

Cancer as a metaphor

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Abstract

Since the publication of Susan Sontag's highly influential *Illness as Metaphor* in 1979, many studies have provided follow-up analyses on her critique of metaphors for cancer, but none have investigated her claims about the uses and implications of cancer as a metaphor (e.g. *the cancer of corruption*), and her prediction that medical advances would make this metaphor obsolete. In this paper, we present the first systematic study of cancer as a metaphor in contemporary English. We show the forms, frequencies and functions of 925 metaphorical uses of cancer-related vocabulary in two large English language corpora, and discuss their implications for: (a) the framing of the phenomena that are most frequently described as cancers, and of potential courses of action to be taken in relation to these phenomena; (b) perceptions of cancer itself; and (c) theoretical accounts of what makes a metaphor successful, in terms of its effectiveness and its applicability to a wide range of topics. In this way, we provide detailed evidence, and additional nuance, for Sontag's critique of cancer as a metaphor, and put forward an explanation for the current persistence of this metaphor, despite its controversial status.

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1 Introduction

Metaphors are well known to be central tools in both communication and thinking. Crucially, even though many metaphors become conventionalised, metaphor choices are seldom neutral. Different metaphors frame the same topic in different ways, facilitating different inferences and evaluations. As such, metaphors can become the subject of controversy, because of the particular framings and evaluations they suggest, because of objections to the use of particular expressions (and associated concepts) as metaphors in the first place, or because of a combination of these factors. This paper is concerned with one such controversial metaphor: in what follows, we present the first systematic study of the use of cancer as a metaphor in contemporary English.

In her seminal essay *Illness as Metaphor* (1979), sociologist Susan Sontag famously critiqued both the use of military metaphors for cancer (e.g. President Nixon's 'War on Cancer') and the use of cancer itself as a metaphor (e.g. Trotsky's description of Stalinism as 'the cancer of Marxism'; Sontag 1979: 84). Concerning the latter tendency, which is our concern in this paper, Sontag argued that to describe something as a cancer suggests that it is 'unqualifiedly and unredeemably wicked' (Sontag 1979: 83) and constitutes an 'incitement to violence' as it 'encourages fatalism and justifies "severe" measures' (Sontag 1979: 84). She further suggested that 'the people who have the real disease are also hardly helped by hearing their disease's name constantly being dropped as the epitome of evil' (Sontag 1979: 85). However, Sontag anticipated a future in which, thanks to medical advances, the use of cancer as a metaphor would become 'obsolete' (Sontag 1979: 88).

Four decades on, cancer is still one of the leading causes of death worldwide, but there has been considerable progress in what Sontag saw as the two main reasons for its use and power as a metaphor: understanding the causes of cancer, and treating it (e.g. Quaresma et al. 2015). Nonetheless, while Sontag's claims about metaphors for cancer have been discussed and partly challenged in a substantial body of research across disciplines (e.g. Clow 2001, Reisfield and Wilson 2004, Semino et al. 2018), her claims about the implications of using cancer as a metaphor, and the potential demise of this metaphor due to medical advances, have not been followed up by studies based on the systematic analysis of actual language use. In this paper, we aim to fill this gap.

More specifically, we aim to answer the following question:

- What does the use of cancer as a metaphor in contemporary English reveal about (a) dominant views on the phenomena that are most frequently described as cancers, (b) perceptions of cancer itself, and (c) the factors that may contribute to the persistence and wide applicability of a (controversial) metaphor?

To address this question, we will show the following in relation to our data:

- The frequencies, forms and functions of metaphorical uses of cancer-related vocabulary;

- The kinds of phenomena correspond to the cancer and, where made explicit, the body when cancer-related vocabulary is used metaphorically;
- The way in which different kinds of cancer treatments are exploited as metaphors when cancer-related vocabulary is used metaphorically.

In the next section, we contextualise our study in relation to research on metaphor in cognition and discourse. Section 3 introduces our data and our classification of uses of cancer as a metaphor. Section 4 examines in detail how the metaphor is deployed in seven main topic areas, with a particular focus on extensions of the metaphor to include cancer treatments and the use of cancer as a metaphor for violent extremism, often associated with some Islamic groups. In Section 5, we address each part of our research question before summarising and looking ahead to future research in Section 6.

2 Background

In the years since the publication of *Illness as Metaphor*, research on metaphor has made theoretical and empirical advances that are relevant to Sontag's arguments, and more generally to an understanding of the role of metaphor in cognition and discourse.

A year after the publication of *Illness as Metaphor*, Lakoff and Johnson initiated a paradigm shift in metaphor research with their book *Metaphors We Live By* (1980). In what has come to be called Conceptual Metaphor Theory (hereafter CMT), conventional patterns of metaphorical expressions in language (e.g. 'He shot down all of my arguments') are seen as evidence of conventional patterns of metaphorical thought, or conceptual metaphors (e.g. ARGUMENT IS WAR). Conceptual metaphors consist of mappings, or sets of correspondences from a source domain (e.g. WAR) to a target domain (e.g. ARGUMENT). Typically, target domains are more subjective, abstract, complex and poorly delineated than source domains, which are typically more intersubjectively accessible, concrete, simple and image-rich. Crucially, different source domains 'frame' the target domain in different ways, highlighting some aspects and backgrounding others. For example, the ARGUMENT IS WAR conceptual metaphor frames arguments as antagonistic activities and downplays their potential collaborative aspects.

Although CMT has since been critiqued (e.g. Vervaeke and Kennedy 1996, Deignan et al. 2013), developed (e.g. Kövecses 2015) and partly superseded as a single explanatory framework for metaphor use (e.g. Fauconnier and Turner 2002, Dancygier and Sweetser 2014, Gibbs 2017), the framing implications of metaphors have recently received considerable attention, particularly from cognitive scientists and discourse analysts.

From a cognitive science perspective, numerous experimental studies have shown how metaphors can influence people's reasoning and evaluations on different topics, including socially relevant concepts such as crime and morality (for overviews see Landau et al. 2010 and Thibodeau et al. 2017). More specifically, the most effective metaphors in terms of framing effects have been found to involve (a) source domains that are widely accessible, clearly delineated and image-rich (which is most typically the case with concrete objects), (b) mappings that are 'apt', i.e. precise and clearly applicable to the target domain, and (c) target domains that are complex and abstract, and not already linked to confident understandings and strong views in the relevant individuals or groups (Grady 2017, Thibodeau et al. 2017).

