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A corpus-based study of metaphor signaling variations in three genres

Abstract: This study examines the use of words and phrases that signal metaphors in three genres in order to further examine the corpus-based evidence for signaling variation mentioned in previous research. While previous studies have focused on pragmatic functions, discourse functions, and the level of conventionalization, this study demonstrates that the communicative goals within each genre underlie the reasons for the metaphor signaling. Three corpora of approximately 600,000 words were created for this research, and they were made up of US presidential addresses, popular science articles, and business periodical articles. The corpora were electronically queried for the use of sixteen previously identified metaphor signals in order to obtain comparable quantitative data. The study was complemented by a qualitative analysis of the identified instances of signaled metaphors. We found that three metaphor signal categories – copular similes, verbal processes, and modals/conditionals – accounted for the large majority of the signals analyzed in the genres. Furthermore, we found that while copular similes and verbal processes signals were used for different rhetorical purposes, depending on the communicative goals of each genre, the conditional signal was always used to foreshadow metaphorically expressed possibilities, regardless of the genre in which it was used.

Keywords: metaphor, signaling, corpora, genre, communication

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1 Introduction

The extent to which metaphors can be anticipated in a text by words and phrases is a prominent area of inquiry within the field of metaphor analysis, as these signals may assist the reader in metaphor identification and interpretation.

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Metaphor signaling itself has received attention within metaphor studies and has been approached from different perspectives, often leading to variation in the terminology used. For example, the terms: hedges (Glucksberg and Keysar 1993), metaphorical markers (Goatly 1997), tuning devices (Cameron and Deignan 2003), meta-communicative markers (Pramling 2006), and flagging (Steen 2007) have all been used in the field, indicating that metaphor signaling is a new area of study.

The existing data on the use of metaphor signals provide a fragmentary picture of signal patterning in discourse, as they are based on corpora differing in their size and scope, and focus on distinct words and expressions. Some studies used specifically designed corpora, reflecting a number of communicative contexts (Cameron and Deignan 2003; Partington 2006; Skorczynska and Piqué 2005), while other studies relied on collections of spoken or written discourse samples (Cameron and Deignan 2003; Wallington et al. 2003). Thus, the field is still in need of comparable data sets that can provide more generalizable insights into metaphor signal patterning variations over different contexts, so that knowledge about metaphor co-text can be attained in a more systematic manner. In this sense, this study will improve data comparability by analyzing the same set of metaphor signals in different corpora.

One of the most important findings (Cameron and Deignan 2003) in the field, later replicated in other studies (Skorczynska 2010; Steen 2007; Wallington et al. 2003), revealed that metaphor signaling is not related to the type of metaphor used (conventional or novel), but rather to the local pragmatic strategies of participants.[1] Building on this finding, this study provides corpus data obtained in a contrastive analysis of selected metaphor signals across three genres. The genre perspective proposed here seems to be a promising way of approaching metaphor signaling in discourse, and has been motivated by the concept of metaphor expectedness in discourse, as elaborated by Cameron and Deignan (2003).

The genre perspective (Swales 1990) concentrates on the context of communication and the participants' shared communicative purposes, which in turn influence and constrain the schematic structure of the genre, as well as the lexical and stylistic choices made. From this view, metaphor signaling in

1 According to Knowles and Moon (2006), novel (or creative) metaphors are those which need to be deconstructed or "unpacked" in order to understand what is meant. They are new, although they may be based on pre-existing ideas or images. By contrast, conventional (or conventionalized) metaphors are repeatedly used in discourse to refer to a particular thing (e.g., "divorced" used to mean "completely separated"). They are recorded in dictionaries, as opposed to novel metaphors. In our study, metaphors included in *Macmillan English Dictionary for Advanced Learners* (Rundell and Fox 2007) were considered as conventional. The Praglejaz Project (Steen 2005) argued that it is a suitable dictionary for this purpose.

discourse might be interrelated with the genre's contextual features, its communicative purposes, and its conventions. As metaphors seem to fulfill distinct pragmatic functions in different genres (Skorczynska and Deignan 2006), the need for metaphor signaling may also vary from genre to genre, in that less expected metaphors may need to be anticipated in discourse to facilitate their comprehension, while metaphors that are highly expected in a particular genre may be signaled for other reasons, as determined by the communicative context.

Variation in metaphor signaling might be correlated with genre variation, not only in terms of the frequency of signals, but also regarding the type of signal used. Therefore, in this study, we hypothesize that the same signaling words and phrases will show different patterns of use in three written genres – political speeches, popular science articles, and business periodical articles – as the communicative goals of those genres vary. The quantitative data and qualitative insights found will provide a basis for a discussion of the interrelations between the genre and metaphor signaling.

The section that follows (Section 2) provides an overview of metaphor signaling research. After that, Section 3 includes a detailed description of the corpora and the research method used. The following three sections discuss the results with reference to the US Presidential Radio Addresses (Section 4), popular science articles (Section 5), and business periodical articles (Section 6). The conclusions are provided in the final section.

