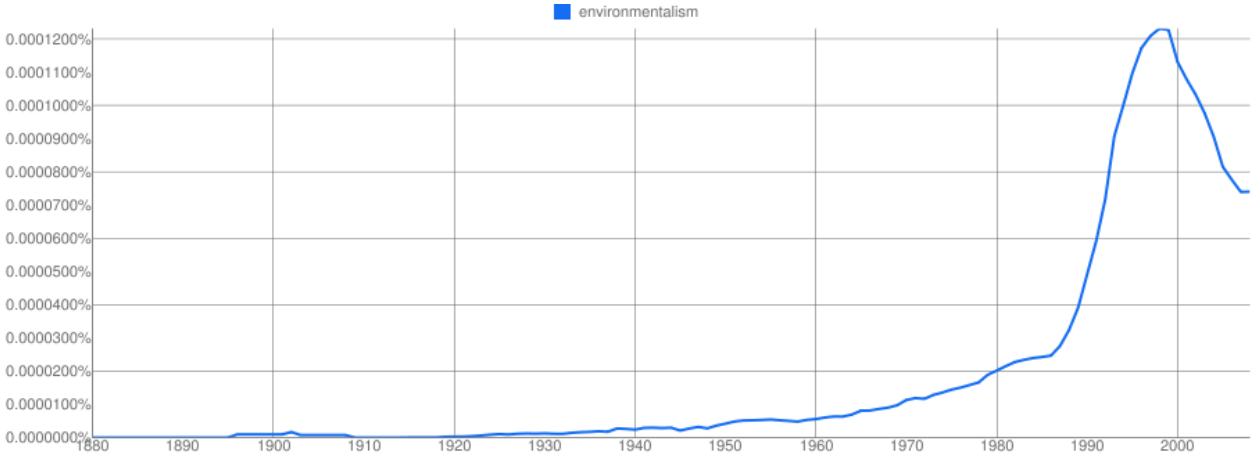

Figure 8.9 COHA trend of 'environmentalism' from 1800 to 2000

'greenhouse'

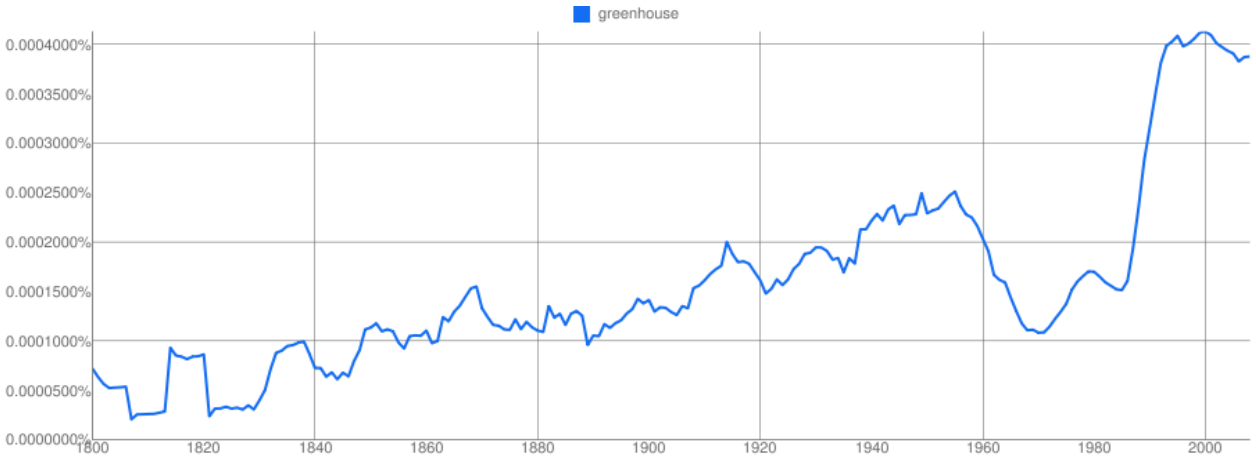

Figure 8.10 Google Books trend of 'greenhouse' from 1800 to 2008

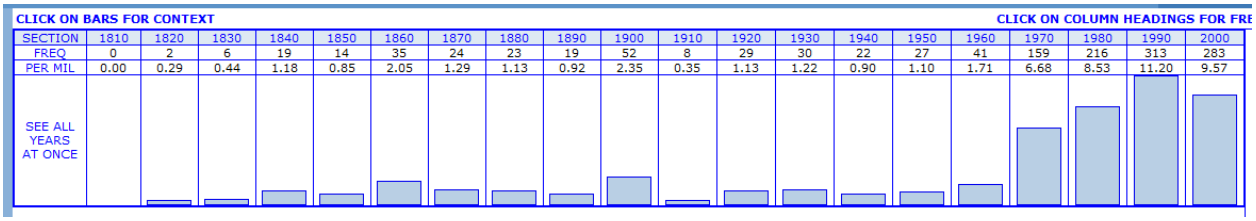

Figure 8.11COHA trend of 'greenhouse' from 1800 to 2000

'emissions'

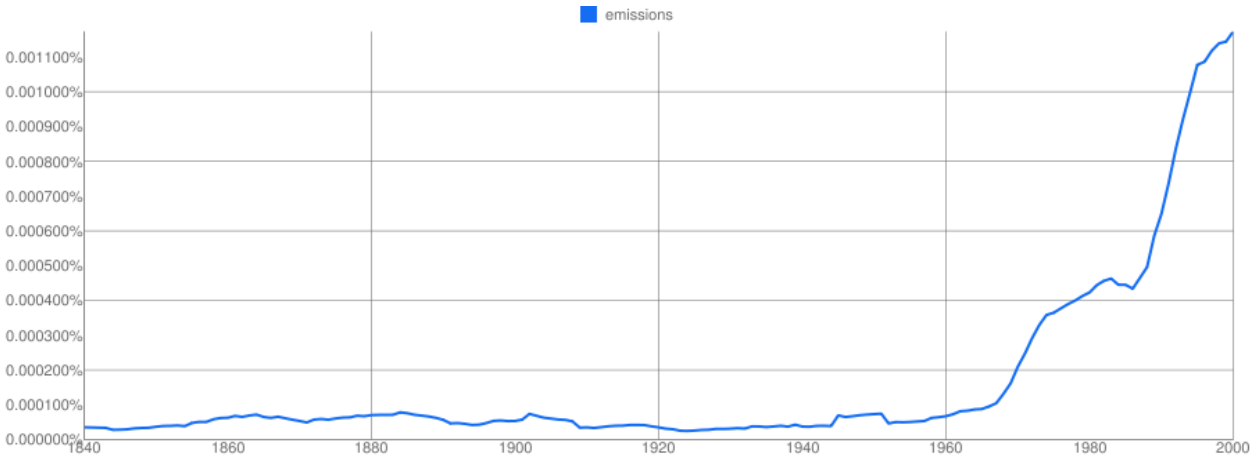

Figure 8.12 Google Books trend of 'emissions' from 1840 to 2000

8.1.1.2 Words showing increase over time from before 1960

'non-toxic'

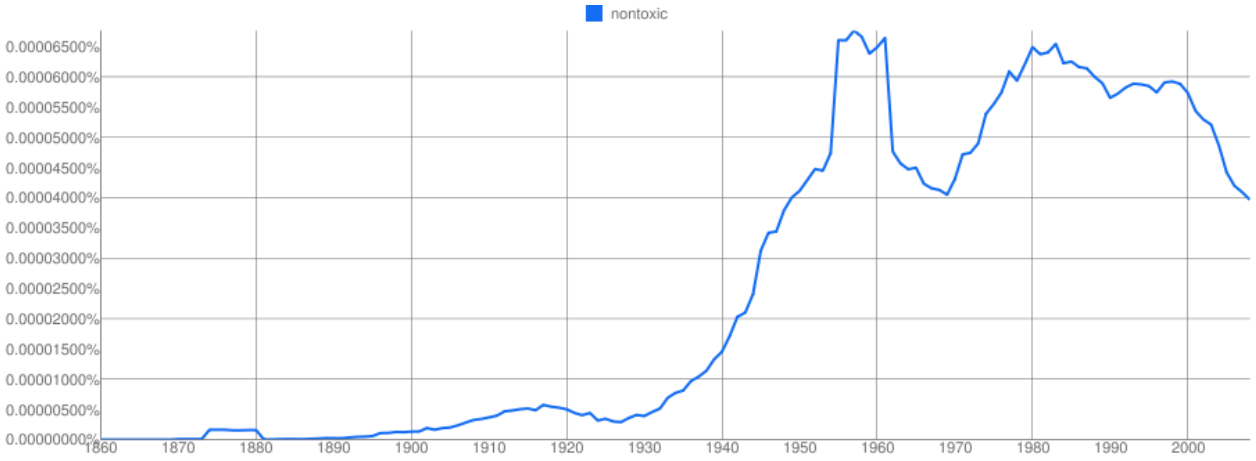

Figure 8.13 Google Books trend of 'non-toxic' from 1860 to 2008

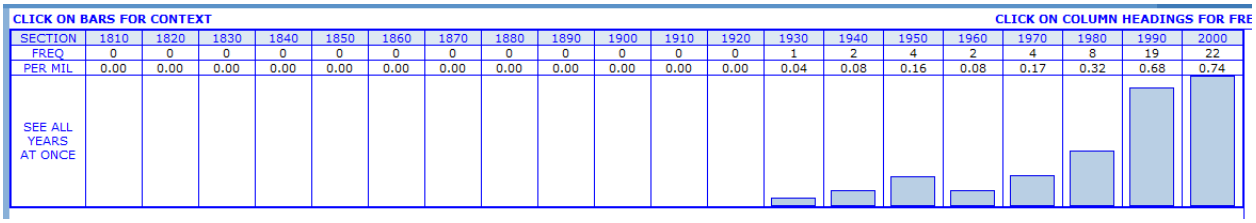

Figure 8.14COHA trend of 'non-toxic' from 1800 to 2000

'organic'

Figure 8.15 Google Books trend of 'organic' from 1800 to 2008

'plant-based'

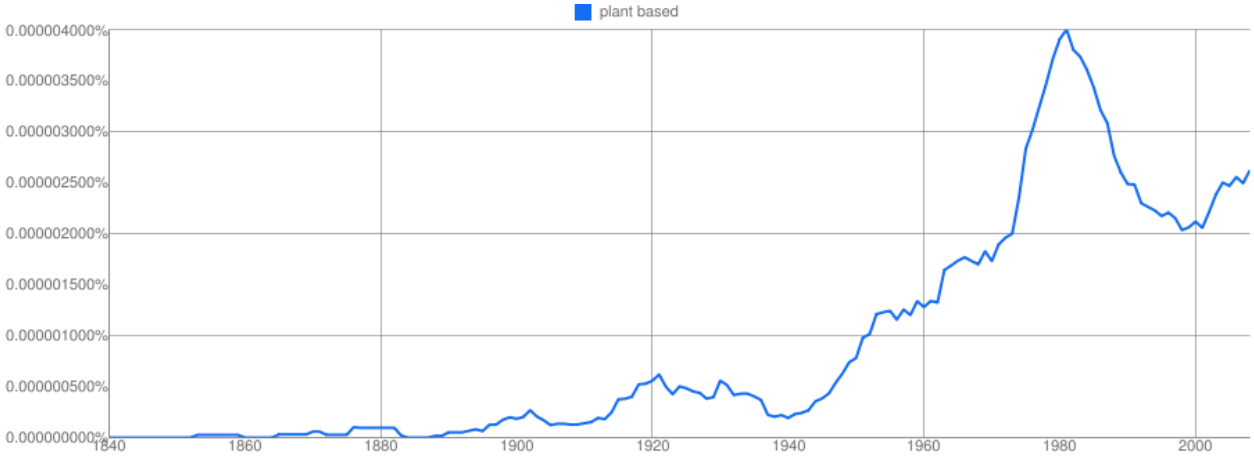

Figure 8.16 Google Books trend of 'plant-based' from 1840 to 2008

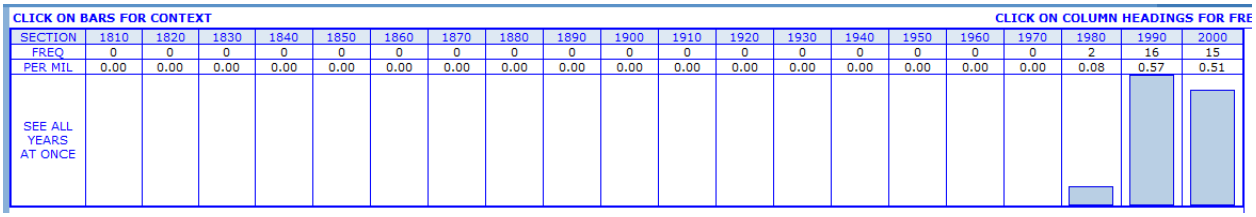

Figure 8.17 COHA trend of 'plant-based' from 1800 to 2000

'hybrid'

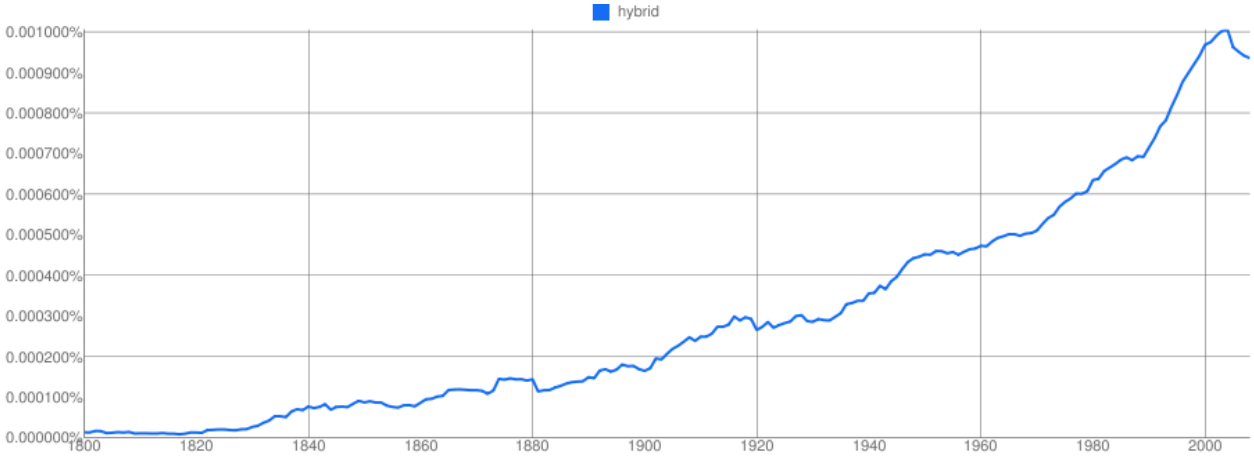

Figure 8.18 Google Books trend of 'hybrid' from 1800 to 2008

'toxic'