From a discourse analysis perspective, many studies have focused on the frequencies and manifestations of metaphoricity in different kinds of texts, and using a variety of methods, including those of Corpus Linguistics (e.g. Deignan 2005, L'Hôte 2017). These studies have highlighted particularly the evaluative, persuasive and, more generally, ideological implications of metaphor choices, as in the case, for example, of parasite metaphors and prejudice against immigrants (Musolff 2016). Health and illness in particular have been discussed both as source and target domains, to use the terminology of CMT.

With respect to illness as a target domain, a substantial literature exists on the use and implications of different metaphors for, for example, pain (e.g. Loftus 2011), diabetes (e.g. Aanand et al. 2011) and cancer itself, often with reference to Sontag's arguments against (military) metaphors (e.g. Reisfield and Wilson 2004, McCartney 2014, Landau 2017: 180-92, Semino et al. 2018). With respect to illness as a source domain, the general contrast between health and illness has been shown to be used conventionally, particularly in politics and economics, to evaluate situations, organisations and people positively (e.g. *healthy finances*) or negatively (e.g. *febrile atmosphere of British politics*) (e.g. Charteris-Black 2004, Musolff 2016). References to specific conditions, such as paralysis, are also conventionally used to present particular situations as problematic, while notions such as cure and recovery are conventionally used to refer to improvements or solutions to problems.

In the light of all this, and of Sontag's critique, it is surprising that the use of cancer as a metaphor has never been studied systematically.

3 Data Selection and Methodology

3.1 Data description

In order to determine an appropriate set of search terms, we undertook a pilot study to test the prevalence of metaphoricity for a number of 'nodes' (words or multi-word structures) in three corpora: the British National Corpus, the Corpus of Contemporary American English, and an *ad hoc* corpus of reportage collected from Nexis, between 1 June and 1 July 2017. These corpora were selected to represent a range of varieties, time periods and genres. Nodes included: *cancerous*; *cancer of*; *cancer on*; *metastasis*; *metastatic*; *metastasisz*/metastasis**; and *tumor(s)/tumour(s)*.¹ In this pilot, 12,409 instances were extracted. Metaphoricity ranged from 83.33% (*like a cancer*) to 0.15% (*tumor/tumour*). We determined that each node would have to be used metaphorically in at least 8% of cases in the pilot study to be considered productive for our purposes, as this seemed a natural dropping-off point in the results. This left us with a final set of four search terms: *like a cancer*; *cancer on [the]*; *cancer of*; *metastasi(s/z)** (which includes *metastasis*, *metastases* and all forms of the verb *metastasise/ize*).

Having utilised the Corpus of Contemporary American English (COCA) in the pilot study, we were aware of the breadth and depth of this resource. COCA is a large, modern corpus, comprising 560 million words from 1990 to 2017, roughly equally divided by year and genre. However, COCA has two limitations: it is only representative of American English, and while it is large, it did not contain a sufficient number of instances of the very specific

¹ Other terms (*cancer*, *is a cancer*, *are a cancer*, *cancer in*, *malignant*, and *malignancy*) were also initially considered but were rapidly discarded when the first 100 results did not contain a single instance of metaphoricity.

metaphorical usages we were concerned with. To address these limitations, we also made use of the Sketch Engine (Kilgarriff et al. 2014) to search the Oxford English Corpus (OEC), a 2.4 billion word corpus that spans the period 2000-2011 and includes texts from a wide variety of text types and world Englishes. Using these two corpora together has allowed us to: 1) span a diachrony not possible when using most other large corpora; 2) include some examples from a number of varieties of English; and, crucially, 3) collect enough instances of our chosen search terms to be able to make some generalisations about the metaphorical uses of cancer-related vocabulary.

Due to the (relatively) modest size of COCA, we were able to review all 1,495 concordance lines resulting from our searches. The OEC, however, is four times as large as COCA and contains a number of genres that were found to contain 100% nonmetaphorical usage for our search terms, such as medical journals. As a result, we performed more targeted searches in this corpus. First, we excluded the OEC domain of ‘Medicine’ from our concordances, as that domain almost exclusively contained non-metaphorical uses of our search strings. Second, we concordanced the string ‘cancer on the’ rather than ‘cancer on’ in this corpus, as the latter resulted in 883 citations, most of which turned out to be non-metaphorical (e.g. ‘died of cancer on May 3rd’). In contrast, a search for ‘cancer on the’ resulted in 147 hits, with a high proportion of metaphorical uses outside of the Medicine domain. Owing to this and differences in generic descriptions in COCA and the OEC, we will not make generalisations about the use of cancer as a metaphor at the level of genre. Similarly, we will not consider differences across international varieties of English, as COCA only represents US English and the OEC is internally biased towards US and British English.

We established the following process to identify and annotate metaphors in the data:

1. Extract concordance lines containing search strings (with metadata) to a spreadsheet;
2. Identify metaphorical instances of *cancer on [the]*; *cancer of*; *metastasi(s/z)** (following Pragglejaz Group 2007) and figurative uses of *like a cancer* (using the notion of ‘direct metaphor’ in Steen et al. 2010);²
3. Identify explicit references in the co-text (or concordance line) to the entities that correspond to the metaphorical ‘cancer’ and, if present, the metaphorical ‘body’;
4. Classify the metaphorical ‘cancers’ and ‘bodies’ semantically by allocating them to one of a set of categories that were developed bottom-up during the data analysis (see below);
5. Make note of any extensions of the use of cancer as a metaphor beyond our search strings, e.g. metaphorical references to treatments.

The two researchers each began with results from one corpus (i.e. COCA or OEC) and independently completed stages 1-5. The researchers then exchanged their work and cycled through stages 3-4 a number of times until the final categories were agreed, coding was settled, and inter-rater consistency was assured. In total, 3,189 concordance lines were extracted, and 925 were determined to be unique, metaphorical cases (after the removal of duplicates). A more detailed breakdown of frequency by corpus and search term can be found in Table 1, below.

² Due to our interest in cancer as an illness, concordances containing phrases such as ‘he looked *like a cancer patient*’ (focussing on humans) were discarded.