2 Metaphor signaling

Metaphor signaling has been approached from both qualitative and quantitative perspectives. Miller (1993: 371), for instance, listed the following words and phrases that could signal metaphors in text: *like*, *acts like*, *looks like*, *is similar to*, *as*, *resembles*, or *the same as*, while Ortony (1993: 347) pointed to *sort of*, *kind of*, or *in a way*. Glucksberg and Keysar (1993) referred to metaphor signals as *hedges* and argued that they may diminish the degree of implicative elaboration required in understanding a metaphor.

Along the same line, Goatly (1997) argued that metaphor co-text and context are likely to influence its interpretation, so that the lack of co-textual and contextual clues might lead to metaphor misinterpretation. In other words, the use of linguistic resources as signals in the metaphor vehicle environment can decrease the reader's or the listener's processing effort in interpreting a metaphor. Similarly, the processing effort may increase or diminish depending on the signal category: the most explicit signals, such as *metaphorically* and *really*, convert a metaphor into a literal comparison, as in "young officers who acquired

wives before they had, metaphorically* speaking, **cut their wisdom teeth**" (Goatly 1997: 170; asterisk and bold letters have been added). The least explicit signals, such as *may* and *as it were*, generate a variety of weak implicatures, such as those created by "they disappeared instantly as it were* **into thin air**" (Goatly 1997: 193; the author's asterisk and bold letters).

Goatly's (1997) grouped metaphor signals into twenty categories: explicit markers (*metaphor*, *figuratively*); intensifiers (*literally*, *really*); hedges or downtowners (*in a way*, *a bit of)*; semantic metalanguage (*mean*, *import*); mimetic terms (*image*, *likeness*); symbolism terms (*symbol*, *sign*); superordinate terms (*sort of*, *kind of)*; copular similes (*like*, *as*); precision similes (material verb + *like*); clausal similes (*as if*, *as though*); perceptual processes (*seem*, *sound)*; misperception terms (*delusion*, *illusion*); cognitive processes (*believe*, *think*); verbal processes (*say*, *call)*; *so to speak*; orthography; modals + verbal processes (*could say*); modals (*must*, *perhaps*); conditionals (*if.... could)*; and *as it were*.[2]

Cameron and Deignan (2003) showed that metaphors are signaled depending on their expectedness in a particular discourse context. The authors found that metaphor tuning devices were used to direct listeners to a particular interpretation of a metaphor and to adjust the strength of a metaphor. They were also used to alert interlocutors to the unexpected use of a metaphor, for instance when a metaphor used is not appropriate for the level of formality in the interaction. Metaphor expectedness in discourse can be interpreted in terms of the hearer's ability to match the topic with the vehicle, the existence of other linguistic cues, or metaphor appropriateness for the register used. As can be seen, expectedness is an all-inclusive concept, which involves contextual aspects of discourse and metaphor use, as well as the interlocutors' abilities. The study suggests that spoken communication could feature a significant frequency of tuning devices for metaphors, as interlocutors may be involved in evaluating each other's discourse competence during their interaction in a specific communicative context.

In a comparative study of metaphor signals in a corpus of economic research papers and a corpus of business periodical articles, Skorczynska and Piqué (2005) detected significant differences in the use of 67 potential metaphor signals (Goatly 1997). A larger number of signals were found in the business periodical articles corpus in comparison to the economic research papers corpus. The frequency of individual metaphor signals was also significantly higher in the business periodical articles corpus. The study attributed metaphor signaling variation to a possibly more frequent use of metaphors in business periodicals and to distinct

2 Wallington et al. (2003), following Goatly's (1997) study, provided a list of metaphor signals compiled through the studies of metaphor collocational patterns in corpora. The authors divided the signals into twelve types and established a similar categorization to Goatly's (1997).

discourse functions of the samples studied. A more functional and more detailed approach to metaphor signals was adopted in Skorczynska (2010). The study revealed that there were correlations between metaphor signaling and metaphor functions in discourse. For instance, business metaphorical terms were not signaled, while half of the illustrating metaphors were anticipated by signaling words and phrases. In this sense, the study confirmed Cameron and Deignan's (2003) claim that metaphors can be signaled or not signaled depending on their discourse functions, rather than on their level of conventionalization.

From a rather different perspective, and using data from a small corpus of different discourse samples, Wallington et al. (2003) reported that metaphors were more frequently anticipated by *metaphoricity signals* in written rather than in spoken discourse. This might have occurred because of a more frequent use of metaphors in written texts in general, and because writing allows time for the use of creative or novel metaphors, which in turn might need to be signaled for the reader's convenience. Spoken discourse, or speech in general, may not favor the construction of novel metaphors, and therefore the use of metaphor signals might not be necessary. The study also revealed that the probability of a word or phrase to be used as a metaphor signal was higher in the written part of the corpus analyzed.