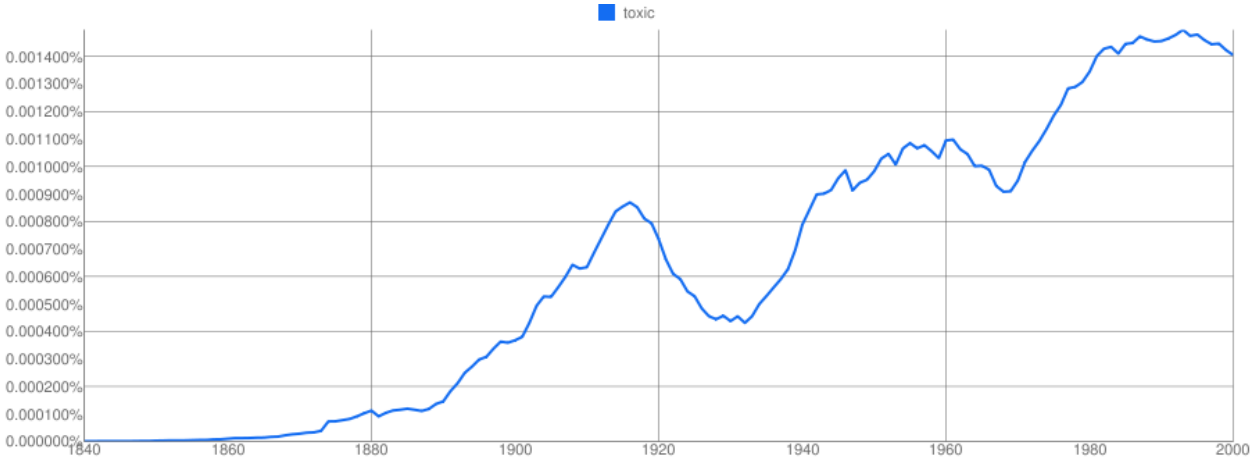

Figure 8.19 Google Books trend of 'toxic' from 1840 to 2000

'fuel'

Figure 8.20 Google Books trend of 'fuel' from 1800 to 2008

'solar'

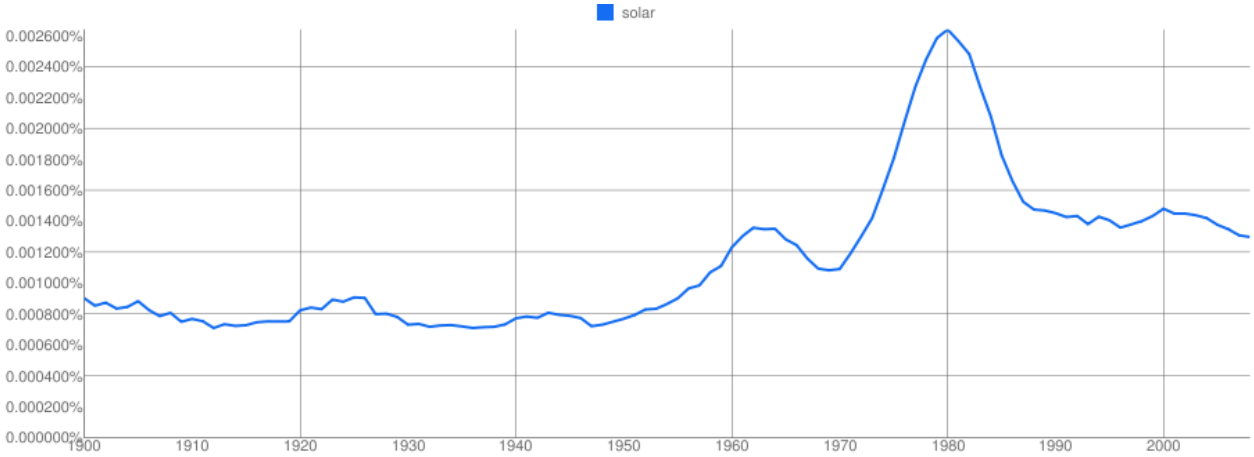

Figure 8.21 Google Books trend of 'solar' from 1900 to 2008

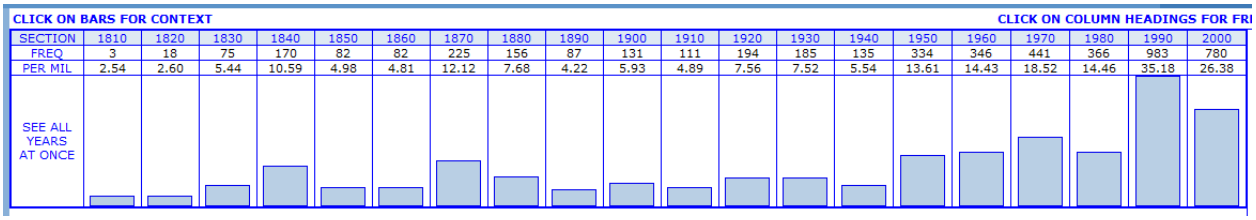

Figure 8.22 COHA trend of 'solar' from 1800 to 2000

8.1.1.3 Words showing decrease over time:

'natural'

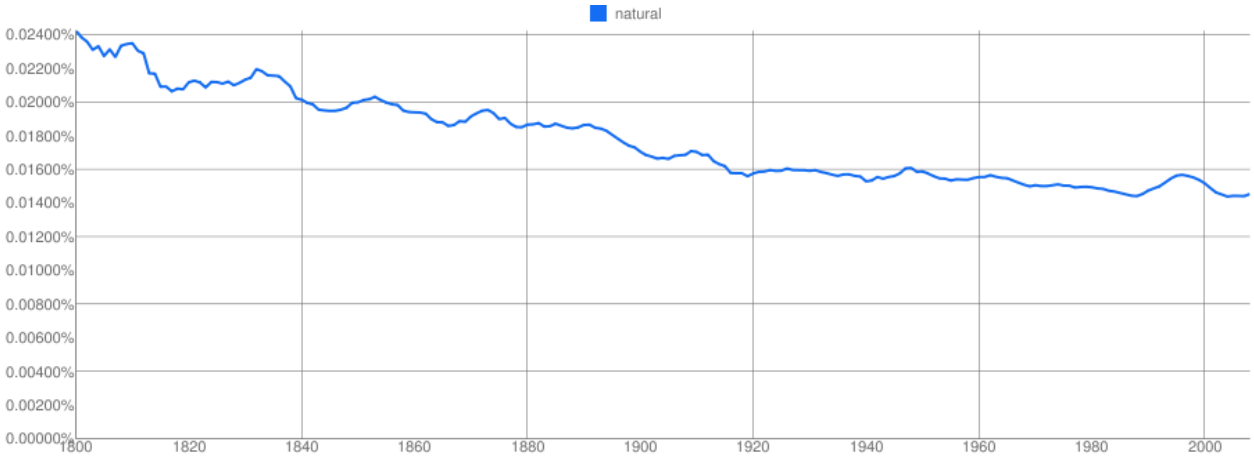

Figure 8.23 Google Books trend of 'natural' from 1800 to 2008

CLICK ON BARS FOR CONTEXT — CLICK ON COLUMN HEADINGS FOR FR

SECTION	1810	1820	1830	1840	1850	1860	1870	1880	1890	1900	1910	1920	1930	1940	1950	1960	1970	1980	1990	2000
FREQ	217	1598	3405	3833	3801	3431	3571	3885	3720	3527	3182	3255	2731	2608	2585	2416	2893	2481	3613	3532
PER MIL	183.71	230.69	247.19	238.84	230.76	201.17	192.38	191.23	180.58	159.61	140.17	126.88	111.00	107.11	105.32	100.76	121.48	98.00	129.31	119.46

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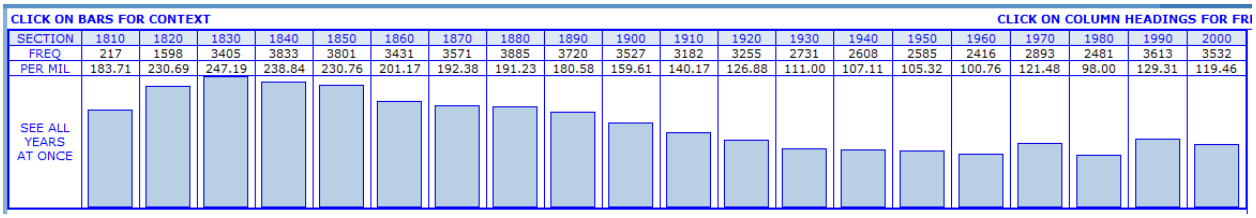


Figure 8.24 COHA trend of 'natural' from 1800 to 2000

'harmony'

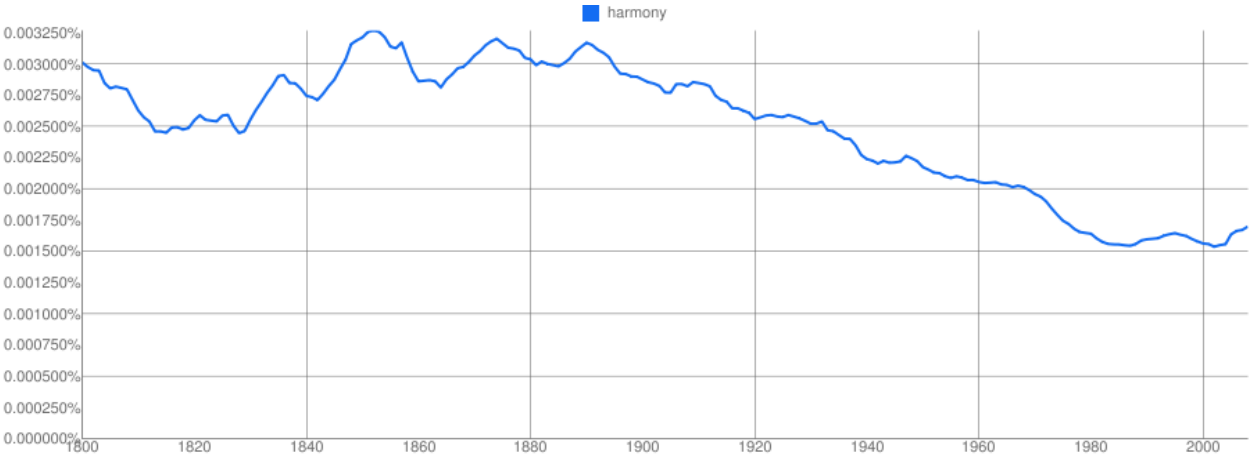


Figure 8.25 Google Books trend of 'harmony' from 1800 to 2008

'botanical'

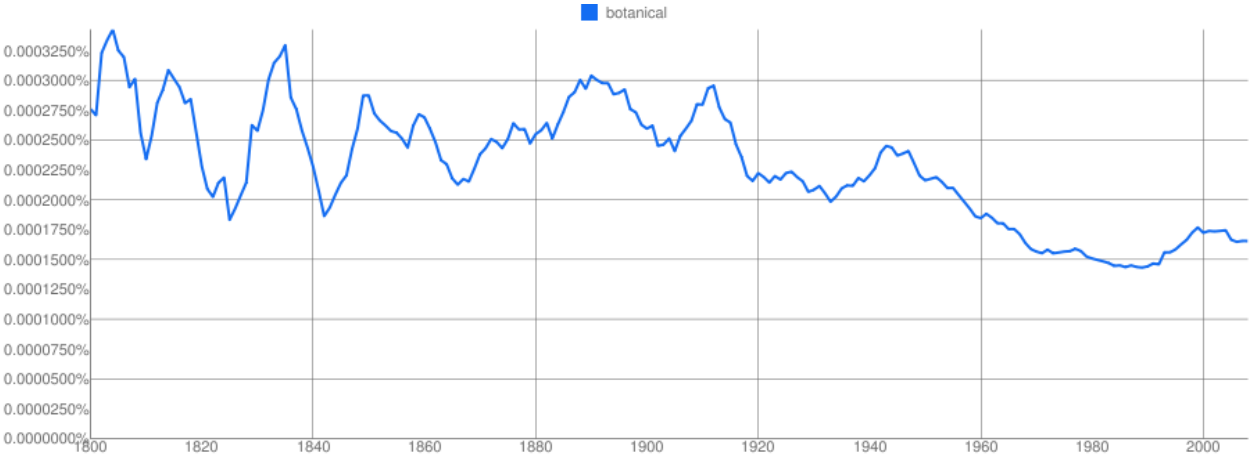


Figure 8.26 Google Books trend of 'botanical' from 1800 to 2008

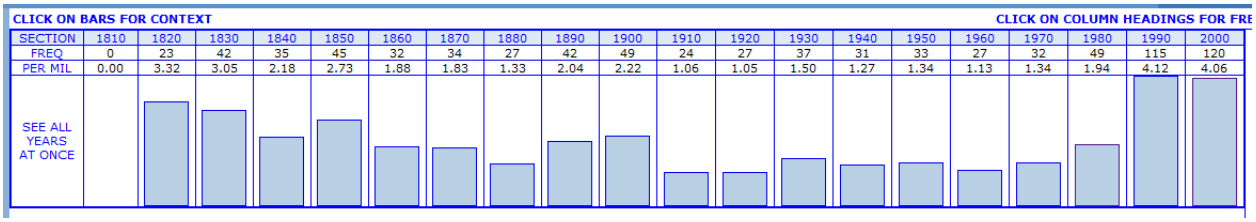


Figure 8.27 COHA trend of 'botanical' from 1800 to 2000

'wind'

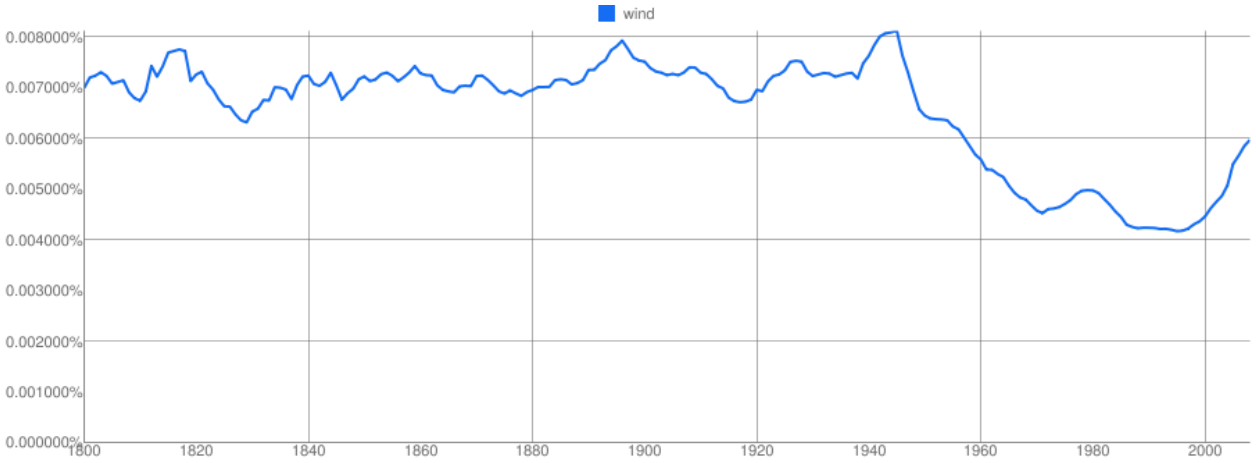


Figure 8.28 Google Books trend of 'wind' from 1800 to 2008

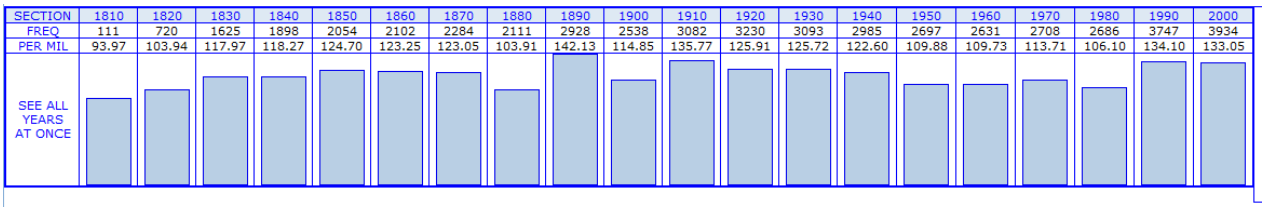


Figure 8.29 COHA trend of 'wind' from 1800 to 2000

8.1.1.4 Words with other trends:

'fresh'