	COCA				OEC				Total
	Total	Met uses	Dupe concs	De-duped	Total	Met uses	Dupe concs	De-duped	Final, de-duped
<i>Metastasi(s/z)*</i>	804	164	1	163	687	312	10	302	465
<i>Like a cancer</i>	66	59	0	59	189	177	7	170	229
<i>Cancer of</i>	471	47	1	46	705	93	1	92	138
<i>Cancer on [the]</i>	153	34	0	34	114	62	3	59	93
Total	1494	304	2	302	1695	644	21	623	925

Table 1: Frequency of search terms, with overall frequency, frequency of metaphorical usage, frequency of duplicate concordance lines (dupe concs), and final frequency of items informing analysis, in COCA and in the OEC.

In Table 2, we have calculated the proportion of metaphorical instances of the various search terms used. At 92.55%, the syntactical structure of the simile *like a cancer* is clearly the most productive in terms of metaphorical meanings. Two other strings—*cancer on [the]* and *metastasi(s/z)**—are approximately 36% and 32% metaphorical, respectively. The least metaphorical search term is *cancer of*, which often appears in the fixed phrase *cancer of the x*, where *x* is human anatomy. Nonetheless, 12% metaphoricity is still salient to this study, and may prove equally valuable for further work.

	Total	Metaphorical uses	% metaphorical
<i>like a cancer</i>	255	236	92.55%
<i>cancer on [the]</i>	267	96	35.96%
<i>metastasi(s/z)*</i>	1491	476	31.92%
<i>cancer of</i>	1176	140	11.90%
Total	3189	948	29.73%

Table 2: Metaphorical usage of search terms, by frequency and percentage of overall appearance in COCA and OEC.

3.2 Categorisation of concordance lines

An overview of the categorisation scheme for the entities functioning as metaphorical cancers and bodies appears in Table 3. We use small capitals for category labels as this is common practice in Corpus Linguistics for references to semantic domains.³ In the table, the categories are presented in order of descending overall frequency in the whole of our data. For each category we then provide: the number of times it applies to an entity corresponding to the metaphorical cancer (CancerCat); the number of times it applies to an entity corresponding to a metaphorical body (BodyCat); and some examples from our data, divided into groups as appropriate.

For example, in the expression *the cancer of corruption in this country*, the noun *corruption* refers to the entity that corresponds to the cancer, and was classified under CRIME/CONFLICT/CORRUPTION as CancerCat; and the phrase *this country* refers to the entity that corresponds to the body affected by the metaphorical cancer, and was classified under PLACE as BodyCat. Where the co-text for each node available to us through the relevant corpus software did not include references to an entity that functioned as metaphorical body, a ‘0’ was assigned.

³ The same convention is used in CMT for references to conceptual domains, but our categorisation system does not aim to capture conceptual domains. Nonetheless, in CMT terms our categories can be loosely related to the notion of target domain.

Category	Overall freq.	CancerCat freq.	BodyCat freq.	Description and examples
PLACE	183	9	174	specific locations (e.g. <i>Union Station</i>); cities (<i>New York City</i>); countries (<i>Australia</i>); regions of varying size (<i>Gulf, world</i>)
PEOPLE	173	93	80	pronouns; unnamed and named individuals (e.g. <i>drug dealer, Saddam Hussein</i>); and groups linked by a common attribute (e.g. <i>Jews, progressives</i>)
CRIME/CONFLICT/ CORRUPTION	164	162	2	local, singular, or generalised mentions of criminal activity (e.g. <i>gun crime</i>); conflict, usually armed (e.g. <i>messy war in Iraq</i>); corruption and scandal (<i>narco-corruption</i>)
EMOTION/SENSATION/ COGNITION	140	126	14	emotions (e.g. <i>fear</i>); sensations (e.g. <i>creepiness</i>); cognitive processes or states (<i>perception</i>)
IDEOLOGY/RELIGION/ BELIEF	98	86	12	concepts related to ideology (e.g. <i>fascism</i>); religion (e.g. <i>Muslim religion</i>); belief and theory (e.g. “ <i>slap-in-the-face</i> ” <i>theory</i>)
ORGANISATION/BUSINESS/ RELIGIOUS GROUP	87	59	28	named and unnamed organisations (e.g. <i>organization, NEA</i>); businesses (<i>Disney, company</i>); and religious groups (<i>Opus Dei, the church</i>)
POLITICAL/SOCIAL/ LEGAL INSTITUTION	77	18	59	social, legal, and political institutions and affiliations (e.g. <i>Democratic party, Boston Police department</i>)
POLITICAL/SOCIAL/ LEGAL SYSTEM/ PROCESS/REGULATION	70	55	15	political and legal systems (e.g. <i>democratic system, criminal justice system</i>); processes (e.g. <i>suits, grade inflation</i>); and regulations (e.g. <i>Emergency Economic Stabilization Act of 2008</i>)
FINANCE/ECONOMY/POVERTY	70	65	5	terms to do with finance, or lack thereof, from personal to global (e.g. <i>money, unemployment, body economic</i>)
SOCIAL/SEXUAL ACTION/PRACTICE/BEHAVIOUR	57	53	4	social practices or actions (e.g. <i>gambling</i>); sexual activities and behaviours (e.g. <i>orgy</i>)
ARTS/CULTURE/MEDIA	50	41	9	specific and generic instances of arts (e.g. <i>hip-hop</i>); genres of media (<i>journalism</i>)
ARCHITECTURE/DEVELOPMENT/ FEATURES	43	35	8	lexical items related to architecture (e.g. <i>architectural carbuncles</i>) and development (e.g. <i>overdevelopment</i>)
COMMUNICATION/TECHNOLOGY	41	36	5	features of linguistic communication (e.g. <i>Gore’s rhetoric, lies</i>) and communication technology (e.g. <i>the Internet</i>)
SOCIETY	40	0	40	references to <i>society</i> and <i>culture</i> , usually general
CLIMATE/ENVIRONMENT/ RESOURCES/BIOTA	36	22	14	wide-ranging climate lexis (e.g. <i>global warming</i>); more localised environmental issues (e.g. <i>flooding</i>); and biota (e.g. <i>exotic species</i>)

OBJECT	21	17	4	miscellaneous concrete objects (e.g. <i>mass of paperwork, drone</i>)
SOCIAL/MEDICAL CARE/ SERVICES	18	12	6	care provisions, whether educational (e.g. <i>public secondary education methods</i>); medical (e.g. <i>psychiatric care in prison</i>); or social (e.g. <i>entitlement programs</i>)
TIME	15	4	11	specified and unspecified, bounded and unbounded units of time (e.g. <i>19th century, time</i>)
DRUGS/ALCOHOL	15	15	0	substance names and usage (e.g. <i>narcotics, alcoholism</i>)
DISEASE/DISORDER	11	11	0	specified and unspecified diseases, illnesses, conditions, and disorders (e.g. <i>depression, idiopathic scoliosis</i>)

Table 3: Overview of categorisation scheme with frequencies in CancerCat, BodyCat, and overall; provided with illustrative examples.