Similar results were reported by Low et al. (2008) in the study of metaphors in three academic lectures. The authors argued that metaphor signaling was inconsistent and infrequent, and they related the differences detected to the degree of discourse formality. There were practically no instances of metaphor signaling in the formal lectures, while in a more informal example, the lecturer repeatedly used *sort of* to signal metaphors indicating the lecture's key episodes. This is an interesting finding as it shows that the absence or presence of metaphor signaling may be related to different levels of discourse formality.

Partington (2006: 282–286) showed that *sort of* and *kind of* were more often used to signal metaphors in newspapers than in spontaneous oral discourse, represented by political briefings. Newspaper writing is highly creative and rich in expressions, exhibiting a higher figurative density than the political briefings, which in general confirms findings on written and spoken discourse by Wallington et al. (2003). What is interesting is that *sort of* is also used in newspaper writing, in addition to being used in informal lectures, as discussed in Low et al. (2008). These are two very different genres and levels of formality, and this indicates that the signal itself might be used in different genres; that is, within any one study, comparisons may be made regarding what types of signals are used and how frequently they are used, but it is difficult to draw comparisons across studies that focus on small samples of discourse using different methodological approaches.

Thus, in this study we would like to return to the issues raised in Skorczynska and Piqué (2005), who found that the signaling of metaphors was more frequent in business articles than in research papers and that the categories of usage differed across these two genres. Hence, this study will examine metaphor anticipation patterns involving metaphor signals across three genres with different audiences and different goals. Saturday addresses by US presidents, broadcast by radio and currently available as video files on the White House's website, are consent-oriented subgenres of political speech. They are designated to express consensual political values and political norms, often related to the imagined community of the nation, as well as to national identity. Even though the orators read a text prepared beforehand, they often try to suggest that they are speaking freely (Reisigl 2008).

Popular science articles aim to disseminate scientific knowledge to general society, by transforming "specialized knowledge into 'everyday' knowledge," as well as by re-contextualizing scientific discourse (Calsamiglia and Van Dijk 2004: 370). They are not a simplified version of the research article, but a discursive reconstruction of scientific knowledge to an audience other than the academic one (Calsamiglia et al. 2001). The discourse of science popularization can be described in terms of enunciative standpoints (Beacco et al. 2002; Moirand 2003), which add discourses of different sectors of society (e.g., policy-makers, technical practitioners, historians, sociologists, and public) in the discussion of the validity of scientific findings.

An overview of our corpus of business periodical articles has showed that they are intended for the general educated public interested in economic matters and political affairs. They are similar in their communicative purpose to opinion articles in newspapers, as they provide an in-depth analysis and an interpretation of the issues of interest to a wide range of professionals from the field of economy and business management, in addition to nonspecialist readers willing to broaden their views on the current economic and political matters.

The data obtained from the three corpora will allow for a more generalizable view of metaphor signaling variation across genres. We hypothesize, following Skorczynska and Piqué (2005), that the differences in communicative goals will result in metaphors being used more frequently in popular science articles and business periodical articles, as the need for explanation is greater in these two genres. This finding would also be in line with the frequency data found in Partington (2006) and Wallington et al. (2003), showing that metaphors occur more frequently in text than in speech, even though our sample is a written-to-be-read speech. In addition, we should find that the reasons for signaling metaphors in political speeches differ from the reasons metaphors are signaled in the other

two genres, as political speeches are designed not to examine and explain, but rather to persuade and convince.

3 Corpora and research method

Three written corpora of a similar size were created for this study: US Presidential Radio Addresses, popular science articles, and business periodical articles. The corpora were designed to cover entirely different topics so that a variety of language uses would be reflected. While all three genres are available and comprehensible to a readership educated at the high-school level and above, those reading in any one (or more) of the three genres will usually be interested in those areas, i.e., politics, business, or science. In addition, possible differences between the use of metaphor signals in spoken and written language were attended by including samples of presidential addresses, even though they represent written-to-be-spoken discourse, and therefore cannot be approached in the same terms as spontaneous spoken production.

The US Presidential Radio Addresses corpus consisted of nearly 700,000 words and contained speeches by four US presidents: George H. W. Bush (1989–1993), Bill Clinton (1993–2001), George W. Bush (2001–2009), and Barack Obama (2009). The collection of speeches covered a wide time span of nearly 20 years. The US Presidential Radio Addresses are delivered on the radio every Saturday morning, and more recently, Barack Obama's weekly addresses are uploaded to the White House webpage as video clips. The US presidents frequently comment on the current situation of the country, focusing on a particular political, social, or economic issue. The second corpus included articles published in two popular science magazines – *Scientific American* and *New Scientist* – and consisted of slightly more than 600,000 words. Popular science magazines offer an interpretation of scientific developments, and the articles can be written by both scientists and journalists. The third corpus included a collection of articles published in three business periodicals – *Business Week*, *Fortune*, and *The Economist* – and consisted of around 600,000 words. These articles are intended for business practitioners, but also for anyone interested in economic issues, and they are normally written by journalists specialized in business and management.