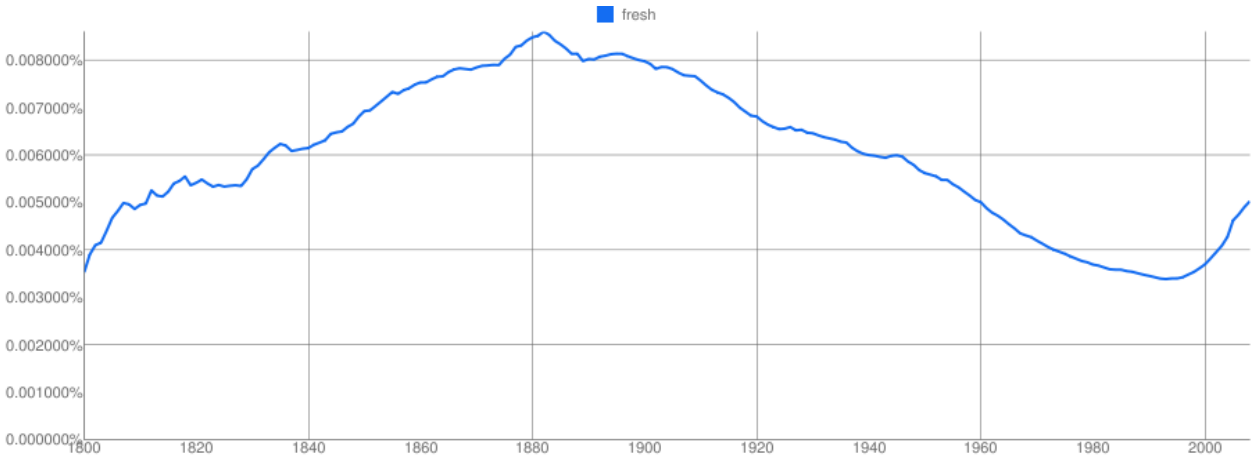
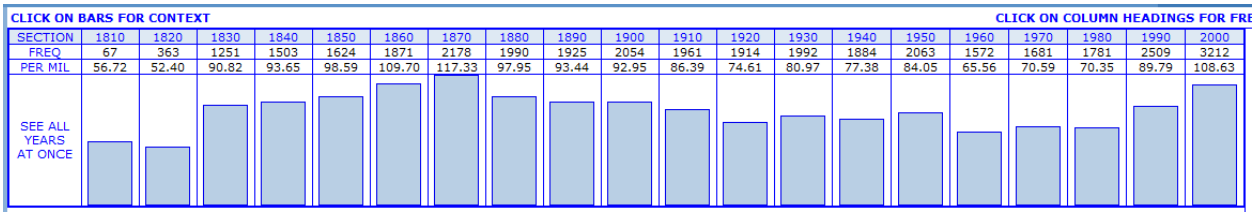


Figure 8.30 Google Books trend of 'fresh' from 1800 to 2008



CLICK ON BARS FOR CONTEXT — CLICK ON COLUMN HEADINGS FOR FRE

SECTION	1810	1820	1830	1840	1850	1860	1870	1880	1890	1900	1910	1920	1930	1940	1950	1960	1970	1980	1990	2000
FREQ	67	363	1251	1503	1624	1871	2178	1990	1925	2054	1961	1914	1992	1884	2063	1572	1681	1781	2509	3212
PER MIL	56.72	52.40	90.82	93.65	98.59	109.70	117.33	97.95	93.44	92.95	86.39	74.61	80.97	77.38	84.05	65.56	70.59	70.35	89.79	108.63

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Figure 8.31 COHA trend of 'fresh' from 1800 to 2000

'green'

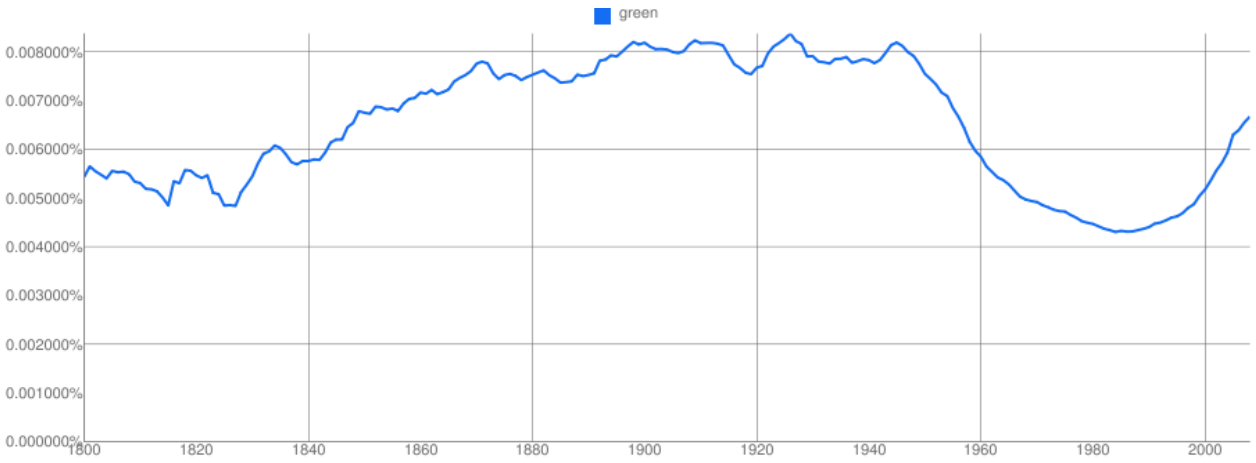


Figure 8.32 Google Books trend of 'green' from 1800 to 2008

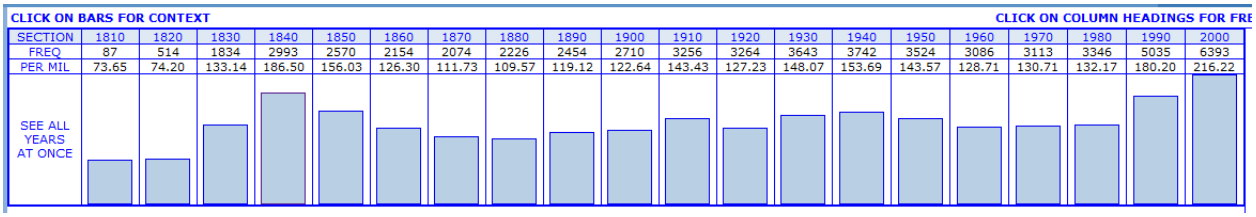


Figure 8.33 COHA trend of 'green' from 1800 to 2000

'gas'

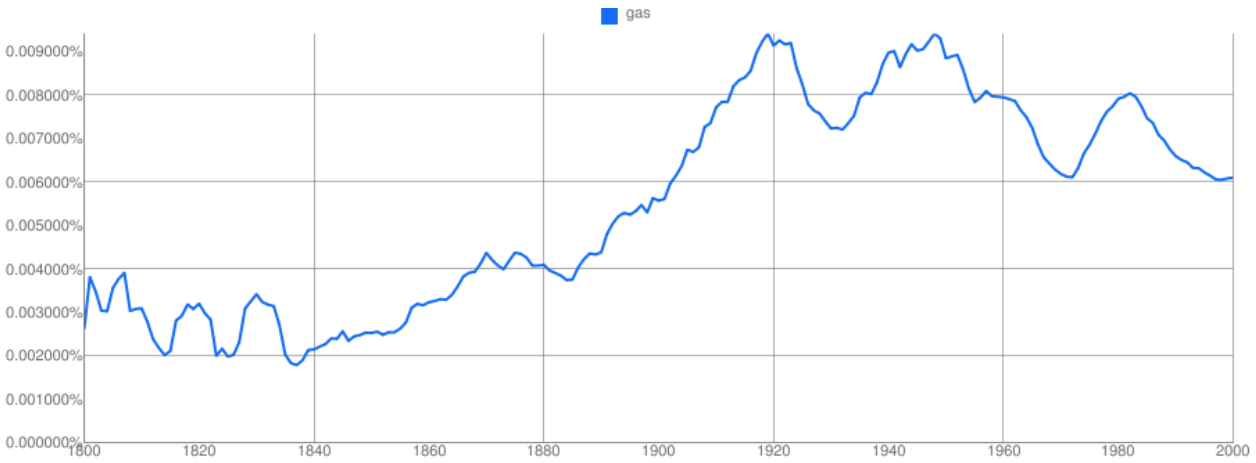
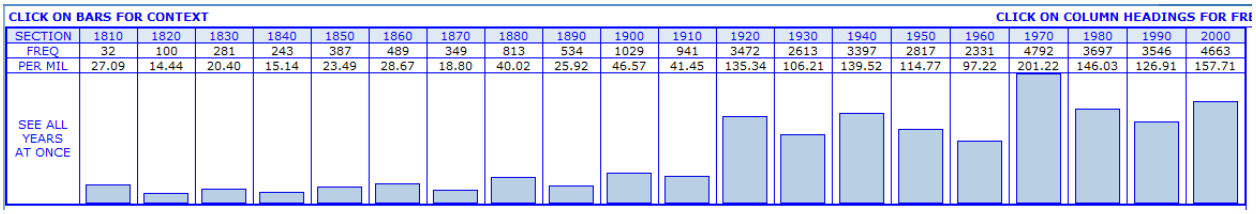


Figure 8.34 Google Books trend of 'gas' from 1800 to 2000

'oil'

Figure 8.35 Google Books trend of 'oil' from 1800 to 2000



CLICK ON BARS FOR CONTEXT — CLICK ON COLUMN HEADINGS FOR FR

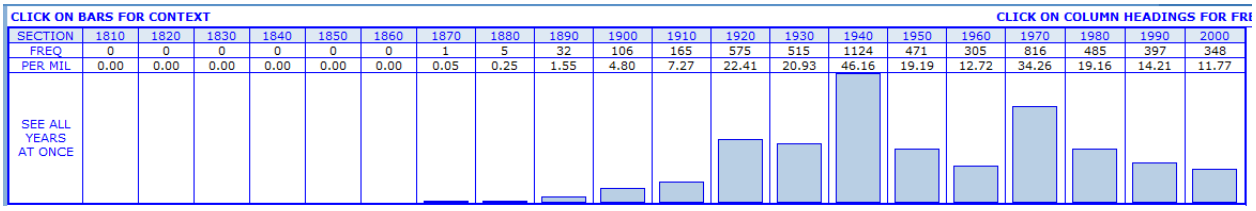
SECTION	1810	1820	1830	1840	1850	1860	1870	1880	1890	1900	1910	1920	1930	1940	1950	1960	1970	1980	1990	2000
FREQ	32	100	281	243	387	489	349	813	534	1029	941	3472	2613	3397	2817	2331	4792	3697	3546	4663
PER MIL	27.09	14.44	20.40	15.14	23.49	28.67	18.80	40.02	25.92	46.57	41.45	135.34	106.21	139.52	114.77	97.22	201.22	146.03	126.91	157.71

SEE ALL YEARS AT ONCE

Figure 8.36 COHA trend of 'oil' from 1800 to 2000

'gasoline'

Figure 8.37 Google Books trend of 'gasoline' from 1880 to 2000



CLICK ON BARS FOR CONTEXT — CLICK ON COLUMN HEADINGS FOR FR

SECTION	1810	1820	1830	1840	1850	1860	1870	1880	1890	1900	1910	1920	1930	1940	1950	1960	1970	1980	1990	2000
FREQ	0	0	0	0	0	0	1	5	32	106	165	575	515	1124	471	305	816	485	397	348
PER MIL	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.25	1.55	4.80	7.27	22.41	20.93	46.16	19.19	12.72	34.26	19.16	14.21	11.77

SEE ALL YEARS AT ONCE

Figure 8.39 COHA trend of 'gasoline' from 1800 to 2000

'industrial'

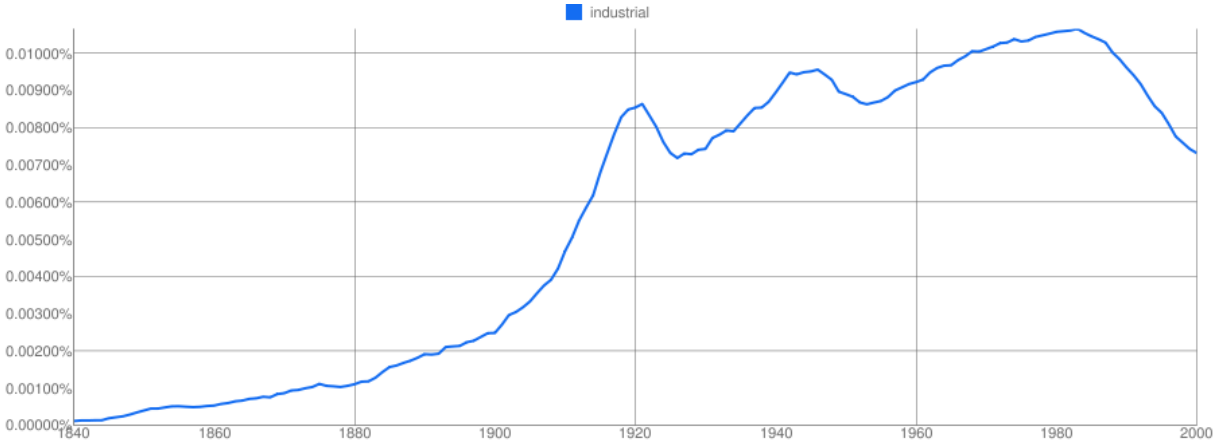


Figure 8.40 Google Books trend of 'industrial' from 1840 to 2000

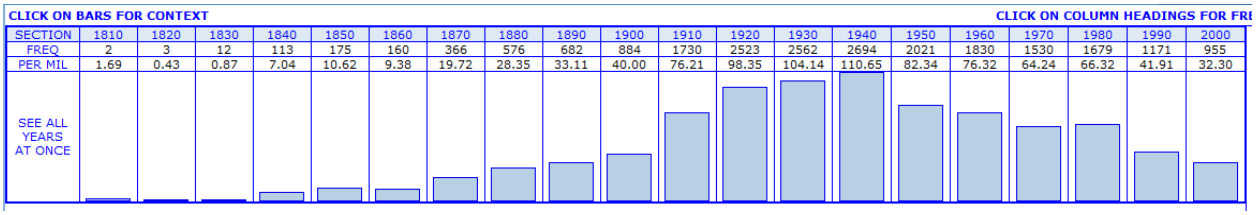


Figure 8.41 COHA trend of 'industrial' from 1800 to 2000

'smog'