As the table shows, SOCIETY only functions as BodyCat in our data (e.g. *Society is riddled with the cancer of crime and addiction*). Two categories—DRUGS/ALCOHOL and DISEASE/DISORDER—only function as CancerCats (e.g. *the malady which plagued him had spread, like a cancer, to those around him*). PEOPLE is evenly split between CancerCat and BodyCat (see below for more detail), while all other categories show a more or less marked preference for one or the other.

In the rest of this paper, we focus on the seven categories that occur at least 55 times in our data as CancerCat (i.e. as the category that captures the entity corresponding to the metaphorical cancer). These are:

1. CRIME/CONFLICT/CORRUPTION;
2. EMOTION/SENSATION/COGNITION;
3. PEOPLE;
4. IDEOLOGY/RELIGION/BELIEF;
5. FINANCE/ECONOMY/POVERTY;
6. ORGANISATION/BUSINESS/RELIGIOUS GROUP;
7. POLITICAL/SOCIAL/LEGAL SYSTEM/PROCESS/REGULATION.

Cumulatively, these categories amount to 70% of the metaphorical uses of our search terms in the two corpora.

4 Analysis

In this section, we begin to address the first part of our research question, i.e.: What does the use of cancer as a metaphor in contemporary English reveal about dominant views on the phenomena that are most frequently described as cancers?

We discuss each of the most frequent CancerCats and consider their interactions with their most frequent BodyCats. Table 4 provides the frequencies of the seven CancerCats under consideration and of their two most frequent BodyCats, including 0.

Cancer Category	Body Category	Frequency
CRIME/CONFLICT/CORRUPTION		162
	0	72
	PLACE	38
EMOTION/SENSATION/COGNITION		126
	0	57
	PEOPLE	41
PEOPLE		93
	0	29
	PLACE	24
IDEOLOGY/RELIGION/BELIEF		86
	0	40
	PLACE	24
FINANCE/ECONOMY/POVERTY		65
	0	31
	PLACE	14
ORGANISATION/BUSINESS/RELIGIOUS GROUP		59
	0	36
	PLACE	16

POLITICAL/SOCIAL/LEGAL SYSTEM/PROCESS/REGULATION	55
0	32
PLACE	5

Table 4: Frequency of metaphorical ‘cancer’ categories (frequency at least 55) and top two most frequently associated ‘body’ categories.

4.1 Metaphorical cancers without metaphorical bodies

As Table 4 shows, the largest sub-group of each of the seven most frequent CancerCats did not involve an explicit reference to an entity corresponding to the metaphorical body (in other words, this was discursively absent, or ‘0’). Overall, this applied in three main types of cases.

In the first kind of case, the metaphorical cancer is presented as a general, near-universal phenomenon that applies so widely as to make any specific reference to a metaphorical body irrelevant, as in, for example, *the cancer of passive living* and *Hatred is like a cancer*. In the second type of case, the entity that functions as the metaphorical body is easily inferable in context, and therefore does not need to be mentioned explicitly, as in Line 1 below. [NB: here and throughout, node terms appear in angle brackets, the expression that corresponds to the cancer is in boldface, and the expression that corresponds to the body (where appropriate) is italicised.]

■ You hear things like, ‘**Mexico City** has grown <like a cancer>.’

Here, it may be interpreted that Mexico itself is the entity affected by the growth of the metaphorical cancer, but this is not made explicit in the co-text.

The third type of case involves the search term *metastasi(s/z)**, and accounts for 80% of concordance lines where we could not identify a reference to a BodyCat entity. Our analysis revealed that the noun *metastasis* and, particularly, the verb *metastasise/ize* tend to be used metaphorically to refer to a process whereby something that is negatively evaluated (the metaphorical cancer) increases in scope or intensity (e.g. *metastasising creepiness*), or turns into something worse (e.g. *a grudge that may metastasize into [...] irreconcilable differences*). This metaphorical use of *metastasi(s/z)** is quite conventional, but does not entirely reflect the literal meaning of *metastasi(s/z)**, which is to do with cancer affecting other organs beyond the site of the original tumour. It may be argued that the notion of malignancy, which is associated with literal metastases, partly explains the notion of negative transformation which is associated with the metaphorical use of *metastasi(s/z)**. Nonetheless, the conventional metaphorical meaning is not, in this case, entirely predictable from the literal meaning. This phenomenon is not adequately explainable in terms of CMT, but can be accounted for in terms of more recent approaches in which metaphorical meanings and associations emerge and develop dynamically in discourse, as a result of the interaction of a variety of factors (Cameron and Deignan 2006, Gibbs 2017). In this case, the general notion of something bad turning into something even worse could be argued to be a more familiar and rhetorically useful aspect of the process of metastasizing than the precise medical understanding of this process.

The examples we have just discussed also begin to show that cancer can be exploited metaphorically both to describe phenomena that are independently associated with a negative evaluation (e.g. *hatred*) and to provide a negative evaluation of phenomena that are otherwise only mildly negative (e.g. *a grudge*) or not inherently negative at all (e.g. *Mexico City*). It is

in the latter kind of cases that the choice of cancer as a metaphor may have the biggest influence on how the relevant phenomena are perceived.

We now consider the seven highly frequent CancerCats in turn and discuss them in relation to their most frequent BodyCat, where the latter is explicitly realised. Six of these categories are to do with human beings, groups, activities and organisations which are presented as cancers that predominantly affect places, including cities, nations and so on. We begin with the only exception to this pattern—EMOTION/SENSATION/COGNITION—and then move on to the other categories.