Sixteen metaphor signals were chosen for the study (Table 1). They were selected from the most frequent metaphor signals and metaphor signal categories reported in Skorczynska and Piqué (2005), based on the original list by Goatly (1997). Because of the aim of this research, we chose a top-down approach to obtain significant data in terms of word frequency.

Table 1: Metaphor signals analyzed (based on Goatly 1997).

Metaphor signal category	Metaphor signal
Explicit signals	*metaphor*
Intensifiers	*just, really, literally*
Symbolism forms	*symbol*
Superordinate terms	*sort of, kind of*
Copular similes	*like, as*
Clausal similes	*as if*
Perceptual processes	*look*
Verbal processes	*say, call*
Modals and conditionals	*may, could, would*

A corpus analysis of metaphor signaling is straightforward and can be carried out with any concordancing program, if we use a pre-selected list of signals. The concordances of the words and phrases previously selected as potential metaphor signals can be manually analyzed for the cases of metaphor signaling. In this study, WordSmith Tools 5 (Scott 2008) was used to electronically query the three corpora for the use of the words and phrases in Table 1. Thereafter, the concordances obtained were manually examined for signaled metaphors. Three analysts independently conducted the manual analysis of the concordances following the Metaphor Identification Procedure Vrije Universiteit (MIPVU) (Steen et al. 2010). The advantage of using MIPVU is that it acknowledges the use of metaphor *flags* or signals; that is, words that are related to metaphors, and which are considered as direct. Direct metaphors involve cross-domain mapping taking place in conceptual structure, but are expressed directly at the level of linguistic form by the use of words such as *like*, *as*, *seem*, etc. Steen et al. (2010) point out that similes, analogies and other nonliteral comparisons are examples of directly expressed metaphors.

The level of agreement reached by the three analysts in the identification of metaphors anticipated by the words listed in Table 1 was between 80% and 100%. When agreement was less than 100%, the examples were discussed until a consensus was reached.

4 Metaphor signals in the US Presidential Radio Addresses

Table 2 shows the normalized frequencies of the signals examined in the US Presidential Radio Addresses. *Would* was the most frequently used signal,

Table 2: Frequencies of metaphor signals in the US Presidential Radio Addresses.

Metaphor signal	Occurrences	Per 1,000 words
would	65	0.0958
as	37	0.0545
say	34	0.0501
symbol	19	0.0280
just	17	0.0250
could	15	0.0221
call	13	0.0192
like	11	0.0162
really	5	0.0074
may	5	0.0074
look	3	0.0044
kind of	1	0.0015
metaphor	0	0
literally	0	0
sort of	0	0
as if	0	0

followed by *as* and *say*. Two words (*metaphor*, *literally*) and one phrase (*sort of)* did not signal any metaphor in the corpus. Only occurrences that signaled a metaphor are included in Table 2.

The most frequent metaphorical signal used is the conditional *would*, which assists in describing hypothetical situations, that is, possible true circumstances if particular conditions are fulfilled. In signaling metaphors, *would* enhances the metaphoricity of a following expression reinforcing its present non-true status. In the examples provided, metaphor signals are highlighted with an asterisk, while metaphorically used words (metaphor vehicles) are emphasized in bold.

(1) (Bill Clinton, 15 July 2000)
Having already passed more than half a trillion dollars in reckless tax cuts, this week they passed a fiscally irresponsible plan to repeal the entire state tax. Its costs would* **explode** to $750 billion after 10 years.

(2) (Bill Clinton, 16 December 1995)
America's children would* **bear the most pain from the sharp cuts** proposed by the Republican Congress.

(3) (George W. Bush, 9 October 2004)
He's proposed the Kerry doctrine, which would* **paralyze** America by subjecting our national security decisions to a global test.

(4) (George W. Bush, 26 November 2008)
But in that hour of trial he gave thanks, because he believed America would* **weather the storm and emerge into a new era of liberty**.

Would combines with verb metaphors, and thus the metaphorical meaning signaled refers to actions, processes, and states. The metaphors signaled in this way are used by the presidents to express their particular vision of what might happen in hypothetical situations, and in this way, to point to alternative solutions or to describe situations which may occur if certain actions are not taken. The verb metaphors anticipated by *would* tend to be semantically polarized by transmitting either positive meaning (example [4]) or negative meaning (examples [1], [2], and [3]) in order to conveniently create either a good or a bad perspective of the American reality and of the rest of the world.

Would, therefore, plays a pragmatic role, in that it signals metaphors enacting hypothetical realities in order to generate a greater impact of the message being promulgated in the political discourse. The hypothetical scenarios are therefore strengthened by the use of the signal, in a way similar to how certain signals were used in the classroom interactions discussed in Cameron and Deignan (2003). Viewed from the genre perspective, it seems that this particular pragmatic role of metaphor anticipation is favored in certain communicative contexts, such as political speeches, where hypothetical scenarios are essential tools of the rhetorical argument.