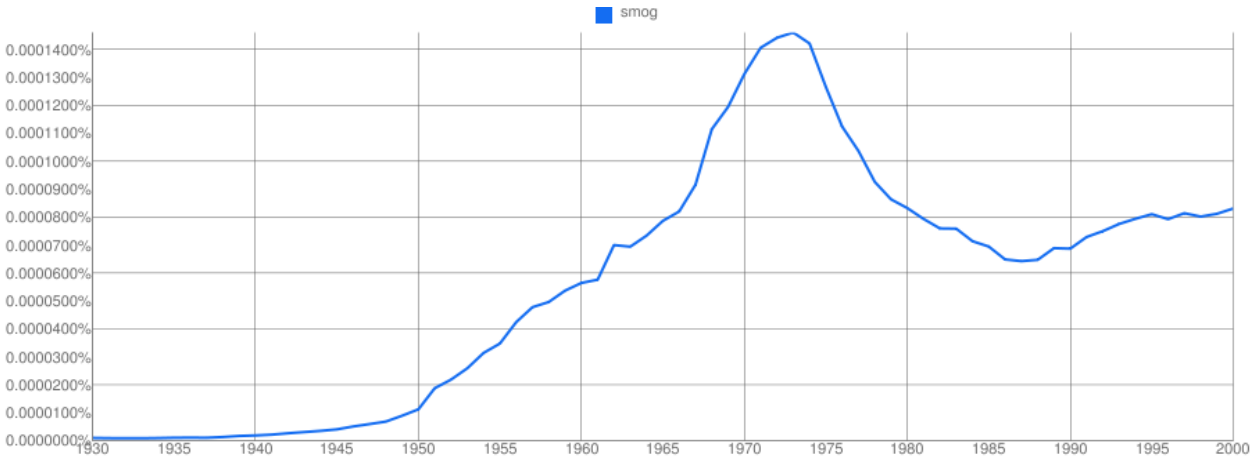


Figure 8.42 Google Books trend of 'smog' from 1930 to 2000

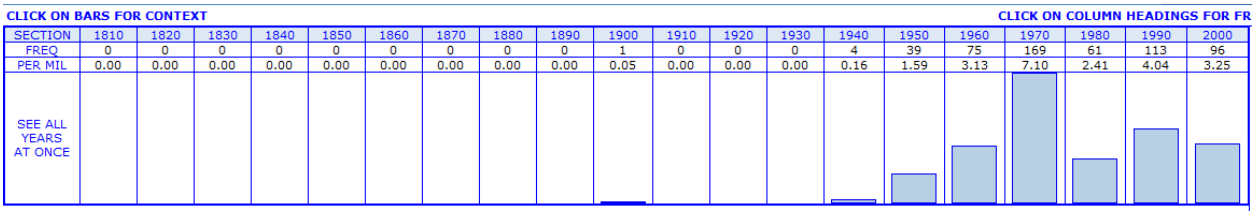


Figure 8.43 COHA trend of 'smog' from 1800 to 2000

8.1.1.5 Low Frequency Items

'free range'

Figure 8.44 Google Books trend of 'free range' from 1800 to 2008

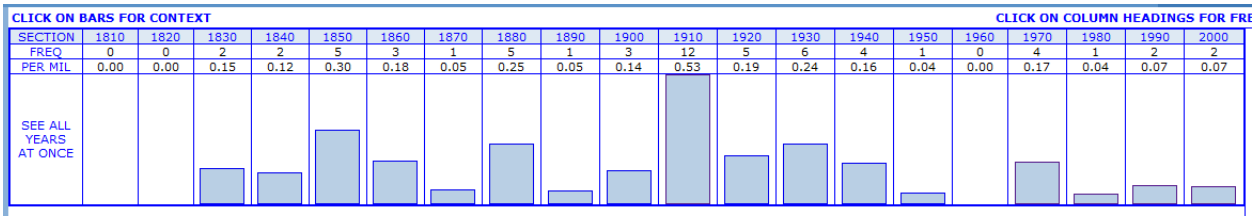


Figure 8.45 COHA trend of 'free range' from 1800 to 2000

'decomposable'

Figure 8.46 Google Books trend of 'decomposable' from 1800 to 2008

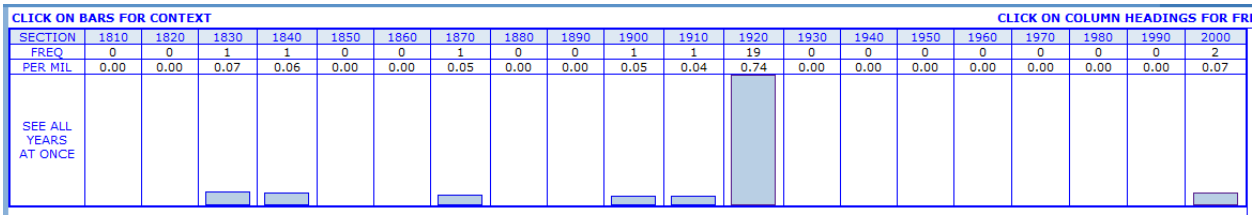


Figure 8.47 COHA trend of 'decomposable' from 1800 to 2000

8.1.2 Collocation in COHA

8.1.2.1 Words showing increase - starting after 1960s

'renewable'

Table 8.1 COHA unique collocate comparison (1980-2000s vs. 1930-1960s) for 'renewable'

	Collocates (80-00s)	Tokens (80-00s)	Tokens (30-60s)	Ratio	Collocates (30-60s)	Tokens (30-60s)	Tokens (80-00s)	Ratio
renewable	ENERGY	155	0	187.14	TENURE	4	0	4.1
	SOURCES	36	0	43.47	YEARS	3	1	2.55
	NATIONAL	12	0	14.49	RESOURCES	3	24	0.11
	LABORATORY	12	0	14.49				
	FUELS	9	0	10.87				
	WIND	8	0	9.66				
	USING	8	0	9.66				
	EFFICIENCY	8	0	9.66				

	RESOURCES	24	3	9.41
	TECHNOLOGIES	7	0	8.45

‘greenhouse’

Table 8.2 COHA unique collocate comparison (1980-2000s vs. 1930-1960s) for ‘greenhouse’

	Collocates (80-00s)	Tokens (80-00s)	Tokens (30-60s)	Ratio	Collocates (30-60s)	Tokens (30-60s)	Tokens (80-00s)	Ratio
greenhouse	GASES	131	0	158.16	NIGHT	3	2	1.27
	GAS	107	0	129.19	GARDEN	3	6	0.42
	EMISSIONS	71	0	85.72	GLASS	3	11	0.23
	EFFECT	92	2	54.14				
	WARMING	29	0	35.01				
	DIOXIDE	22	0	26.56				
	ATMOSPHERE	21	0	25.35				
	REDUCE	21	0	25.35				
	FIRST	20	1	23.54				
	CARBON	17	0	20.53				

‘emissions’

Table 8.3 COHA unique collocate comparison (1980-2000s vs. 1930-1960s) for ‘emissions’

	Collocates (80-00s)	Tokens (80-00s)	Tokens (30-60s)	Ratio	Collocates (30-60s)	Tokens (30-60s)	Tokens (180-00s)	Ratio
emissions	REDUCE	124	0	149.71	RADIO	3	7	0.36
	CARBON	113	0	136.43				
	DIOXIDE	87	0	105.04				
	GREENHOUSE	71	0	85.72				
	GAS	56	0	67.61				
	CUT	52	0	62.78				
	PERCENT	42	0	50.71				
	REDUCING	38	0	45.88				
	AIR	35	0	42.26				
	REDUCTIONS	34	0	41.05				

8.1.2.2 Words showing increase over time from before 1960

'non*toxic'

Table 8.4 COHA unique collocate comparison (1980-2000s vs. 1930-1960s) for 'greenhouse'

	Collocates (80-00s)	Tokens (80-00s)	Tokens (30-60s)	Ratio	Collocates (30-60s)	Tokens (30-60s)	Tokens (80-00s)	Ratio
greenhouse	SHOT	5	0	6.04				
	GOITER	3	0	3.62				
	CHICKEN	7	0	8.45				
	DEBRIS	7	0	8.45				
	LOOK	7	0	8.45				
	PEOPLE	7	0	8.45				
	PROPOSED	7	0	8.45				
	VEGETARIAN	7	0	8.45				
	INCLUDING	14	2	8.24				
	GOING	7	1	8.24				

'organic'

Table 8.5 COHA unique collocate comparison (1980-2000s vs. 1930-1960s) for 'organic'

	Collocates (80-00s)	Tokens (80-00s)	Tokens (30-60s)	Ratio	Collocates (30-60s)	Tokens (30-60s)	Tokens (80-00s)	Ratio
organic	FOODS	41	1	48.25	DISEASE	42	1	35.69
	GARDEN	27	0	32.6	EDUCATION	23	0	23.6
	FARMERS	24	1	28.24	PHILOSOPHY	22	0	22.57
	BEER	21	0	25.35	FACTORS	18	1	15.3
	FARM	21	1	24.71	CHEMISTS	12	0	12.31
	CERTIFIED	18	0	21.73	SOCIAL	10	0	10.26
	INGREDIENTS	18	0	21.73	UNION	10	0	10.26
	VEGETABLES	17	1	20.01	LAW	22	2	9.35
	GARDENING	16	1	18.83	FIELD	9	0	9.23
	PRODUCE	31	2	18.24	MAN	9	0	9.23

'hybrid'

Table 8.6 COHA unique collocate comparison (1980-2000s vs. 1930-1960s) for 'hybrid'

	Collocates (80-00s)	Tokens (80-00s)	Tokens (30-60s)	Ratio	Collocates (30-60s)	Tokens (30-60s)	Tokens (80-00s)	Ratio
hybrid	BASS	21	0	25.35	SWARM	10	0	10.26
	CARS	21	0	25.35	TREES	4	0	4.1
	CAR	19	1	22.36	TABULAEFORMIS	3	0	3.08
	VIGOUR	11	0	13.28	MONSTER	3	0	3.08
	TEA	10	0	12.07	DENSATA	3	0	3.08
	DEVELOPMENT	9	0	10.87	ALBERTA	3	0	3.08

	GAS-ELECTRIC	8	0	9.66	FEMALES	3	1	2.55
	TEAS	8	0	9.66	HALF	3	1	2.55
	WIND	8	0	9.66	SORT	4	3	1.13
	RESEARCH	8	1	9.41	VIGOR	7	6	0.99

'toxic'

Table 8.7 COHA unique collocate comparison (1980-2000s vs. 1930-1960s) for 'toxic'

	Collocates (80-00s)	Tokens (80-00s)	Tokens (30-60s)	Ratio	Collocates (30-60s)	Tokens (30-60s)	Tokens (80-00s)	Ratio
				149.7				
toxic	WASTE	124	0	1	APPEARS	3	0	3.08
	WASTES	33	1	38.84	D	3	0	3.08
	CHEMICALS	98	3	38.44	INFECTIVE	3	0	3.08
	METALS	25	0	30.18	TAKEN	3	1	2.55
	SITES	24	0	28.98	VITAMIN	5	2	2.12
	CHEMICAL	42	2	24.71	TREATED	4	2	1.7
	EMISSIONS	19	0	22.94	PRODUCE	6	4	1.27
	AGENCY	17	0	20.53	HUMAN	3	2	1.27
	MATERIALS	17	1	20.01	HOWEVER	3	2	1.27
	CONTROL	16	1	18.83	DDT	3	2	1.27

'fuel'

Table 8.8 COHA unique collocate comparison (1980-2000s vs. 1930-1960s) for 'fuel'

	Collocates (80-00s)	Tokens (80-00s)	Tokens (30-60s)	Ratio	Collocates (30-60s)	Tokens (30-60s)	Tokens (80-00s)	Ratio
				102.3				
fuel	SPENT	87	1	9	RATIONING	20	0	20.52
	HELPED	30	1	35.31	MINISTER	18	1	15.3
	GROWTH	26	1	30.6	CENT	13	0	13.34
	FOSSIL	68	3	26.68	LIGHT	30	2	12.75
	ECONOMY	132	6	25.89	CHAMBER	10	0	10.26
	ALTERNATIVE	21	0	25.35	ATOMIC	24	2	10.2
	INJECTORS	21	0	25.35	SHIP	11	1	9.35
	EXTERNAL	19	0	22.94	MINISTRY	9	0	9.23
	STANDARDS	19	1	22.36	PRESENT	10	1	8.5
	MPG	17	0	20.53	DEALERS	8	0	8.21

'solar'

Table 8.9 COHA unique collocate comparison (1980-2000s vs. 1930-1960s) for 'solar'

	Collocates (80-00s)	Tokens (80-00s)	Tokens (30-60s)	Ratio	Collocates (30-60s)	Tokens (30-60s)	Tokens (80-00s)	Ratio
sol	MASSES	63	0	76.06	BATTERY	10	1	8.5

	PANELS	92	2	54.14	TEMPERATURE	9	1	7.65
	INNER	43	1	50.6	ABSORPTION	7	1	5.95
	NEBULA	23	1	27.07	LINES	7	1	5.95
	PASSIVE	22	0	26.56	MONTH	5	0	5.13
	COLLECTORS	20	0	24.15	REACTION	5	0	5.13
	WATER	20	0	24.15	SORT	5	0	5.13
	OBSERVATORY	20	1	23.54	SHIP	6	1	5.1
	EARLY	18	0	21.73	BATTERIES	10	2	4.25
	STAGE	17	0	20.53	MINIATURE	5	1	4.25

8.1.2.3 Words showing decrease over time:

'natural'

Table 8.10 COHA unique collocate comparison (1980-2000s vs. 1930-1960s) for 'natural'

	Collocates (80-00s)	Tokens (80-00s)	Tokens (30-60s)	Ratio	Collocates (30-60s)	Tokens (30-60s)	Tokens (80-00s)	Ratio
natural	COUNCIL	61	0	73.65	RUBBER	65	3	18.41
	SYSTEMS	53	1	62.37	ABSOLUTELY	13	0	13.34
	ECOSYSTEMS	38	0	45.88	GONE	13	0	13.34
	PERCENT	28	0	33.81	OVERCOME	15	1	12.75
	CELLS	25	0	30.18	PAINTED	15	1	12.75
	INGREDIENTS	24	0	28.98	SEQUENCE	15	1	12.75
	ENVIRONMENTAL	22	0	26.56	SUPPOSE	41	3	11.61
	CARE	22	1	25.89	PRESS	12	1	10.2
	FLUCTUATIONS	18	0	21.73	FLORA	11	1	9.35
	KILLER	18	1	21.18	PRINCIPLE	11	1	9.35

'harmony'

Table 8.11 COHA unique collocate comparison (1980-2000s vs. 1930-1960s) for 'harmony'

	Collocates (80-00s)	Tokens (80-00s)	Tokens (30-60s)	Ratio	Collocates (30-60s)	Tokens (30-60s)	Tokens (80-00s)	Ratio
harmony	MELLO	8	0	9.66	PARTY	22	0	22.57
	BATHSHEBA	7	0	8.45	COMPLETE	39	2	16.57
	BOOKS	7	1	8.24	GENERAL	15	1	12.75
	DAY	6	0	7.24	HIMSELF	11	1	9.35
	MILES	6	0	7.24	PRINCIPLE	11	1	9.35
	BLACK	6	1	7.06	BLUEBLOSSOM	9	0	9.23
	JUSTICE	6	1	7.06	SEEMED	9	0	9.23
	LAND	6	1	7.06	OBJECTIVES	10	1	8.5
	CHILDREN	5	0	6.04	ACTION	8	0	8.21
	ASKED	5	0	6.04	MEANS	8	0	8.21

'botanical'

Table 8.12 COHA unique collocate comparison (1980-2000s vs. 1930-1960s) for 'botanical'

	Collocates (80-00s)	Tokens (80-00s)	Tokens (30-60s)	Ratio	Collocates (30-60s)	Tokens (30-60s)	Tokens (80-00s)	Ratio
harmony	DESERT	13	0	15.7	FAMOUS	3	0	3.08
	ATLANTA	11	0	13.28	EVIDENCE	3	1	2.55
	ART	10	1	11.77	FLOWERS	3	1	2.55
	PRINTS	7	0	8.45	SPECIMENS	5	4	1.06
	ARTISTS	7	0	8.45	NAMES	5	5	0.85
	PHOENIX	6	0	7.24	MUSEUM	3	3	0.85
	PIEDMONT	6	0	7.24	YORK	8	9	0.76
	MEDICINE	6	0	7.24	BRONX	3	4	0.64
	AMERICAN	6	0	7.24	NEW	8	11	0.62
	COMMON	6	1	7.06	NAME	4	6	0.57

'wind'

Table 8.13 COHA unique collocate comparison (1980-2000s vs. 1930-1960s) for 'wind'