4.2 Emotion/sensation/cognition as a cancer of people

This category captures a fairly homogeneous group of expressions. Though a small number of instances are references to cognitive states and processes (e.g. *memory*, *idea*) and sensory perceptions (e.g. *odors of continental breakfasts and business dinners*), nearly three quarters of CancerCat concordance lines [freq. 61] can be broadly described as references to emotions, which are almost exclusively negatively valenced. These include prototypical affective states (e.g. *fear* and *anger*) as well as affective dispositions (e.g. *hopelessness* and *distrust*) (Manstead 2007).

Where BodyCat is specified, EMOTION/SENSATION/COGNITION is most often constructed as negatively impacting PEOPLE. Typical examples involve negative emotions being presented as having progressively more negative consequences for individuals or groups:

■ This **hurt** is just eating *me* away from the insides out - <like a cancer>...
■ **Hopelessness** <metastasizes> and spreads to *the family and friends* of the self-destructive ...

In terms of framing effects, the instances of EMOTION/SENSATION/COGNITION as CancerCat with PEOPLE as BodyCat do not just negatively evaluate an aspect of the person's mental life as harmful to the person itself or those around them. They also present it as being outside the experiencer's control, and potentially separate from their core/true self.

Examples 2 and 3 are also typical of our data more generally, in the sense that they contain additional metaphorical expressions that describe the effects of the metaphorical cancer, by means of verbs such as *eat away at*, *spread* or, in other cases, *grow* and *build up*. These expressions draw from what is perhaps the best-known characteristic of cancer – that it involves an abnormal growth of cells in the body which damages the body itself.

4.3 Metaphorical cancers of places

The remaining six top CancerCats in our data are to do with different aspects of human beings and their activities, and all have PLACE as their most frequent BodyCat (where this is expressed in the co-text). The metaphorical presentation of a place as a body is arguably apt as both types of entities have physical extension and can change as a result of processes that take place within them. A reference to a place can also function metonymically to include not just the actual spatial location, but the people and economic/political/societal structures associated with it. As we show below, there is variation in our data in terms of the kind of place involved (a city, a region, a nation, the whole world, etc.), and also in terms of what other aspects of each place are relevant in context. The overarching pattern, however, is the metaphorical use of cancer to provide a starkly negative evaluation of how people and their activities affect some part of the world.

4.3.1 Ideology/Religion/Belief

Like EMOTION/SENSATION/COGNITION, another of our seven most frequent CancerCats is linked to human thought, namely IDEOLOGY/RELIGION/BELIEF. This category captures broad systems of beliefs and attitudes that are shared by large groups of people, and can be further divided into five subcategories.

Two distinct subcategories—discrimination and political ideology—occur 16 times each. Items subcategorised as discrimination are forms of bigotry, most commonly *anti-Semitism* [freq. 8] or *Holocaust revisionism* [1] and *racism* [freq. 4], but also *anti-American* sentiment [freq. 2], *Islamophobia* [freq. 1], and *xenophobia* [freq. 1]. Political ideology contains a wide range of alignments (e.g. *Nazism*, *conservative movement*, *liberalism*, *liberal democracy*), though there is a slight preference for right-wing political ideologies metaphorically constructed as ‘cancerous’ (e.g. *the cancer of Fascism*).

The next subcategory [freq. 14] is religion, e.g. *Islam*, *Wahhabism*, *Scientology*, *fundamentalism*, and *liberal Protestantism*. *Islam* and *fundamentalism* are the most frequently represented items here, and they are very negatively appraised. Through PLACE as BodyCat, religion is sometimes described as affecting (or infecting) the entire world (see line 4).

■ **Islam** is spreading <like a cancer> *all over the world*.

We have kept distinct another subcategory which overlaps with both political and religious ideology, and mainly contains references to religious extremism [11] – overwhelmingly described as *Islamic*, with two other references to *Zionism*. The type of PLACE that functions as BodyCat can be a country or region associated with that particular type of extremism (e.g. *Iraq*, *the Middle East*), or, again, the world as a whole.

Though the concepts we included in this category are somewhat disparate, their behaviour within concordance lines are very similar. Strong attachments to (usually non-Christian) religious beliefs and (often right-wing) thoughts or ideologies are described as deeply damaging to different kinds of places, and, via association, the people and societal structures in those places.

4.3.2 PEOPLE

The third most-frequent CancerCat (PEOPLE) is related to the two previous CancerCats in different ways: it is the main BodyCat for EMOTION/SENSATION/COGNITION, and the origin of the range of phenomena captured by IDEOLOGY/RELIGION/BELIEF. The specificity and count of the PEOPLE who make up this CancerCat varies, but individuals (for instance: *Palin*, *her*) are most common [freq. 40], followed closely by groups (e.g. *Palestinians*, *non-readers*) [freq. 35], and finally, generalisations (e.g. *humanity*) [freq. 18].

Concerning PLACE as the most frequent BodyCat, the most prominent pattern [freq. 11] involves humans in general (e.g. *human beings/humanity/we*) being presented as causing mostly environmental problems on the planet:

■ **Human beings** are a disease, a <cancer on> *this planet*.

In a smaller number of cases, groups of people [freq. 9] linked by some (out-group) commonality cause problems in a PLACE, usually on a smaller scale:

- *Iranians in the Mideast*
- *Jews in Arab countries*
- *Palestinians in the Jewish State*
- *the Serb minority in the underbelly of Croatia*
- *hate preachers in a nation that prides itself on free speech*
- *non-readers in our country*
- *Seattle's population of freaks in other parts of the country*

Individuals that appear in the PEOPLE CancerCat are primarily (in)famous leaders. They are presented as having a negative effect on the locations over which they have or have had influence:

■...allowing **Osama bin Laden** to nest and <metastasize> in *Kabul and its precincts*.

The commonality here is that PEOPLE (singular, plural, or universal) possessing out-group attributes or engaging in deviant behaviours are constructed as a 'cancer' of their environs.

While this and the previous CancerCats are to do people and their inner states or belief systems, we now turn to three CancerCats that are to do with types or products of human behaviour.