Other signals from the category of modals and conditionals – *could* and *may* – were also identified in the corpus, but they were used less frequently, with 0.0221 and 0.0074 occurrences per 1,000 words, respectively. As with *would*, conditionality and modality are used to signal metaphors that depict possible ideal or undesired political and social scenarios (examples [5] and [6]).

(5) (George H. W. Bush, 28 September 1991)
If every community in this land committed itself to sacrifice and action in this work, then each could* become a "**community of light**".

(6) (Bill Clinton, 5 April 1997)
But this morning it looks like this chance to reopen the Government may* **be slipping away**.

As, appearing half as frequently as *would*, was used in nonliteral comparisons. Most of those nonliteral comparisons signaled by *as* were conventional metaphorical expressions. However, it is interesting to observe how the use of a conventional metaphor (examples [7] and [9]) can be made deliberate by anticipating *as*

combined with a verb expressing a personal view:[3] *I place... as....* or *I view....as....* These phrases seem to be especially effective in strongly personalizing a politician's speech, and thus in transmitting a particular ideological stance.

(7) (George H. W. Bush, 6 June 1992)
Thomas Jefferson's words still ring true: "I place public debt as* **the greatest of the dangers** to be feared".

(8) (Bill Clinton, 17 February 1996)
Two distinguished United States Senators have sponsored a sensible campaign finance reform bill that can serve as* **a foundation** for real reform.

(9) (George W. Bush, 27 January 2001)
I view principals, teachers, and parents as* **allies** in reform.

Say was nearly as frequent as *as* in signaling metaphors in the presidential addresses, and served to quote someone else's metaphor, included between inverted commas. In most of the cases with *say*, the metaphorical statements of relevant American personalities (examples [10] and [11]), historical and current, were mentioned; in addition, the figurative assertions of unknown American citizens were used as an inspiration in the messages to the American nation. On fewer occasions, the speaker used the first person plural *we say.../we said...* to anticipate a metaphor apparently shared with the audience (example [10]).

(10) (Bill Clinton, 11 November 2000)
President Roosevelt once said*, "Democracy is not **a static thing,** it is **an everlasting march**".

(11) (Barack Obama, 11 April 2009)
This idea that we're all bound up, as Martin Luther King once said*, "**in a single garment of destiny**", is a lesson of all the world's great religions.

(12) (Bill Clinton, 14 August 1993)
With the economic plan in hand and a very tough anticrime bill on the way, we can truly say* – our country **is headed in a new direction**: more responsibility, more opportunity, a deeper sense of community, and restoring the American dream.

3 All types of metaphor, whether conventional or novel, can be used deliberately in discourse. The concept of deliberateness has to do with the communicative function of metaphor rather than with its cognitive and linguistic structure (Steen 2008).

The use of metaphors occurring in both direct speech (examples [8] and [9]) and indirect speech (example [10]), is frequent in the presidential addresses, especially in the case of Bill Clinton, although there were no cases of the presidents quoting their own metaphors. In addition to serving as an inspiration, quoted metaphors allow the speakers to align themselves with the collective history and wisdom of the nation.

The relatively high frequency of *symbol* (0.0280) in this corpus should also be noted. It was used with reference to the symbols of the United States' national identity (e.g., flag, the White House, the World Trade Center) and to the symbols of spiritual values, especially Christian religious values. Interestingly, all of the 18 instances of *symbol* signaling a metaphor were used by two of the four presidents analyzed: George W. Bush (8 instances) and Bill Clinton (10 instances). Similar to the use of quoted metaphors discussed above, the use of *symbol* allows the speakers to align themselves with the shared political and religious history of the nation.

(13) (Bill Clinton, 11 November 2000)
... the White House has stood as the living symbol* of our **democracy.**

(14) (Bill Clinton, 2 April 1994)
Easter symbolizes* for us **the ultimate victory of good over evil, hope over despair, and life over death**.

In sum, metaphor signals in the presidential addresses corpus serve primarily to identify metaphors that inspire or transmit ideology, or to align the politician with the collective experience of the nation (cf. Charteris-Black's [2004] discussion of metaphorical keys to transmit political ideology). Explicit references to the use of metaphorical expressions (*metaphor*) were not found in the corpus, nor were instances of the informal *sort of* identified. *Kind of*, similar to *sort of*, was used only once, and the practical absence of these signals seems to be significant for this corpus. Goatly (1997: 179–183) suggested that both *sort of* and *kind of* are especially frequent in dialogue, when speakers need to use a metaphor to fill a lexical gap or to express hesitation. However, this contradicts Partington's (2006) findings pointing to a more frequent use of these two signals in newspaper discourse, as compared to political briefings, which exemplify spontaneous oral discourse. The author argued that this pattern of metaphor signaling was due to a higher density of metaphorical language in newspapers.