	Collocates (80-00s)	Tokens (80-00s)	Tokens (30-60s)	Ratio	Collocates (30-60s)	Tokens (30-60s)	Tokens (80-00s)	Ratio
wind	ENERGY	134	1	157.7	WARP	21	0	21.54
	TURBINES	76	1	89.44	HAULED	19	1	16.14
	TURBINE	57	1	67.08	TRADE	31	2	13.17
	FARMS	37	1	43.54	RIGGING	15	1	12.75
	ELECTRICITY	24	1	28.24	PINK	12	0	12.31
	PLANT	24	1	28.24	SPRANG	14	1	11.9
	SYSTEMS	24	1	28.24	ABRASION	11	0	11.29
	GUSTED	22	1	25.89	CRIED	11	0	11.29
	PLANTS	19	0	22.94	AFFAIRS	13	1	11.05
	ASSOCIATION	17	0	20.53	KEEN	13	1	11.05

8.1.2.4 Words with other trends:

'fresh'

Table 8.14 COHA unique collocate comparison (1980-2000s vs. 1930-1960s) for 'fresh'

	Collocates (80-00s)	Tokens (80-00s)	Tokens (30-60s)	Ratio	Collocates (30-60s)	Tokens (30-60s)	Tokens (80-00s)	Ratio
fresh	CHOPPED	319	1	375.42	DRESS	20	0	20.52
	TABLESPOONS	149	0	179.9	FISHES	16	0	16.41
	TABLESPOON	119	0	143.68	OCCUR	14	0	14.36
	MINCED	105	0	126.77	ATTACK	12	0	12.31
	1/2	97	1	114.15	ANGLE	11	0	11.29
	CILANTRO	91	0	109.87	CHINA	10	0	10.26

	1	454	5	106.86	CONFINED	10	0	10.26
	GINGER	90	1	105.92	HANDKERCHIEF	10	0	10.26
	TEASPOON	89	1	104.74	LIPS	10	0	10.26
	THYME	68	0	82.1	STRENGTH	10	0	10.26

'green'

Table 8.16 COHA unique collocate comparison (1980-2000s vs. 1930-1960s) for 'green'

	Collocates (80-00s)	Tokens (80-00s)	Tokens (30-60s)	Ratio	Collocates (30-60s)	Tokens (30-60s)	Tokens (80-00s)	Ratio
green	FIDDLER	35	0	42.26	MARTIE	46	0	47.19
	ZONE	35	0	42.26	GOVERNOR	28	0	28.73
	FEES	26	1	30.6	GLADE	73	3	20.68
	PRODUCTS	24	0	28.98	ILLINOIS	20	0	20.52
	PHOTOGRAPH	21	0	25.35	FORM	16	0	16.41
	GABLES	19	1	22.36	LABOR	16	0	16.41
	JEANS	19	1	22.36	QUALITY	16	0	16.41
	FLUORESCENT	16	0	19.32	WILLOWS	16	0	16.41
	COMPANIES	14	0	16.9	LETTER	18	1	15.3
	VINYL	14	0	16.9	TELEPHONE	14	0	14.36

'gas'

Table 8.17 COHA unique collocate comparison (1980-2000s vs. 1930-1960s) for 'gas'

	Collocates (80-00s)	Tokens (80-00s)	Tokens (30-60s)	Ratio	Collocates (30-60s)	Tokens (30-60s)	Tokens (80-00s)	Ratio
gas	GREENHOUSE	107	0	129.19	CONSOLIDATED	70	1	59.48
	EMISSIONS	56	0	67.61	COKE	37	0	37.96
	GRILL	53	1	62.37	LIGHTED	15	0	15.39
	ATLANTA	48	1	56.49	BOARDS	14	0	14.36
	PERCENT	35	1	41.19	ORDINARY	13	0	13.34
	CHARCOAL	24	1	28.24	REGULATION	12	0	12.31
	GRILLS	18	0	21.73	WELDING	11	0	11.29
	SWAMP	17	0	20.53	ACETYLENE	13	1	11.05
	BRAKE	15	0	18.11	GANGRENE	13	1	11.05
	PLASMA	15	1	17.65	RATION	12	1	10.2

'oil'

Table 8.18 COHA unique collocate comparison (1980-2000s vs. 1930-1960s) for 'oil'

	Collocates (80-00s)	Tokens (80-00s)	Tokens (30-60s)	Ratio	Collocates (30-60s)	Tokens (30-60s)	Tokens (80-00s)	Ratio
oil	SPILL	77	1	90.62	ANGLO-IRANIAN	39	1	33.14
	CANVAS	128	2	75.32	CENT	36	1	30.59
	OPEC	58	0	70.03	COTTON	33	1	28.04

	SPILLS	41	0	49.5	WHEAT	28	1	23.79
	1973	38	0	45.88	GERMANY	23	0	23.6
	MINISTER	38	1	44.72	JERSEY	107	4	22.73
	24	37	1	43.54	HUMBLE	26	1	22.09
	EXXON	35	1	41.19	ITALY	21	0	21.54
	SECTOR	30	0	36.22	COD	49	2	20.82
	GLOBAL	30	1	35.31	N.J.	19	0	19.49

'gasoline'

Table 8.19 COHA unique collocate comparison (1980-2000s vs. 1930-1960s) for 'gasoline'

	Collocates (80-00s)	Tokens (80-00s)	Tokens (30-60s)	Ratio	Collocates (30-60s)	Tokens (30-60s)	Tokens (80-00s)	Ratio
gasoline	REFORMULATED	21	0	25.35	EASTERN	28	0	28.73
	PERCENT	17	0	20.53	SYNTHETIC	30	1	25.49
	UNLEADED	15	1	17.65	AVIATION	55	2	23.37
	HEATING	12	1	14.12	RATION	23	1	19.54
	LEAD	17	2	10	DRUMS	21	1	17.84
	METHANOL	7	0	8.45	AMMUNITION	16	0	16.41
	ROSE	7	1	8.24	RETAILERS	16	0	16.41
	ETHANOL	6	0	7.24	SITUATION	15	0	15.39
	LAWN	6	0	7.24	STOVE	15	0	15.39
	PHASE	6	0	7.24	AUTOMOBILE	14	0	14.36

'industrial'

Table 8.20 COHA unique collocate comparison (1980-2000s vs. 1930-1960s) for 'industrial'

	Collocates (80-00s)	Tokens (80-00s)	Tokens (30-60s)	Ratio	Collocates (30-60s)	Tokens (30-60s)	Tokens (80-00s)	Ratio
industrial	DEMOCRACIES	27	1	31.77	MOBILIZATION	60	1	50.98
	DOW	137	7	23.03	DOW-JONES	86	2	36.54
	MATSUSHITA	14	0	16.9	ESTABLISHMENTS	31	0	31.8
	INFRASTRUCTURE	13	0	15.7	GERMANY	65	2	27.62
	JONES	136	11	14.55	RAILROAD	26	0	26.67
	EMISSIONS	11	0	13.28	PEACE	61	2	25.92
	ROBOTS	10	0	12.07	DEPRESSION	25	0	25.65
	WASTELAND	10	0	12.07	GOING	24	0	24.62
	CONGLOMERATE	9	0	10.87	CONCENTRATION	23	0	23.6
	GASES	9	1	10.59	MEN	27	1	22.94

'smog'

Table 8.21 COHA unique collocate comparison (1980-2000s vs. 1930-1960s) for 'smog'

s	Collocates (80-00s)	Tokens (80-00s)	Tokens (30-60s)	Ratio	Collocates (30-60s)	Tokens (30-60s)	Tokens (80-00s)	Ratio

	OZONE	11	0	13.28	BRIGHTER	3	0	3.08
	NOW	9	0	10.87	CHICAGO	3	0	3.08
	PLAN	9	0	10.87	HEAVY	3	0	3.08
	RAIN	9	0	10.87	SMOKE	6	3	1.7
	ACID	8	1	9.41	ANGELES	9	6	1.27
	PROBLEM	8	1	9.41	LOS	8	9	0.76
	COMPONENT	7	0	8.45	TRAFFIC	3	6	0.42
	THICK	7	0	8.45				
	WHEN	7	1	8.24				
	LAYER	6	0	7.24				

8.1.3 Collocation in COCA (1990-2010)

8.1.3.1 Words showing increase over time after 1960

'renewable'

Table 8.22 COCA collocates (with frequency) from 1990-2010—with 5 year increments—for 'renewable'

	1990-2010		1990-1994		1995-1999		2000-2004		2005-2009	
renewable	ENERGY	1985	ENERGY	167	ENERGY	266	ENERGY	630	ENERGY	801
	SOURCES	399	RESOURCES	63	SOURCES	63	SOURCES	108	SOURCES	169
	RESOURCES	226	SOURCES	48	RESOURCES	55	RESOURCES	61	POWER	93
	POWER	172	RESOURCE	32	TECHNO-LOGIES	35	TECHNO-LOGIES	58	FUELS	72
	TECHNO-LOGIES	170	TECHNO-LOGIES	26	RESOURCE	25	RESOURCE	38	ELECTRICITY	55
	NATIONAL	123	CONSER-VATION	22	USE	21	NATIONAL	34	NATIONAL	51
	RESOURCE	120	NATIONAL	19	EFFICIENCY	20	POWER	33	FUEL	47
	FUELS	116	POWER	17	POWER	19	EFFICIENCY	31	WIND	46
	LABORATORY	111	LABORATORY	15	LABORATORY	15	LABORATORY	31	LABORATORY	44
	EFFICIENCY	106	GUARANTEED	13	NATIONAL	15	SYSTEMS	28	EFFICIENCY	43

'biodegradable'

Table 8.23 COCA collocates (with frequency) from 1990-2010—with 5 year increments—for 'biodegradable'

	1990-2010		1990-1994		1995-1999		2000-2004		2005-2009	
biodegradabl	URBAN	50	URBAN	30	AIR	15	TRAFFIC	12	ANGELES	7
	POLLUTION	40	POLLUTION	16	OZONE	14	FORMULA	10	LOS	7
	OZONE	37	RAIN	16	SOOT	11	AIR	10	OZONE	6
	AIR	35	ACID	14	URBAN	11	POLLUTION	9	THICK	6
	RAIN	34	LOS	12	POLLUTION	10	HAZE	7	REDUCE	6

	ACID	31	OZONE	11	POLLUTANTS	9	COMPONENT	7	POLLUTION	5
	LEVELS	29	COMPONENT	10	ACID	9	THICK	7	KNOWN	5
	LOS	26	LEVELS	10	RAIN	9	URBAN	7	AIR	5
	COMPONENT	25	CITY	10	CAUSE	9	LEVELS	7	PROBLEM	5
	THICK	25	LESS	9	LEVELS	7	MAIN	7	PHOTO-CHEMICAL	4

'recyclable'

Table 8.24 COCA collocates (with frequency) from 1990-2010—with 5 year increments—for 'recyclable'

	1990-2010		1990-1994		1995-1999		2000-2004		2005-2009	
recyclable	MATERIALS	81	MATERIALS	18	MATERIALS	31	MATERIALS	17	MATERIALS	12
	PRODUCTS	25	PRODUCTS	11	COMPO-STABLE	11	PRODUCTS	6	PLASTIC	5
	PLASTIC	21	PAPER	8	WASTE	11	PLASTIC	5	PRODUCTS	5
	PAPER	21	CONTAINERS	7	MATERIAL	8	PAPER	5	PERCENT	5
	PERCENT	20	PLASTIC	7	PERCENT	8	REUSABLE	4	RENEWABLE	4
	MATERIAL	19	USE	7	PAPER	7	CANISTERS	4	RECYCLED	3
	WASTE	17	RECYCLED	6	WASTES	6	PACKAGING	4	EXTREMELY	3
	COMPO-STABLE	14	PACKAGING	6	OCC	5	BOTTLES	4	MAKING	3
	RECYCLED	13	TRASH	4	REUSABLE	5	ALUMINUM	4	YET	3
	BOTTLES	12	ITEMS	4	CANS	5	PERCENT	4	USE	3

'ecofriendly'

Table 8.25 COCA collocates (with frequency) from 1990-2010—with 5 year increments—for 'ecofriendly'

	1990-2010		1990-1994		1995-1999		2000-2004		2005-2009	
ecofriendly	PRODUCTS	26	BIO-ETHANOL	1	AN	6	MATERIALS	3	PRODUCTS	11
	MATERIALS	7	REGGAE-INFLECTED	1	ECO-FRIENDLY	2	CLEANSERS	2	PRACTICES	6
	PRACTICES	6	POTHEAD	1	COFFEES	2	RESORT	2	GREEN	6
	GREEN	6	CORNUCOPIA	1	CHOCOLATES	2	WOOD	2	LAWN	5
	CLEANING	5	WIGGINS	1	PROMOTE	2	STYLE	2	CLEANING	5
	OPTIONS	5	LANDSCAPING	1	HOME	2	SIDEBAR	2	MATERIALS	5
	DESIGN	5	EDIBLE	1	SELENGUT	1	SITE	2	OPTIONS	4
	NATURAL	5	APPAREL	1	MOKOMBA	1	BUILDING	2	IDEAS	4
	BUILDING	5	PACKAGING	1	MAHO	1	HEALTH	2	SAFE	4
	LAWN	4	ADVANCE-MENT	1	LESS-TOXIC	1	BUSINESS	2	DESIGN	4

'environmentally friendly'

Table 8.26 COCA collocates (with frequency) from 1990-2010—with 5 year increments—for

'environmentally friendly'

environmentally friendly	1990-2010		1990-1994		1995-1999		2000-2004		2005-2009	
	FRIENDLY	585	FRIENDLY	78	FRIENDLY	111	FRIENDLY	159	FRIENDLY	217
	MORE	114	MORE	15	MORE	24	MORE	30	MORE	40
	PRODUCTS	39	PRODUCTS	11	PRODUCTS	7	MATERIALS	9	ENERGY	14
	ENERGY	20	MANNER	5	BEHAVIOR	7	PRODUCTS	8	PRODUCTS	12
	MATERIALS	18	PRODUCT	4	TECHNOLOGY	5	CARS	7	WAYS	8
	EFFICIENT	14	PRACTICES	3	COST-EFFECTIVE	4	POWER	5	CAR	8
	MANNER	12	STORE	3	EFFICIENT	4	LESS	4	BUILDING	7
	PRACTICES	12	GREEN	3	CONSUMER	4	ECONOMICAL	3	MATERIALS	6
	CARS	12	REFRIGERANT	2	PRACTICES	4	SUSTAINABLE	3	GREEN	6
	GREEN	12	DIAPERS	2	UNFRIENDLY	3	SOCIALLY	3	EFFICIENT	5

'sustainable'

Table 8.27 COCA collocates (with frequency) from 1990-2010—with 5 year increments—for 'sustainable'

sustainable	1990-2010		1990-1994		1995-1999		2000-2004		2005-2009	
	DEVELOPMENT	1365	DEVELOPMENT	387	DEVELOPMENT	371	DEVELOPMENT	265	DEVELOPMENT	295
	AGRICULTURE	249	USE	70	AGRICULTURE	63	AGRICULTURE	61	AGRICULTURE	64
	USE	246	GROWTH	47	USE	63	MANAGEMENT	41	DESIGN	63
	FUTURE	184	AGRICULTURE	44	GROWTH	49	ENVIRON-MENTALLY	37	ENERGY	62
	GROWTH	181	ENVIRON-MENTALLY	40	FUTURE	47	ENERGY	37	MANAGEMENT	59
	ENVIRON-MENTALLY	178	FUTURE	34	ENVIRON-MENTALLY	39	FUTURE	36	FUTURE	58
	MANAGEMENT	156	ECONOMIC	33	RESOURCES	33	PRACTICES	33	PRACTICES	57
	ENERGY	148	SOCIETY	31	PRACTICES	31	FORESTRY	30	ENVIRON-MENTALLY	52
	PRACTICES	143	MAXIMUM	29	ECONOMY	31	ECONOMY	30	GROWTH	38
	ECONOMIC	137	RESOURCES	27	ECONOMIC	28	GROWTH	28	CREATE	38