4.3.3 Organisation/Business/Religious group

The sixth most frequent CancerCat is ORGANISATION/BUSINESS/RELIGIOUS GROUP. In principle, this was intended as a broad category, ranging from references to commercial companies and industries (e.g. *the Disney Empire, fashion industry*) [freq. 16] to references to religious organisations (e.g. *Opus Dei*) [freq. 6]. In practice, however, in our data just under 65 per cent of instances [freq. 38] involve organisations associated with violent extremism, particularly Islamic (e.g. *Al Qaeda, ISIS, the Taliban*).

In the 15 cases where PLACE is specified as BodyCat, it is nearly always extremist groups who occupy the CancerCat. The relevant geographical areas are middle-Eastern Muslim countries (e.g. *Syria, Iraq*), or, less frequently, the world more generally:

■...because **ISIL** already shows signs of <metastasizing> *outside of Syria and Iraq*.

This echoes our previous finding regarding out-group behaviours, beliefs, and peoples as CancerCats. We will return to this pattern in Section 4.4 below.

4.3.4 Finance/Economy/Poverty

Related to both PEOPLE and ORGANISATION/BUSINESS/RELIGIOUS GROUP is the next CancerCat: FINANCE/ECONOMY/POVERTY. Seven of these are references to economic inequalities and poverty (e.g. *cycle of poverty in the African-American community*); a further six are references to economic systems, and specifically *capitalism* [freq. 5] and *consumerism* [freq. 1]. The remainder involve references to problems to do with finances and economic systems, particularly in connection to the 2008 global financial crisis (e.g. *economic crisis* and *subprime mortgage problem*).

PLACE occurs as BodyCat in 13 instances. These include several cases where the whole planet is being negatively affected by capitalism or by specific financial processes, but more usually where a specific part of the world is described as being damaged by economic problems:

■ **This debt** is <like a cancer>. It is truly going to destroy *the country* [the U.S.A.] from within.

Notably, both aspects of this metaphorical scenario—the CancerCat’s specific economies (including economic problems) and the BodyCat’s explicitly named PLACE—are associated with Western (specifically American or European) or Asian capitalist/industrialised countries (particularly Japan and China). This reflects the source and chronological span of our data, i.e. texts produced primarily in the UK and the US during a period characterised by global financial crises that also affected those countries.

4.3.5 Political/Social/Legal System/Process/Regulation

Another CancerCat closely linked to society and human behaviour is POLITICAL/SOCIAL/LEGAL SYSTEM/PROCESS/REGULATION, occurring in 55 concordance lines. This category includes two main sub-groups, to do with: law and legal processes (e.g. *prescription drugs bill*) [freq. 25]; and political processes and procedures (e.g. *An election between two men*) [freq. 24].

Among the top seven CancerCats, this particular item is unique in that it has no highly frequent associations with any particular BodyCats; PLACE, the most frequent specified BodyCat, only occurs five times for this CancerCat. This is because, in the majority of cases, the relevant cancer-related metaphorical expression is *metastasi(s/z)**, which, as we mentioned earlier, backgrounds the potential metaphorical body and primarily suggests a negative transformation (e.g. *metastasizing* bills or laws). More specifically, it is often the adversarial aspect of ‘doing’ POLITICAL/SOCIAL/LEGAL SYSTEM/PROCESS/REGULATION that is metaphorically cancerous: *partisanship* and *conflict* are the true illness. More explicit representations of this concept form the next and final CancerCat under discussion.

4.3.6 Crime/Conflict/Corruption

The most frequent CancerCat in our corpus is CRIME/CONFLICT/CORRUPTION. The majority pattern relates to (armed) conflict of varying degrees [freq. 11]. In this sub-group, the relevant PLACES are nearly all in the Middle East:

■ Hanna and his family...joined the 4 million Iraqis who have left their homes as **sectarian fighting** has spread through *Iraq* <like a cancer>.

Where corruption is the foregrounded aspect of this CancerCat, associated PLACES are varied. They include cities such as *Washington D.C.* and *Doncaster*, U.K., named nations such as *Mexico*, *Vietnam*, and *Kenya*, and unnamed nations, including some described in ways that present them as ‘other’:

■ ...the bank cracked down on bribery after a speech by its president, James D. Wolfensohn, denouncing the “<cancer of> **corruption**” and its corrosive impact on *poor countries*.

In contrast with what we noted about violent conflict and extremism, the ‘cancer’ of corruption is constructed as afflicting a range of named cities and countries, both ‘developed’ and ‘developing’. Nonviolent crimes such as scandals, however, are more salient in descriptions of the United States and the so-called ‘body-politic’ rather than the ‘body-geographic’.

Having discussed the seven most frequent CancerCats in relation to their most frequent BodyCats, we now turn to two patterns that cut across different CancerCats in our data.

4.4 A cross-cutting theme: Violent extremism as a cancer

Our discussion so far has begun to reveal how patterns in the selection of metaphorical cancers reflect perceptions about what is regarded as most dangerous and damaging in the world views reflected in the data. The clearest case of this is an overarching category that we have labelled violent extremism, and that spans across different CancerCats and BodyCats: PEOPLE (e.g. *terrorists*), IDEOLOGY/RELIGION/BELIEF (e.g. *fundamentalism*), ORGANISATION/BUSINESS/RELIGIOUS GROUP (e.g. *ISIS*), CRIME/CONFLICT/CORRUPTION (e.g. *violent extremism*), and POLITICAL/SOCIAL/LEGAL INSTITUTION (e.g. *Saddam’s regime*). In approximately 2/3 of instances, the metaphorical body is not evident or explicit in the co-text. Where the ‘body’ is evident, violent extremism is once again most often conceptualised as a cancer of PLACE, at different levels of geographical granularity:

- Cities: *Kabul* [freq. 1]
- Countries: *Iraq* [freq. 4], *Syria* [4], *Afghanistan* [2], *Pakistan* [2], *Turkey* [1], *Israel* [1], *other countries* [2]
- Regions: *so many parts of the Muslim World* [1], *Middle East* [1], *Europe* [1], *region* [1]
- World: *world* [4], *globe* [2]

In several cases, violent extremism is a ‘cancer’ of the Middle East, which is *metastasising* to neighbouring regions, the ‘Muslim World’, Europe, and across the world.

■ Clinton chose a wrong ally in Bosnia, that he did not do anything to prevent the <metastasis> of **al-Qaeda** in *Europe* ...