In the presidential addresses, which are written to be spoken orally, the references to figurative language expressing imprecision or vagueness – as in the case of *sort of* and *kind of* – are avoided by the presidents. Obviously, the

genre represented by the corpus examined cannot be considered a sample of spontaneous speech, but rather should be viewed as a type of written discourse. In this sense, the use of the two metaphor signals differs from the findings reported by Partington (2006), with reference to newspaper political discourse, and might be attributed to the contextual features of the genres in question: political speeches and newspaper articles. On the other hand, other types of metaphor signals such as conditionality, nonliteral comparisons, and quoted metaphorical expressions are notably frequent. These discursive features offer insights into the ways in which metaphorical signals highlight the rhetorical strategies used in political speeches, which, in turn, are aimed to enhance the effectiveness of the message conveyed.

5 Metaphor signals in popular science articles

Table 3 summarizes the frequency data of the metaphor signals in the popular science articles corpus. *As* was the most frequent signal in the corpus, followed by *like* and *say*, with significantly higher frequency ranges than the rest of the words and phrases analyzed. Interestingly, *would* registered similar frequencies in both the presidential addresses and the science articles, with the average occurrence per 1,000 words of all signals notably higher in the science articles than in the presidential addresses.

Table 3: Frequencies of metaphor signals in popular science articles.

Metaphor signal	Occurrences	Per 1,000 words
as	141	0.2290
like	127	0.2063
say	112	0.1819
could	66	0.1072
would	65	0.1056
call	49	0.0796
look	29	0.0471
just	26	0.0422
may	26	0.0422
really	15	0.0244
kind of	13	0.0211
as if	10	0.0162
literally	9	0.0146
metaphor	8	0.0130
sort of	8	0.0130
symbol	7	0.0114

As and *like*, both used in nonliteral comparisons, were the first two most frequent metaphor signals in this corpus. Science popularization discourse has clear instructional goals, as it explains the results of scientific research to the lay public. Journalists who write for popular science magazines often use metaphorical language for pedagogical reasons, since metaphors often involve concrete and familiar concepts to aid readers in understanding concepts they may find abstract and difficult to grasp. In addition, the use of metaphors in educational contexts has been widely researched (e.g., Cameron 2003; Cameron and Low 2004; Low et al. 2008), and popular science discourse fulfills communicative functions that are similar to other types of educational discourse, such as science classroom talk.

In signaling metaphorical expressions, *as* was commonly used in a lexicogrammatical pattern following a verb, which was then followed by a metaphor.

(15) (Battersby 2006: 36)
The common size for the microwave hot and cold spots is known from theory to be a little less than 500,000 light years across. This means that they can be used as* **cosmic yardsticks** to reveal how space bends.

A closer analysis of this word combination revealed that there were four semantically differentiated groups of verbs preceding *as*: action verbs (e.g., *act, function, operate, serve*); perception verbs (e.g., *see, perceive*); verbs expressing verbal processes (e.g., *call, describe, explain, refer to*); and verbs describing cognitive processes (e.g., *know, regard, think of)*.

(16) (Stix 2007: 30)
In fact, it reveals that the immune system functions as* **a double-edged sword**.

(17) (Lane 2009: 20)
This exothermic reaction converts carbon dioxide into simple organic molecules and also releases energy. It's been described as* **"a free lunch** you're paid to eat".

(18) (Tarduno 2008: 15)
The hotspot can be thought of as* **a candle** within the earth whose flame burns through the crust, pumping lava to the surface and building an island.

Examples (16), (17), and (18) show how the metaphorically used expressions are anticipated by *as* and the different verbs in fulfilling the genre's instructional objective of explaining science to the general public.

Like preceding a metaphor in nonliteral comparisons was used in the corpus for the same purpose and in similar word combinations as *as*. The most frequent phrases included the verb *be* (example [19]) and *look* (example [20]), followed by *like* and a metaphor.

(19) (Macknik and Martinez-Conde 2008: 5)
The photoreceptors of your retina are like* **the CCD chip in your camera**: just a matrix of light detectors.

(20) (Chown 2009: 35)
The universe looks like* **"Swiss cheese"** with concentrations of galaxies separated by enormous voids.

Say, the third most frequent metaphor signal in the corpus, was used to introduce metaphorical citations, most of which were direct quotations, as in example (21).

(21) (Holmes 2009: 15)
Eventually, though, evolution wins the day, and after a few tens of millions of years biodiversity rebounds. [...] But more often a new world emerges. "**You're not re-establishing the old chessboard, you're designing a whole new game**", says* Erwin.

Metaphorical direct quotations have the same instructional function as other metaphors used in the popular science articles, in addition to introducing a scientist's personal view of a particular issue. They also allow the speaker or writer to broaden his/her perspective on different topics, introduce variation in the narration, and personalize the information presented. While an individual is often quoted directly in order to enhance the authenticity of the information provided, quotations from a group are presented as indirect quotes so as to summarize a view that is shared by a professional group, but expressed in the journalist's metaphorical words.