'environmentalism'

Table 8.28 COCA collocates (with frequency) from 1990-2010—with 5 year increments—for 'environmentalism'

environmentali	1990-2010		1990-1994		1995-1999		2000-2004		2005-2009	
	CIVIC	20	CORPORATE	10	CIVIC	20	POLITICAL	8	DEATH	8
	RADICAL	19	RADICAL	7	ENVIRON-MENTAL	5	FORMS	7	RADICAL	3
	ENVIRON-MENTAL	14	MOVEMENT	7	MAINSTREAM	4	1970S	6	CATHOLIC	3
	CORPORATE	13	RIGHTS	5	RADICAL	4	RIGHTS	6	CALLS	3

	RIGHTS	13	FEMINISM	4	RELIGION	4	RADICAL	5	GLOBAL	3
	MAINSTREAM	10	ANIMAL	4	BUSINESS	4	MINORITY	5	MADE-FOR-TV	2
	RELIGION	10	COMPETITIVE-NESS	3	TOOL	3	CAUSE	5	MAINSTREAM	2
	MOVEMENT	10	SIERRA	3	ENCOURAGE	3	HUMAN	5	WARMING	2
	MODERN	9	PROGRESSIVE	3	RISE	3	BLACK	5	CAUSES	2
	FORMS	8	PROMISES	3	MODERN	3	HYBRID	4	HOLLYWOOD	2

‘greenhouse’

Table 8.29 COCA collocates (with frequency) from 1990-2010—with 5 year increments—for ‘greenhouse’

	1990-2010		1990-1994		1995-1999		2000-2004		2005-2009	
frequency	GASES	1147	EFFECT	230	GAS	200	GAS	253	GAS	544
	GAS	1140	GASES	223	GASES	183	GASES	235	GASES	479
	EMISSIONS	906	GAS	111	EMISSIONS	164	EMISSIONS	196	EMISSIONS	426
	EFFECT	425	EMISSIONS	92	EFFECT	106	REDUCE	56	REDUCE	98
	REDUCE	217	WARMING	67	REDUCE	35	EFFECT	50	CARBON	53
	WARMING	133	APPLICATORS	44	CONCEN-TRATIONS	31	DIOXIDE	33	DIOXIDE	52
	DIOXIDE	128	DIOXIDE	24	REDUCING	27	ATMOSPHERE	31	ATMOSPHERE	37
	CARBON	127	CARBON	24	CARBON	24	WARMING	29	EFFECT	37
	REDUCING	112	OZONE	22	WARMING	21	CARBON	26	REDUCING	36
	ATMOSPHERE	102	REDUCING	20	DIOXIDE	19	CONCEN-TRATIONS	25	REDUCTION	36

‘emissions’

Table 8.30 COCA collocates (with frequency) from 1990-2010—with 5 year increments—for ‘emissions’

	1990-2010		1990-1994		1995-1999		2000-2004		2005-2009	
emissions	CARBON	1074	REDUCE	162	TRADING	209	CARBON	239	CARBON	442
	GREENHOUSE	906	CARBON	161	REDUCE	202	GREENHOUSE	196	GREENHOUSE	426
	REDUCE	856	DIOXIDE	148	CARBON	192	REDUCE	195	GAS	375
	GAS	788	GREENHOUSE	92	GREENHOUSE	164	GAS	183	REDUCE	280
	DIOXIDE	636	REDUCING	86	DIOXIDE	138	DIOXIDE	134	DIOXIDE	206
	REDUCING	420	AIR	82	GAS	131	TRADING	131	PERCENT	171
	TRADING	390	CO2	81	REDUCING	97	REDUCING	98	CUT	138
	PERCENT	385	GAS	72	REDUCTIONS	72	REDUCTION	91	REDUCING	127
	CUT	283	CONTROL	72	REDUCTION	68	PERCENT	90	GLOBAL	82
	REDUCTION	274	CO	57	SULFUR	49	2	89	CO2	81

8.1.3.2 Words showing increase over time from before 1960

'non-toxic'

Table 8.31 COCA collocates (with frequency) from 1990-2010—with 5 year increments—for 'nontoxic'

	1990-2010		1990-1994		1995-1999		2000-2004		2005-2009	
nontoxic	MATERIALS	19	BIODEGRAD-ABLE	5	MATERIALS	7	BIODEGRAD-ABLE	6	PRODUCTS	11
	PRODUCTS	19	SHOT	5	PRODUCT	7	PAINT	6	CLEANING	8
	BIODEGRAD-ABLE	17	UPLAND	3	USE	7	ACRYLIC	3	MATERIALS	6
	USE	15	CLEANERS	3	TOXIC	6	PAINTS	3	USE	6
	CLEANING	11	LOADS	3	SEAL	5	GLUE	3	BIODEGRAD-ABLE	5
	PAINT	10	MATERIALS	3	CP	4	COMPLETELY	3	CLEANERS	5
	CLEANERS	9	PRODUCTS	3	AP	4	PRODUCTS	3	NATURAL	4
	TOXIC	9	WATER	3	PAINTS	3	2	3	DYES	3
	PRODUCT	9	NONFOULING	2	WASTE	3	RECYCLED	2	SUPPLIES	3
	SAFE	9	PARATHERM	2	MIGHT	3	MARKERS	2	ORGANIC	3

'organic'

Table 8.32 COCA collocates (with frequency) from 1990-2010—with 5 year increments—for 'organic'

	1990-2010		1990-1994		1995-1999		2000-2004		2005-2009	
organic	MATTER	934	MATTER	155	MATTER	339	MATTER	236	MATTER	199
	FOOD	373	COMPOUNDS	56	SOIL	120	FOOD	129	FOOD	153
	COMPOUNDS	351	MATERIAL	53	COMPOUNDS	114	PRODUCE	93	FOODS	119
	SOIL	321	CHEMISTRY	37	CARBON	96	FOODS	88	PRODUCE	105
	MATERIAL	301	VOLATILE	36	MATERIALS	94	MATERIAL	85	COMPOUNDS	102
	PRODUCE	283	CHEMICALS	36	MATERIAL	92	COMPOUNDS	75	SOIL	91
	FOODS	275	MOLECULES	33	VOLATILE	57	SOIL	75	PRODUCTS	81
	MATERIALS	237	PRODUCE	33	FOOD	57	FARMING	71	LOCAL	77
	CARBON	206	SOIL	32	FARMERS	56	PRODUCTS	68	NATURAL	74
	PRODUCTS	194	COTTON	28	FOODS	51	MOLECULES	67	COTTON	70

'plant-based'

Table 8.33 COCA collocates (with frequency) from 1990-2010—with 5 year increments—for 'plant-based'

	1990-2010		1990-1994		1995-1999		2000-2004		2005-2009	
plant-	DIET	48	MEDICINES	2	DIET	13	DIET	23	DIET	7
	FOODS	12	DIET	2	PRODUCTS	5	FOODS	9	SUCH	5

	PRODUCTS	9	EATING	2	MATERIALS	4	REPELLENTS	3	FUELS	4
	MEDICINES	7	MARKET	2	DRUGS	4	BENEFITS	3	PRODUCTS	4
	MATERIALS	7	POLYS	1	MEDICINES	3	NATURAL	3	PLASTICS	3
	NATURAL	6	QUININE	1	FOODS	3	LOW	3	FIBERS	3
	FUELS	5	OUTPACED	1	ESTROGENS	2	HIGH-FIBER	2	INGREDIENTS	3
	DRUGS	5	COATINGS	1	ESTROGEN	2	DIGESTIVE	2	SOMETHING	3
	RESEARCH	5	DOWNPLAY	1	IRELAND	2	ENZYMES	2	ETHANOL	2
	DIETS	4	PRAISING	1	ESTIMATED	2	LOW-FAT	2	MEALS	2

'hybrid'

Table 8.34COCA collocates (with frequency) from 1990-2010—with 5 year increments—for 'hybrid'

	1990-2010		1990-1994		1995-1999		2000-2004		2005-2009	
hybrid	CARS	184	EXERCISE	62	SYSTEM	25	CARS	60	CARS	114
	CAR	122	BASS	33	CORN	19	VEHICLES	38	CAR	74
	VEHICLES	107	DURING	31	ELECTRIC	15	BASS	31	PLUG-IN	63
	ELECTRIC	93	FORM	15	CULTURAL	12	GAS-ELECTRIC	27	VEHICLES	58
	BASS	78	FES-LCE	13	FORM	12	HONDA	26	TOYOTA	42
	PLUG-IN	72	SEED	13	CULTURE	11	ELECTRIC	26	PRIUS	40
	TOYOTA	70	ACE	12	COMBINING	9	TECHNOLOGY	24	ELECTRIC	38
	PRIUS	65	ALONE	12	CREATED	9	TOYOTA	23	VEHICLE	28
	EXERCISE	63	TEAS	10	DEVELOPED	9	CIVIC	23	CIVIC	27
	VEHICLE	60	VARIETIES	10	CREATE	9	VEHICLE	22	VERSION	26

'toxic'

Table 8.35 COCA collocates (with frequency) from 1990-2010—with 5 year increments—for 'toxic'

	1990-2010		1990-1994		1995-1999		2000-2004		2005-2009	
toxic	WASTE	674	WASTE	272	WASTE	207	CHEMICALS	173	CHEMICALS	132
	CHEMICALS	661	CHEMICALS	193	CHEMICALS	147	SUBSTANCES	123	ASSETS	116
	SUBSTANCES	480	SUBSTANCES	157	SUBSTANCES	82	WASTE	119	SUBSTANCES	104
	CHEMICAL	172	WASTES	82	HIGHLY	44	RELEASES	50	WASTE	69
	HIGHLY	168	CHEMICAL	65	WASTES	39	HIGHLY	49	EFFECTS	46
	EFFECTS	160	MATERIALS	52	CHEMICAL	36	EFFECTS	47	EXPOSURE	34
	WASTES	150	METALS	50	METALS	34	POLLUTION	44	LEVELS	34
	MATERIALS	134	EMISSIONS	44	EFFECTS	34	CHEMICAL	44	BUY	34
	AIR	134	HIGHLY	42	PESTICIDES	28	AIR	44	DISEASE	31
	METALS	125	CONTROL	41	GASES	27	MATERIALS	36	AIR	29

'fuel'

Table 8.36 COCA collocates (with frequency) from 1990-2010—with 5 year increments—for 'fuel'

	1990-2010		1990-1994		1995-1999		2000-2004		2005-2009	
fuel	ECONOMY	1495	ECONOMY	330	ECONOMY	240	CELLS	420	ECONOMY	490
	CELLS	916	EFFICIENCY	205	TANK	212	ECONOMY	397	PRICES	246

	CELL	878	CELL	170	FOSSIL	164	CELL	385	COSTS	209
	FOSSIL	615	OIL	165	CELLS	144	SPENT	188	FOSSIL	197
	PRICES	614	PRICES	164	OIL	101	HYDROGEN	181	DIESEL	191
	EFFICIENCY	601	CELLS	159	CELL	97	NUCLEAR	138	CELL	180
	TANK	571	COSTS	116	TANKS	91	FOSSIL	134	NUCLEAR	176
	DIESEL	518	FOSSIL	112	DIESEL	86	EFFICIENCY	129	EFFICIENCY	169
	NUCLEAR	491	PRICE	107	EFFICIENCY	86	MPG	128	JET	167
	OIL	490	STANDARDS	103	PRICES	83	DIESEL	128	TANK	167

'solar'

Table 8.37 COCA collocates (with frequency) from 1990-2010—with 5 year increments—for 'solar'

	1990-2010		1990-1994		1995-1999		2000-2004		2005-2009	
solar	SYSTEM	3410	SYSTEM	614	SYSTEM	752	SYSTEM	1027	SYSTEM	958
	WIND	969	ENERGY	210	WIND	127	ENERGY	258	WIND	431
	ENERGY	933	WIND	109	ENERGY	116	WIND	257	PANELS	357
	POWER	819	POWER	100	POWER	96	POWER	245	POWER	346
	PANELS	714	RADIATION	87	PANELS	80	PANELS	176	ENERGY	311
	CELLS	349	MASSES	77	RADIATION	78	CELLS	112	SYSTEMS	106
	RADIATION	324	ECLIPSE	65	CELLS	71	SYSTEMS	100	RADIATION	102
	ECLIPSE	301	CELLS	65	HEAT	57	ECLIPSE	96	CELLS	88
	SYSTEMS	292	PANELS	52	ECLIPSE	52	PLANETS	77	SOLAR	84
	PLANETS	221	ACTIVITY	45	INNER	46	TOTAL	70	PANEL	76

8.1.3.3 Words showing decrease over time

'natural'

Table 8.38 COCA collocates (with frequency) from 1990-2010—with 5 year increments—for 'natural'

	1990-2010		1990-1994		1995-1999		2000-2004		2005-2009	
natural	GAS	4068	RESOURCES	1191	RESOURCES	1033	GAS	1127	GAS	1299
	RESOURCES	3983	GAS	903	HISTORY	663	RESOURCES	866	RESOURCES	815
	HISTORY	2638	HISTORY	599	GAS	661	HISTORY	675	HISTORY	668
	MUSEUM	1342	SELECTION	293	SELECTION	294	MUSEUM	359	MUSEUM	398
	SELECTION	1263	LAW	285	MUSEUM	285	SELECTION	274	SELECTION	386
	ENVIRON-MENT	930	MUSEUM	281	ENVIRON-MENT	254	RESOURCE	217	DISASTERS	313
	RESOURCE	884	ENVIRON-MENT	268	RESOURCE	246	ENVIRON-MENT	197	LAW	255
	DISASTERS	738	RESOURCE	231	DEPARTMENT	172	OIL	163	OIL	229
	OIL	690	OIL	176	SCIENCES	148	SCIENCES	155	DISASTER	217
	BEAUTY	609	SCIENCE	168	DISASTERS	142	DISASTERS	145	ENVIRON-MENT	196

‘harmony’

Table 8.39 COCA collocates (with frequency) from 1990-2010—with 5 year increments—for ‘harmony’

	1990-2010		1990-1994		1995-1999		2000-2004		2005-2009	
harmony	PEACE	149	RACIAL	62	BETWEEN	55	DR	46	CRYSTAL	31
	RACIAL	138	NATURE	56	RACIAL	43	PEACE	28	PEACE	29
	NATURE	130	PEACE	48	PEACE	42	SOCIAL	25	PERFECT	29
	LIVE	129	LIVE	48	NATURE	34	MELODY	24	BALANCE	28
	PERFECT	116	PERFECT	37	LIVE	32	PERFECT	24	TOGETHER	27
	SOCIAL	109	MELODY	23	MELODY	26	LIVE	22	LIVE	24
	MELODY	88	COLOR	21	PERFECT	26	JUSTICE	21	RHYTHM	20
	BALANCE	82	RHYTHM	15	TOGETHER	25	BALANCE	20	NATURE	19
	RHYTHM	64	UNITY	13	SOCIAL	25	NATURE	20	Y	17
	COLOR	64	MAINTAIN	13	COLOR	21	RACIAL	19	CONFLICT	17

‘botanical’

Table 8.40 COCA collocates (with frequency) from 1990-2010—with 5 year increments—for ‘botanical’