■ If not, there will be more 9/11s in western cities as **radicalism in Islam** spreads <like a cancer> across the *globe*.

As shown by these examples, the individuals, groups or belief systems responsible for violent extremism are predominantly identified as some Islamic groups or forms of Islam, reflecting dominant concerns about and ‘othering’ perceptions of this group in the Anglo-American sources of our data in the early 21st century (see also Baker et al. 2013).

4.5 Cancer treatment as metaphor

As we mentioned earlier, one of Sontag’s (1979) concerns about the use of cancer as a metaphor was that it could be ‘an incitement to violence’ and provide justification for ‘severe’ measures. Our data provides some evidence for these claims.

Forty-three concordance lines include explicit references to cancer treatment as metaphorical descriptions of actions that are intended to deal with the entity that functions as CancerCat. Of these, five involve the generic verb *cure*, which is always used to describe courses of actions that are needed but have not (yet) happened (e.g. *the recognition that the cancer of anti-semitism has not been cured*). In all remaining 38 cases, the treatment involved is specified as the removal of the cancer, lexicalised as: *cut out/away* [freq. 23], *remove* [freq. 8], and *excise/excision* [freq. 7]. The expression *root out*—which draws from the source domain of plants—is also used in two cases to suggest a similar notion of (forceful) removal.

These 38 examples involve a variety of CancerCats, such as CRIME/CONFLICT/CORRUPTION:

■ And can he, or anyone else, cut out the <cancer of> **corruption** that is threatening democracy's growth in *Russia*?

However, a proportion of cases [freq. 13] are part of the cross-category theme of VIOLENT EXTREMISM we mentioned earlier:

■ ...need for coordinated international action to cut out the '<cancer of> **terrorism**' that lurks in the *Arabian peninsula*.

In such cases, although the metaphorical cancer is predominantly seen to affect the Middle East, it is the so-called 'West' that is positioned as the opposing or treating actor. This establishes a meta-conflict between the West (often the US) and violent extremism.

5 Discussion

Our analysis has shown that cancer is still used fairly regularly as a metaphor in contemporary English, as represented in our data, and enabled us to answer the research questions we started with: *What does the use of cancer as a metaphor in contemporary English reveal about (a) dominant views on the phenomena that are most frequently described as cancers, (b) perceptions of cancer itself, and (c) the factors that may contribute to the persistence and wide applicability of a (controversial) metaphor?*

The four search terms that we considered are not just used for the purposes of negative evaluation. They suggest that the phenomenon that corresponds to the cancer has caused or is causing serious damage by changing in intensity, size, scope and/or influence. This is particularly evident where the co-text includes references to processes or actions attributed to metaphorical cancers, which are always to do with hard-to-control processes described as *growing, spreading* or *eating away*.

In some cases, the phenomenon that is metaphorically presented as a cancer is arguably intrinsically negative, irrespective of the metaphor itself (e.g. *fear, crime* and *poverty*, although any evaluation can potentially be seen as a subjective matter). In other cases, the phenomenon itself is not associated with a specific positive or negative valence (e.g. *Mexico City*), or its evaluation is more clearly a matter of perspective (e.g. *Liberalism, Islam*). In all cases, but especially in the last, the use of cancer as a metaphor emphasizes danger, damage, otherness, aberration and uncontrollability, and potentially elicits negative emotional reactions.

Our analysis also shows how the use of cancer as a metaphor reflects the historically and culturally specific concerns, evaluations and ideologies of the texts included in our two corpora. This applies, for example, to the use of cancer-related metaphors for the environmental impact of human beings on the planet, the consequences of financial crises for Western economies, and, most clearly, the rise of violent extremism, particularly as associated with Islamic groups such as Al-Qaeda and ISIS. The metaphorical description of these phenomena as cancers reflects their topical status at the beginning of the 21st century, but also suggests a broadly Anglo-American view of global finance and geopolitics. In the case of violent extremism in particular, the cancer framing emphasizes the contrast between ‘them’ and ‘us’, and potentially legitimises armed military solutions. All of this suggests that the metaphorical use of cancer may more generally reveal what are regarded as the greatest evils and threats by particular groups at particular points in history, and may therefore vary accordingly across time, discourse community, language, and so on.

Concerning part (b) of our question, cancer is consistently used in our data to describe different phenomena as serious and urgent threats. Where the metaphor is extended locally, the cancer is mainly described as *growing*, *spreading* and *eating away*, while any metaphorical mentions of cancer treatment are limited to expressions such as *excision*, *cutting* and *removing*. References to *cure* tend to be negated or otherwise non-factual.

In other words, the metaphorical uses of cancer in our data reflect what could be described as a fairly general, and slightly outdated, view of the disease. For example, while complete surgical removal is still one of the most effective and desirable approaches to cancer treatment, medical advances have provided a range of other options for some cancers, including some that are neither invasive nor associated with devastating side effects, such as hormonal treatments and immunotherapies. These alternatives are not exploited as metaphors in our data, nor is the notion of cancer as an increasingly better understood and more curable disease.

Why should this be the case? First, in spite of advances in prevention and treatment, cancer is currently the second most frequent cause of mortality worldwide,⁴ and is still strongly associated with extremely unpleasant types of treatment. Second, conventional metaphorical expressions inevitably tend to reflect general folk knowledge about the relevant concepts or domains, and are always likely to lag behind any recent developments in the source domain. Third, and most importantly, the understanding of cancer reflected in our data is extremely well suited to the rhetorical purpose of presenting particular phenomena as arch-threats requiring urgent and drastic measures.

Overall, the choice of an extremely common illness as a metaphor for a wide range of alleged evils can therefore be described not just as generally insensitive for people affected by cancer, but also as reinforcing a view of the disease that may exacerbate anxiety, distress, pessimism and even stigma. While the study of metaphor and framing tends to focus on the implications of metaphor choices for the topics or target domains, in cases such as this it is also worth reflecting on potential inferences and associations flowing in the opposite direction. CMT does not consider the implications of conventional metaphorical patterns for source domains, as it defines conceptual metaphors as unidirectional mappings from source to target domains. However, other theories of metaphor before and after CMT see it as involving a combination or ‘blending’ of elements from the mental representations or

⁴ <http://www.who.int/news-room/fact-sheets/detail/cancer>

semantic domains associated with both the literal meanings of metaphorically used expressions and the topics they relate to in context (Black 1962, Fauconnier and Turner 2002). This potentially allows for evaluations and inferences going in both directions.