On the whole, the science articles corpus clearly differs from the presidential addresses corpus in the number and frequency of the metaphor signals used. For instance, *as if* is used in nonliteral comparisons (similar to *as* and *like*) in metaphor-anticipating positions in the science articles. In addition, *kind of* and *sort of* are used notably more often than in the presidential addresses, and serve to signal metaphors explaining new concepts and phenomena. Moreover, *look* occurred significantly more frequently than in the presidential addresses and was often used in combination with *like* (example [22]).

(22) (Wang 2008: 4)
The zinc oxide crystals look something like* **a forest without branches**.

The signals *could* and *may* were used more frequently in the science articles, in anticipating metaphors depicting possible scientific scenarios, which at the present time can only be imagined (example [23]).

(23) (Davies 2007: 41)
If, however, life is weakly defined as something like organized complexity, the roots of life may* **meld seamlessly into the realm of general complex chemistry**.

Finally, explicit metaphor signals, such as *metaphor*, as well as words intensifying a metaphor's effect (*just*, *really*, and *literally*), were found to occur more frequently in the science articles corpus than in the presidential addresses corpus.

The results so far indicate two interesting findings. The first finding is that nonliteral comparisons, quoted metaphorical expressions, and conditionality are the top three types of signals in both corpora. However, the purpose of the first two types of signaled metaphors differ according to the purpose of each genre. In the presidential addresses corpus, nonliteral comparisons are used to transmit ideology, while in the science articles corpus, they are used to instruct and explain. Quoted metaphorical expressions, on the other hand, are used to align the president with the collective past or ideals of the country, while in the science articles, they are used to provide different perspectives and personalize the information presented. The second finding is that the use of conditionals as metaphor signals in both corpora occurs for a similar reason – to explain what could possibly happen in the future – depending upon either the political decisions made or the scientific advances made in the present. In the following section, we turn to the third genre under examination.

6 Metaphor signals in business periodical articles

The frequency data for the metaphor signals in the business periodical articles corpus is shown in Table 4. *Say* registered the highest frequency with 0.5717, followed by *as* with 0.4155 and *would* with 0.2249.

The three most frequent metaphor signals in this corpus are the same as in the presidential addresses corpus, although the order is different: *would*, *as*, and

Table 4: Frequencies of metaphor signals in business periodical articles.

Metaphor signal	Occurrences	Per 1,000 words
say	366	0.5717
as	266	0.4155
would	144	0.2249
could	118	0.1843
like	116	0.1812
may	97	0.1515
call	66	0.1031
look	60	0.0937
just	55	0.0859
really	35	0.0547
kind of	20	0.0312
symbol	18	0.0281
as if	16	0.0250
sort of	13	0.0203
literally	5	0.0078
metaphor	4	0.0062

say. *As* and *say* are also among the most frequent signals in the science articles corpus. The three genres, then, are similar with regard to the metaphor signals that are most often used in each corpus.

As in the other two corpora, *say* was used to quote or to paraphrase someone else's metaphorical statements. However, in contrast to the other corpora, the business articles corpus included citations by groups of individuals, such as economists (example [24]), bankers (example [25]), or managers, besides the metaphorical quotations of individuals.

(24) (Tully et al. 2002: 69)
When prices become uncoupled from rents, economists say*, **a bubble can't be far behind**.

(25) (Reed et al. 2002: 56)
Bankers say* ABB's **brass** didn't see until very late **in the game that** they were **in danger of being locked out of** the commercial-paper market.

While an individual's quotation is often included between inverted commas and inserted in the text to enhance the authenticity of the information provided, quotations from a group are presented in a way that serves a distinct purpose. That is, they summarize a view that is shared by a professional group but is expressed in the journalist's metaphorical words. The journalist, in this way,

takes the risk of metaphorically verbalizing a collective view of an issue, seeking to attract and entertain readers. Therefore, *say* not only anticipates the metaphor but also points to who expresses a particular view, allowing the journalist to distance himself/herself from the metaphor used.

As was preceded by a range of different verbs and followed by a metaphor, in a similar way to what was previously identified in the science articles corpus. The verbs used in the business articles also expressed action (e.g., *count, dismiss, take over*), perception (e.g., *see, view*), verbal processes (e.g., *describe, refer to*), and cognitive processes (e.g., *know, think of)*.

(26) (The sky's the limit, *The Economist 2001*)
For American consumers, airlines have taken over from HMOs (the controversial health-care companies) as* **public enemy number one**.

(27) (Navigators in troubled waters, *The Economist 1999*)
Over the years, central bankers have popularly been referred to as* **captains, admirals, pilots and lifeboatmen**.

The fact that both corpora (i.e., popular science articles and business periodical articles) are samples of journalistic discourse explains the similarities mentioned. However, the nonliteral comparisons with *as*, *as if*, and *like* in the business articles are more often used to attract the reader's attention, to play on his/her imagination, and to make the texts more lively, rather than to explain and illustrate concepts as in the science articles.