	1990-2010		1990-1994		1995-1999		2000-2004		2005-2009	
botanical	GARDEN	510	GARDEN	85	GARDEN	121	GARDEN	124	GARDEN	161
	GARDENS	280	GARDENS	60	GARDENS	91	GARDENS	63	GARDENS	63
	ATLANTA	98	YORK	19	MISSOURI	24	ATLANTA	23	ATLANTA	44
	YORK	77	MISSOURI	12	ATLANTA	19	YORK	18	YORK	20
	MISSOURI	58	ATLANTA	10	NATIONAL	17	ART	17	ROYAL	16
	PRINTS	32	ZOOLOGICAL	9	AMERICAN	17	NATIONAL	13	PIEDMONT	15
	ART	31	PRINTS	9	TROPICAL	16	PRINTS	12	1345	14
	SPECIMENS	29	ARTIST	9	YORK	16	ARTISTS	12	MISSOURI	12
	TROPICAL	29	DIRECTOR	9	COUNCIL	12	SPECIMENS	11	SOCIETY	10
	COUNCIL	28	SPECIMENS	8	ST	11	MISSOURI	9	DESERT	9

‘wind’

Table 8.41 COCA collocates (with frequency) from 1990-2010—with 5 year increments—for ‘wind’

	1990-2010		1990-1994		1995-1999		2000-2004		2005-2009	
wind	POWER	972	BLOWING	282	BLOWING	252	POWER	322	SOLAR	431
	BLOWING	967	BLEW	189	BLEW	191	SOLAR	257	POWER	399
	SOLAR	967	COLD	173	RAIN	174	BLOWING	234	ENERGY	304
	RAIN	706	GONE	168	GONE	168	RAIN	172	TURBINES	220
	BLEW	672	RAIN	166	COLD	159	ENERGY	158	BLOWING	186
	COLD	624	BLOWS	110	BLOWS	128	BLOWS	151	RAIN	179
	ENERGY	615	SOLAR	109	SOLAR	127	BLEW	146	CHILL	170
	GONE	572	SPEED	103	HAIR	101	COLD	145	FARMS	157
	BLOWS	495	HAIR	98	GUST	99	GONE	129	COLD	140
	GUST	414	STRONG	94	WIND	92	GUST	113	BLEW	133

8.1.3.4 Words with other trends

'fresh'

Table 8.42 COCA collocates (with frequency) from 1990-2010—with 5 year increments—for 'fresh'

	1990-2010		1990-1994		1995-1999		2000-2004		2005-2009	
fresh	1	3856	AIR	423	1	908	AIR	1025	1	1569
	AIR	2833	1	353	CHOPPED	692	1	828	CHOPPED	1058
	CHOPPED	2687	WATER	346	2	608	CHOPPED	551	2	979
	2	2496	2	264	CUP	551	2	516	AIR	861
	CUP	2159	FRUIT	210	AIR	413	CUP	451	CUP	846
	JUICE	1451	CHOPPED	198	1/2	366	WATER	352	JUICE	620
	WATER	1403	CUP	182	WATER	356	LEAVES	286	TBSP	492
	LEAVES	1311	JUICE	178	LEAVES	346	TABLESPOONS	270	LEAVES	487
	TABLESPOONS	1031	VEGETABLES	178	TABLESPOONS	313	JUICE	265	TSP	471
	LEMON	947	FISH	158	JUICE	313	TEASPOON	228	LEMON	437

'green'

Table 8.43 COCA collocates (with frequency) from 1990-2010—with 5 year increments—for 'green'

	1990-2010		1990-1994		1995-1999		2000-2004		2005-2009	
green	RED	2167	RED	428	BAY	699	RED	543	RED	556
	BAY	2090	BAY	404	RED	568	LIGHT	457	BAY	512
	LIGHT	1650	BLUE	356	LIGHT	392	BAY	448	ONIONS	483
	BLUE	1545	LIGHT	354	BLUE	373	BEANS	394	EYES	417
	EYES	1418	EYES	321	BEANS	338	BLUE	388	LIGHT	412
	BEANS	1398	GREEN	266	ONIONS	332	EYES	323	BEANS	407
	ONIONS	1239	DARK	250	GREEN	297	YELLOW	312	BLUE	378
	GREEN	1191	YELLOW	229	YELLOW	283	PARTY	262	GREEN	340
	YELLOW	1111	BEANS	211	DARK	276	ONIONS	252	TEA	275
	DARK	1026	LEAVES	180	PEPPER	256	GREEN	252	YELLOW	266

'gas'

Table 8.44 COCA collocates (with frequency) from 1990-2010—with 5 year increments—for 'gas'

	1990-2010		1990-1994		1995-1999		2000-2004		2005-2009	
gas	NATURAL	4074	NATURAL	903	NATURAL	661	NATURAL	1127	NATURAL	1300
	OIL	3391	OIL	855	OIL	557	OIL	704	OIL	1126
	STATION	1792	STATION	396	STATION	375	STATION	474	PRICES	823
	PRICES	1648	PRICES	272	GREENHOUSE	200	PRICES	422	GREENHOUSE	544
	GREENHOUSE	1139	TEAR	240	TEAR	168	GREENHOUSE	253	STATION	519
	EMISSIONS	786	TAX	185	TANK	162	TEAR	196	EMISSIONS	375

	STATIONS	702	POISON	166	GAS	156	EMISSIONS	183	STATIONS	213
	TEAR	692	ELECTRIC	166	STATIONS	143	STATIONS	175	PRICE	165
	GAS	611	MASKS	155	EMISSIONS	131	ELECTRIC	170	TANK	163
	ELECTRIC	595	CHAMBER	155	ELECTRIC	131	GAS	154	GALLON	134

‘oil’

Table 8.45 COCA collocates (with frequency) from 1990-2010—with 5 year increments—for ‘oil’

	1990-2010		1990-1994		1995-1999		2000-2004		2005-2009	
oil	OLIVE	7983	PRICES	1087	OLIVE	1970	OLIVE	1922	OLIVE	3018
	1	4519	GAS	854	1	1006	1	978	1	1911
	GAS	3390	OLIVE	735	2	803	2	705	2	1362
	2	3337	PRICE	647	HEAT	712	GAS	704	GAS	1126
	PRICES	3044	OIL	613	TABLESPOONS	672	HEAT	693	PRICES	914
	HEAT	2647	X	590	GAS	557	PRICES	678	HEAT	896
	COMPANIES	2295	COMPANIES	520	CUP	495	OIL	467	COMPANIES	766
	OIL	2073	CRUDE	464	COMPANIES	416	VEGETABLE	457	CUP	739
	CUP	2060	PRODUCTION	350	VEGETABLE	403	CUP	452	TBSP	682
	TABLESPOONS	1934	SPILL	340	TABLESPOON	399	TABLESPOONS	451	OIL	539

‘gasoline’

Table 8.46 COCA collocates (with frequency) from 1990-2010—with 5 year increments—for ‘gasoline’

	1990-2010		1990-1994		1995-1999		2000-2004		2005-2009	
gasoline	PRICES	638	TAX	220	PRICES	60	PRICES	163	PRICES	274
	TAX	335	PRICES	139	TAX	53	OIL	68	PRICE	122
	PRICE	315	PRICE	110	OIL	46	ENGINE	49	GALLON	87
	OIL	282	TAXES	91	REFORMULATED	45	GALLON	46	DIESEL	78
	GALLON	215	OIL	82	FUEL	38	PRICE	41	OIL	78
	FUEL	195	REFORMULATED	64	PRICE	35	DIESEL	40	FUEL	65
	DIESEL	180	GALLON	52	TAXES	34	TAX	37	ENGINE	63
	ENGINE	177	FUEL	52	ENGINE	33	FUEL	34	ENGINES	48
	TAXES	161	INCREASE	41	DIESEL	27	GALLONS	27	ETHANOL	47
	REFORMULATED	129	UNLEADED	39	ENGINES	26	COST	27	STATIONS	41

‘industrial’

Table 8.47 COCA collocates (with frequency) from 1990-2010—with 5 year increments—for ‘industrial’

	1990-2010		1990-1994		1995-1999		2000-2004		2005-2009	
industrial	AVERAGE	846	POLICY	529	REVOLUTION	234	REVOLUTION	194	DOW	225
	DOW	822	REVOLUTION	228	AVERAGE	225	DOW	138	AVERAGE	222
	JONES	798	AVERAGE	226	DOW	216	AVERAGE	137	JONES	217
	REVOLUTION	796	PRODUCTION	210	JONES	212	JONES	129	REVOLUTION	130
	POLICY	660	DOW	206	DEVELOPMENT	133	DEVELOPMENT	83	PRODUCTION	74
	PRODUCTION	460	JONES	202	COMMERCIAL	131	DESIGN	79	DESIGN	68

	DEVELOPMENT	439	DEVELOPMENT	161	PRODUCTION	99	COMMERCIAL	78	POINTS	68
	COMMERCIAL	400	COUNTRIES	143	COUNTRIES	98	PARK	77	PARK	67
	COUNTRIES	337	COMMERCIAL	136	POLICY	95	PRODUCTION	69	ARTS	60
	PARK	324	BASE	126	ORGANIZATION	88	COUNTRIES	66	DEVELOPMENT	55

'smog'

Table 8.48 COCA collocates (with frequency) from 1990-2010—with 5 year increments—for 'smog'

	1990-2010		1990-1994		1995-1999		2000-2004		2005-2009	
smog	URBAN	50	URBAN	30	AIR	15	TRAFFIC	12	ANGELES	7
	POLLUTION	40	POLLUTION	16	OZONE	14	FORMULA	10	LOS	7
	OZONE	37	RAIN	16	SOOT	11	AIR	10	OZONE	6
	AIR	35	ACID	14	URBAN	11	POLLUTION	9	THICK	6
	RAIN	34	LOS	12	POLLUTION	10	HAZE	7	REDUCE	6
	ACID	31	OZONE	11	POLLUTANTS	9	COMPONENT	7	POLLUTION	5
	LEVELS	29	COMPONENT	10	ACID	9	THICK	7	KNOWN	5
	LOS	26	LEVELS	10	RAIN	9	URBAN	7	AIR	5
	COMPONENT	25	CITY	10	CAUSE	9	LEVELS	7	PROBLEM	5
	THICK	25	LESS	9	LEVELS	7	MAIN	7	PHOTO-CHEMICAL	4

8.1.3.5 Words with low frequency

'free range'

Table 8.49 COCA collocates (with frequency) from 1990-2010—with 5 year increments—for 'free range'

	1990-2010		1990-1994		1995-1999		2000-2004		2005-2009	
free range	FREE	57	FREE	7	FREE	6	FREE	12	FREE	28
	CHICKENS	4	LOSS	2	CHICKENS	2	TIMBERLAND	1	ORGANIC	3
	TURKEYS	3	DISAPPEARS	1	AIMLESSLY	1	ANONY-MOUSLY	1	TURKEYS	2
	ORGANIC	3	CHICKENS	1	CORONADO	1	TURKEYS	1	FARMER	2
	FARMER	2	COWBOYS	1	REFINED	1	$90	1	MOTION	2
	MOTION	2	COWBOY	1	OVERLY	1	SURVEYING	1	SELLING	2
	SELLING	2	LATELY	1	SPIRAL	1	GOATS	1	RANGE	2
	LOSS	2	STRUGGLING	1	GRAIN	1	CAGES	1	HOUSE	2
	RANGE	2	ORGANIZED	1	TURKEY	1	SPREADS	1	ONLY	2
	GIVE	2	DESERT	1	HANG	1	ATHLETICS	1	ANKS	1

'decomposable'

Table 8.50 COCA collocates (with frequency) from 1990-2010—with 5 year increments—for 'decomposable'

decomposable	1990-2010		1990-1994		1995-1999		2000-2004		2005-2009	
	-	3	WHOLENESS	1	PARTICULAR	1	SEQUENCE	1	ARE	3
	ARE	3	MODULES	1	SENSE	1	FIGURES	1	MATERIALS	2
	MATERIALS	2	ASPECTS	1	IS	1	BECOMES	1	REDUCIBLE	1
	INTO	2	SEPARATE	1	IT	1	PICTURE	1	DRIER	1
	SO	2	ANALYSIS	1	THAT	1	INTO	1	WEEDS	1
	REDUCIBLE	1	MUST	1	TOTAL	5	IT	1	ALTERNATE	1
	WHOLENESS	1	INTO	1			TOTAL	6	READILY	1
	DRIER	1	SO	1					DISTINCT	1
	MODULES	1	BE	1					PROPERTIES	1
	ALTERNATE	1	TOTAL	9					I.E	1

8.2 Appendix B Survey Information

8.2.1 Green Term Survey

8.2.1.1 Directions

In the following survey, you will be shown a series of words. Please answer the presented question for each word by selecting a response in the form provided.

In order to provide the best results, please take this survey alone and without consultation, and in an area free of distraction. You may discontinue the survey at any time.

Please press '>>' to continue.

8.2.1.2 Prompt

word

"How would you associate this word with being either harmful or beneficial to the environment?"

very harmful to environment			neither harmful nor beneficial		very beneficial to environment	
O	O	O	O	O	O	O

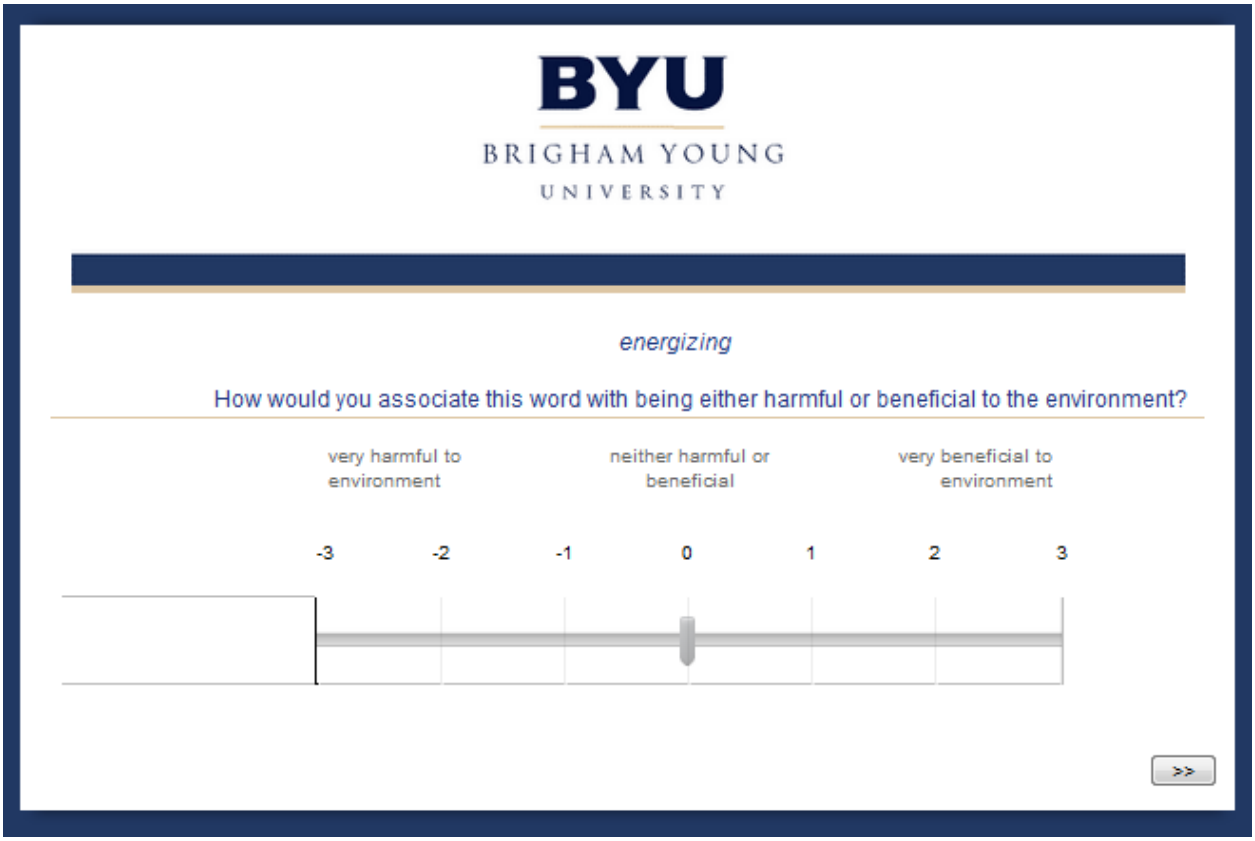


Figure 8.48 Snapshot of survey in Qualtrics

8.2.1.3 Participant info

What is your gender? Male Female Decline to answer

What is your age? (leave blank if decline to answer)

Where do you reside (City, State)? (leave blank if decline to answer)

What city and state do you claim as your hometown? (leave blank if decline to answer)

What political affiliation do you most often agree with? Democrat, Republican, Green, Libertarian, Independent: other, Other: (Fill in); Decline to answer

***

8.2.1.4 Environmental awareness scale

NEP Scale Questionnaire (Dunlap, et al., 2000)

Please indicate to what degree you agree with the following statements. (1 strongly disagree to 7 strongly agree slider scale)

1 We are approaching the limit of people the earth can support

2 Humans have the right to modify the natural environment to suit their needs

3 When humans interfere with nature it often produces disastrous consequences

4 Human ingenuity will insure that we do NOT make the earth unlivable

5 Humans are severely abusing the environment

6 The earth has plenty of natural resources if we just learn how to develop them

7 Plants and animals have as much right as humans to exist

8 The balance of nature is strong enough to cope with the impacts of modern industrial nations

9 Despite our special abilities humans are still subject to the laws of nature

10 The so-called 'ecological crisis' facing humankind has been greatly exaggerated

11 The earth is like a spaceship with very limited room and resources

12 Humans were meant to rule over the rest of nature

13 The balance of nature is very delicate and easily upset

14 Humans will eventually learn enough about how nature works to be able to control it

15 If things continue on their present course, we will soon experience a major ecological catastrophe

8.2.2 Product Ratings Survey

8.2.2.1 Directions

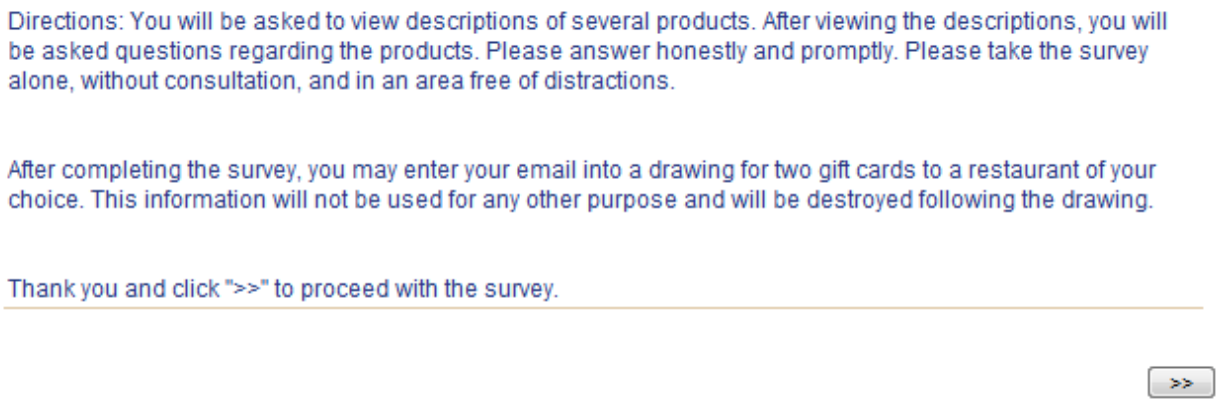


Figure 8.49 Snapshot of directions in Qualtrics

8.2.2.2 Product presentation

Figure 8.49 Snapshot of product presentation in Qualtrics

8.2.2.3 Questions

Figure 8.50 Effects on environment questions

Figure 8.51 Effectiveness questions

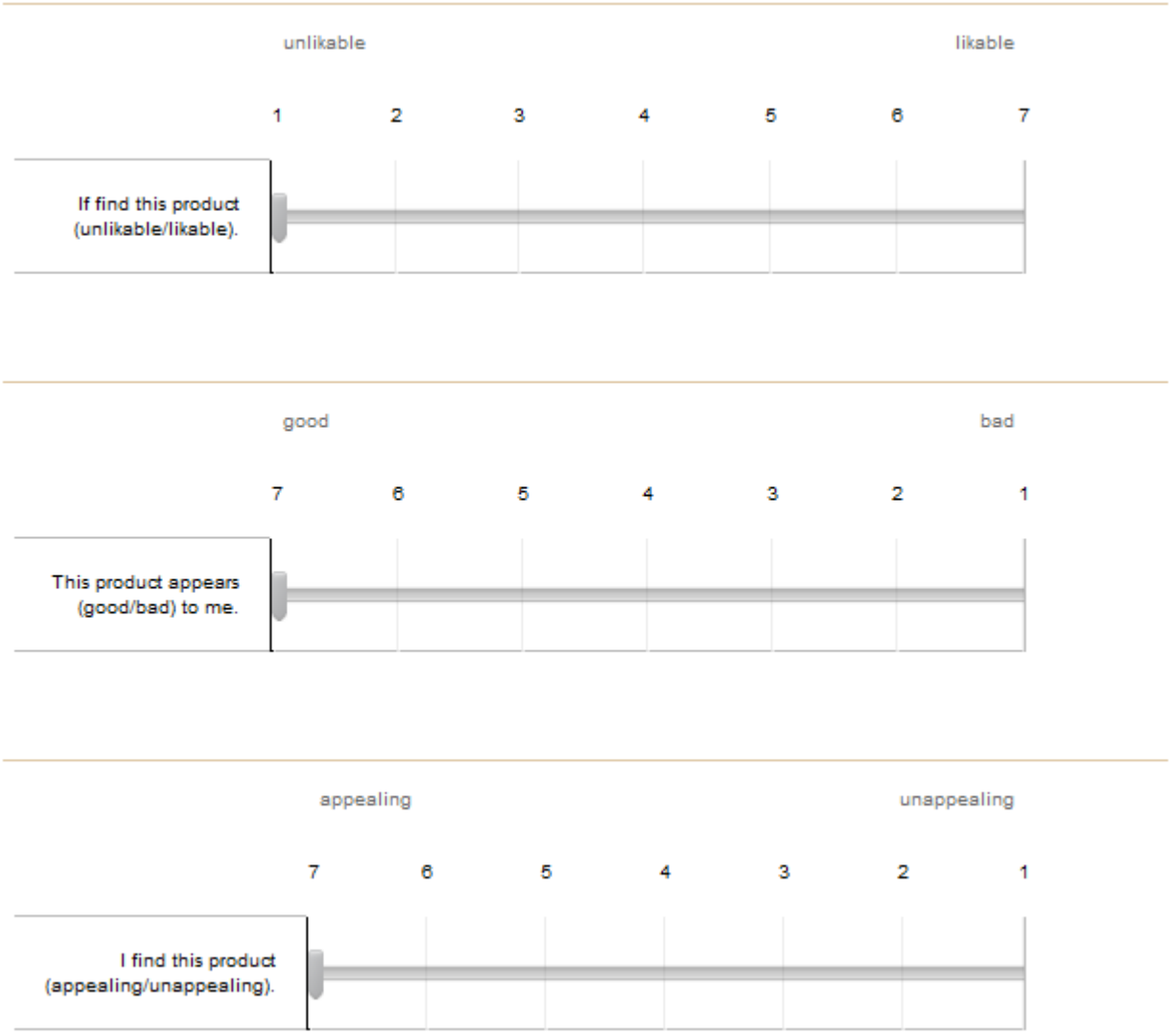


Figure 8.52 Attractiveness questions

Figure 8.53 Buyability questions

8.3 Appendix C Statistics

8.3.1 Chapter 4 Multiple Regression

Fit Group

Response Green

Summary of Fit

RSquare	0.095288
RSquare Adj	0.093437
Root Mean Square Error	1.115963
Mean of Response	1.300612
Observations (or Sum Wgts)	1470

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	3	192.2928	64.0976	51.4686
Error	1466	1825.7166	1.2454	Prob > F
C. Total	1469	2018.0094		<.0001*

Lack Of Fit

Source	DF	Sum of Squares	Mean Square	F Ratio
Lack Of Fit	44	381.2921	8.66573	8.5312
Pure Error	1422	1444.4245	1.01577	Prob > F
Total Error	1466	1825.7166		<.0001*
				Max RSq
				0.2842

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	-0.452743	0.179728	-2.52	0.0119*
Gender	0.5664801	0.059767	9.48	<.0001*
Political(L/R){I-R}	-0.179931	0.033614	-5.35	<.0001*
NEPTotal	0.0143924	0.002832	5.08	<.0001*

Effect Tests

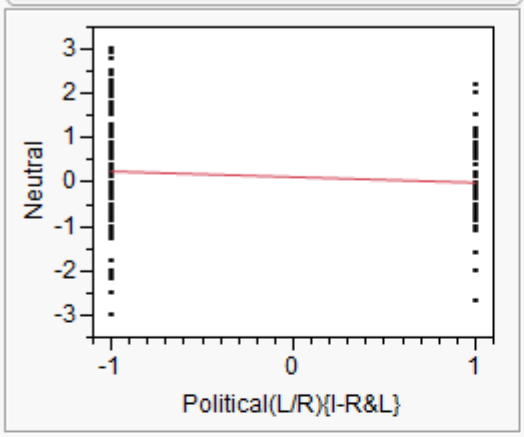
Source	Nparm	DF	Sum of Squares	F Ratio	Prob > F
Gender	1	1	111.87662	89.8338	<.0001*
Political(L/R){I-R}	1	1	35.68295	28.6524	<.0001*
NEPTotal	1	1	32.16901	25.8308	<.0001*

Figure 8.54 Multiple regression analysis of 'green' words

Fit Group

Response Neutral

Regression Plot



Summary of Fit

RSquare	0.016383
RSquare Adj	0.014696
Root Mean Square Error	0.925041
Mean of Response	0.16547
Observations (or Sum Wgts)	585

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	1	8.30937	8.30937	9.7106
Error	583	498.87313	0.85570	Prob > F
C. Total	584	507.18250		0.0019*

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	0.1233333	0.040566	3.04	0.0025*
Political(L/R){I-R&L}	-0.12641	0.040566	-3.12	0.0019*

Effect Tests

Source	Nparm	DF	Sum of Squares	F Ratio	Prob > F
Political(L/R){I-R&L}	1	1	8.3093675	9.7106	0.0019*

Figure 8.55 Multiple regression analysis for 'neutral' group

Fit Group

Response Harmful

Summary of Fit

RSquare	0.106858
RSquare Adj	0.102605
Root Mean Square Error	1.092658
Mean of Response	-1.26856
Observations (or Sum Wgts)	423

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	2	59.99361	29.9968	25.1250
Error	420	501.43821	1.1939	Prob > F
C. Total	422	561.43182		<.0001*

Lack Of Fit

Source	DF	Sum of Squares	Mean Square	F Ratio
Lack Of Fit	44	78.92932	1.79385	1.5964
Pure Error	376	422.50889	1.12369	Prob > F
Total Error	420	501.43821		0.0118*
				Max RSq
				0.2474

Parameter Estimates

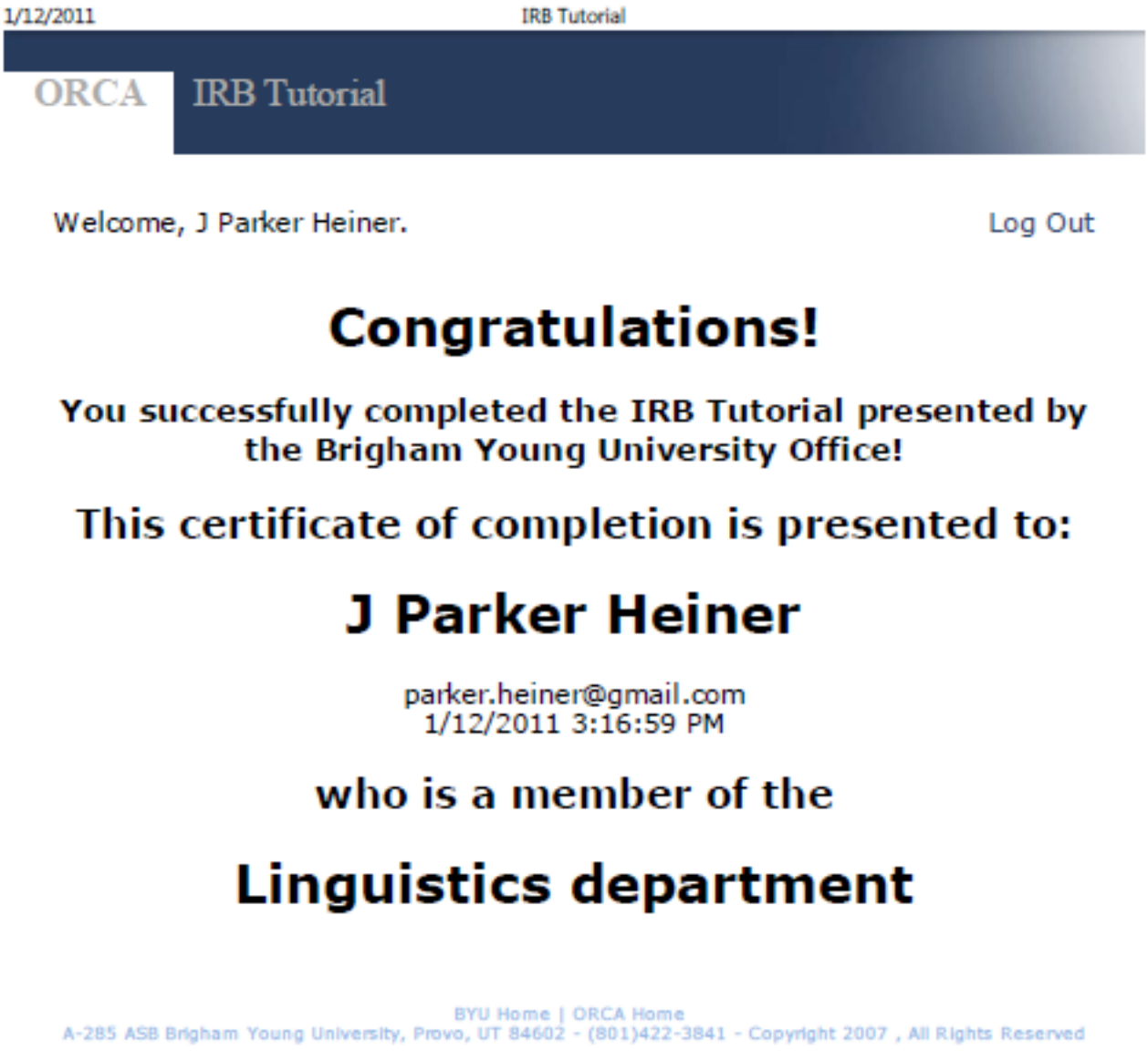
Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	-0.137798	0.335017	-0.41	0.6811
Age	0.0156452	0.003792	4.13	<.0001*
NEPTotal	-0.027444	0.004988	-5.50	<.0001*

Effect Tests

Source	Nparm	DF	Sum of Squares	F Ratio	Prob > F
Age	1	1	20.327888	17.0265	<.0001*
NEPTotal	1	1	36.140627	30.2711	<.0001*

Figure 8.56 Multiple regression analysis of 'harmful' words

8.4 Appendix D IRB Tutorial Certificate



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