The conditional *would* in the business articles corpus, as well as the modals expressing possibility (i.e., *could* and *may*), anticipate metaphors in the same way as in the other two corpora. In this sense, they enhance the metaphor's effect by referring to a hypothetical scenario.

(28) (America's housing market. Cracks in the façade, *The Economist 2007a*)
Even a loss several times larger than that would* barely **ruffle** America's vast financial markets: about $600 billion was wiped out on the stock markets as share prices fell on February 27th.

While most of the metaphor signals registered the highest average frequencies in the business articles corpus, the explicit signal *metaphor* was found less frequently in this corpus (0.0062) compared to the science articles corpus (0.0130). Similarly, of all the intensifiers, *literally* registered a lower average frequency in the business articles (0.0078) in comparison to the science articles (0.0146). Neither of the two signals was used in the presidential addresses, which

suggests that politicians are unwilling to highlight the rhetorical strategies they employ (e.g., by referring explicitly to the use of metaphors) when they address the general audience.

Unlike in the science articles, where writers explicitly referred to the metaphors used, in the business articles, the explicit references to metaphors were in all cases made by business practitioners and economists, who were cited in direct quotations or were paraphrased (example [29]).

(29) (Business schools. New graduation skills, *The Economist 2007b*)
[...] the first time the head of an academic institution has, without a hint of irony, used **a factory-floor** metaphor* for speed and efficiency to describe his ivory tower.

These data suggest that the writers' attitudes toward metaphorical language might be different in the two genres. While in the science articles, metaphors are explicitly referred to when they are used as a communicative and rhetorical strategy, in the business articles, journalists seem to shy away from this strategy, instead preferring to let quoted metaphors communicate the viewpoint of a professional group, which at the same time indicates that they do not necessarily agree with these views. This demonstrates how the two genres differ in their communicative aims and strategies.

Literally, even though it was found less frequently in the business articles than in the science texts, was used in a similar way in both corpora, that is, to intensify the metaphor used (example [30]).

(30) (Frontier-Special report. Click here for cash, *Business Week 1999*)
Caren J. Martineau, for one, feels **the winnowing process** of online finance took **the romance out of** her business – literally*. Martineau approached Vcapital.com for a $4 million investment in her firm [...].

Symbol was used with the same frequency in the business articles and in the presidential addresses – 0.0281 and 0.0280, respectively – but was used less often in the science articles (0.0114). As was previously noted, the metaphorical symbols in the presidential addresses were of religious and patriotic character. The symbols in the business articles, however, represent the business and economic world, and range from companies, their head offices and brands, to well-known business personalities, like in example (31).

(31) (Taylor 2000)
They believed Bill could become a powerful living symbol* of **the Ford brand**.

The frequency data on the use of metaphor signals in this corpus shows that writers use all of the signals examined with varying but significant frequencies in comparison to the other corpora. Even though there were fewer references to explicit metaphoricity, other signals fulfilled different functions, among which anticipating other people's metaphors, introducing nonliteral comparisons, and making metaphorical descriptions more hypothetical were the most prominent.

7 Conclusions

In this study, we found that texts written for the purpose of edification and/or explanation (i.e., business periodical articles and popular science articles) contain more metaphor signals than texts that are written to be spoken, in this case, the presidential addresses. This finding is in line with what both Wallington et al. (2003) and Partington (2006) found when comparing the frequency of metaphor signals in written and spoken genres. In addition, we found that nonliteral comparisons, quoted metaphorical expressions, and conditionality are the top three types of signals in all three corpora. However, the purpose of the first two types of signaled metaphors differ according to the purpose of each genre: in the presidential addresses corpus, nonliteral comparisons were used to ideologically persuade listeners, while in the science articles corpus, they were used to aid the reader in understanding the explanation provided, and in the business articles corpus, they were used to liven up the language. Furthermore, quoted metaphorical expressions were used to align the presidents with the shared history of the country, a purpose that is found in presidential speeches in other countries as well (Lu and Ahrens 2008).

In contrast, in the science articles corpus, quoted metaphorical expressions were used to personalize information and provide alternative viewpoints, and in the business articles corpus, they were used to indicate who expresses a particular point of view, allowing the journalist to distance himself/herself from that view. The use of conditionals as metaphor signals, however, occurred for a similar reason across all three corpora – to posit a hypothetical scenario, whether it be a possible political future, scientific future, or financial future.

Thus, this study has demonstrated that some signals have the potential to be "universal" signals across all three genres, while other signals are genre-specific and align closely with the pragmatic purpose of the genre in question. In this sense, this finding does not fully support the hypothesis that we formulated for this research, which claimed a genre-dependent variation of signaling, but instead argues that the pragmatic goals of the text will guide how the

metaphors, and the associated metaphor signals, are used. However, we have not yet examined whether one genre contains more metaphors overall, as it may be the case that one genre contains a large number of conventionalized conceptual metaphors that are unmarked. Future work may include examining both signaled and nonsignaled metaphor usages in order to distinguish not only the frequency but also the pragmatic function of each type of metaphor.

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