Concerning part (c) of our question, cancer is not a prototypical source domain in terms of CMT, nor does it possess all the characteristics that have been associated with apt and potentially effective metaphors. It is not a separate well-delineated concrete entity or ‘thing’; it is not simple; it is not ‘image-rich’ in and of itself. On the other hand, cancer has two crucial characteristics that can explain its success and wide applicability. First, it is a familiar and well-known illness, i.e. it belongs to a set of what Thibodeau et al. (2017: 859) call ‘shared embodied or cultural experiences’ that ‘are more likely to be able to establish common ground and resonate’. Second, it is associated with a few salient and highly distinctive characteristics that can easily be mapped onto aspects of a wide range of phenomena: abnormal and harmful growth (usually from the inside); tendency to spread; tendency to worsen; relative uncontrollability; potential to kill; best removed via surgery. In Kövecses’s (2010: 137ff.) terms, these characteristics, which correspond to the general understanding of cancer we have mentioned earlier, constitute a clear and distinctive ‘main meaning focus’ for cancer as a source domain and provide a set of central mappings that, as we have seen, may apply to a wide range of topics or target domains, resulting in a wide metaphorical ‘scope’. The accessibility of these mappings, regardless of the specific domain they are applied to, is at the basis of the specific rhetorical power of cancer as a metaphor. The distinctiveness of this cluster of elements also helps to explain the persistence of the metaphor in spite of criticisms and medical advances. No other illness or, more generally source domain, can convey quite so concisely and effectively the notion of an increasing, hard to control and potentially fatal internal change.

6 Conclusion

In this paper we have shown how, at least by the second decade of the 21st century, Sontag’s (1979) expectation that medical advances would make the use of cancer as a metaphor obsolete has not been realised. We have referred to research on metaphor and framing to explain why this might be the case. On the other hand, we have provided systematic textual evidence that Sontag was right to be concerned that this metaphor might be used to legitimise extreme measures as solutions to perceived threats, and might also be insensitive for people with cancer. While our professional approach to language use is primarily descriptive, we therefore concur with Sontag’s prescriptive view (1979: 87) that the use of cancer as a metaphor is generally best avoided.

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7 Works Cited

- Aanand, D.N., Teal, C.R., Rodriguez, E. and Haidet, P.** 2011. ‘Knowing the ABCs: A comparative effectiveness study of two methods of diabetes education’, *Patient Education and Counseling*, 85: 383–389.
- Baker, P., C. Gabrielatos, and T. McEnery.** 2013. *Discourse Analysis and Media Attitudes: The Representation of Islam in the British Press*. Cambridge University Press.

- Black, M.** 1962. *Models and Metaphors: Structure in Language and Philosophy*. Cornell University Press.
- Cameron, L. and A. Deignan.** 2006. 'The emergence of metaphor in discourse,' *Applied Linguistics* 27/4: 671-90.
- Charteris-Black, J.** 2004. *Corpus approaches to critical metaphor analysis*. Palgrave Macmillan.
- Clow, B.** 2011. 'Who's afraid of Susan Sontag? or The myths and metaphors of cancer reconsidered.' *Social History of Medicine* 14/2: 293-312.
- Dancygier, B. and E. Sweetser.** 2014. *Figurative Language*. Cambridge University Press.
- Deignan, A.** 2005. *Metaphor and Corpus Linguistics*. John Benjamins.
- Deignan, A., Littlemore, J. and Semino, E.** 2013. *Figurative Language, Genre and Register*. Cambridge: Cambridge University Press.
- Fauconnier, G. and M. Turner** 2002. *The Way We Think: Conceptual Blending and the Mind's Hidden Complexities*. Basic Books.
- Gibbs, R. W. Jr.** 2017. 'Metaphor, language and dynamical systems' in Semino, E. and Demjén, Z. (eds.): *The Routledge Handbook of Metaphor and Language*. Routledge.
- Grady, J.** 1997. 'THEORIES ARE BUILDINGS revisited', *Cognitive Linguistics* 8/4: 267-90.
- Kilgarriff, A., V., V. Baisa, V. Bušta, M. Jakubíček, V. Kovář, J. Michelfeit, P. Rychlý, and V. Suchomel** 2014. 'The Sketch Engine: ten years on.' *Lexicography* 1: 7-36.
- Kövecses, Z.** 2010 *Metaphor. A Practical Introduction* 2nd edn,: Oxford University Press.
- Kövecses, Z.** 2015. *Where Metaphors Come From. Reconsidering Context in Metaphor*. Oxford University Press.
- L'Hôte, E.** 2014. *Identity, Narrative and Metaphor: A Corpus-based Cognitive Analysis of New Labour Discourse*. Palgrave Macmillan.
- Lakoff, G. and M. Johnson.** 1980. *Metaphors We Live By*. University of Chicago Press.
- Landau, M. J., Meir, B. P. and Keefer, L. A.** 2010. 'A socially enriched social cognition,' *Psychological Bulletin* 136/6: 1045-67.
- Landau, M. J.** 2017. *Conceptual Metaphor in Social Psychology*. New York: Routledge.
- Loftus, S.** 2011. 'Pain and its metaphors: A dialogical approach,' *Journal of Medical Humanities* 32: 213-230.
- McCartney, M.** 2014. 'The fight is on: military metaphors for cancer may harm patients,' *The BMJ* 349: g5155.
- Musolff, A.** 2016. *Political Metaphor Analysis: Discourse and Scenarios*. Bloomsbury.
- Quaresma, M., Coleman, M. P. and Rachet, B.** (2015) '40-year trends in an index of survival for all cancers combined and survival adjusted for age and sex for each cancer in England and Wales, 1971–2011: a population-based study' *Lancet* 385: 1206-18.
- Reisfield, G. M. and G. R. Wilson.** 2004. 'Use of metaphor in the discourse on cancer,' *Journal of Clinical Oncology* 22: 4024-4027.
- Semino, E., Demjén, Z., Hardie, A., Rayson, P. and Payne, S.** 2018. *Metaphor, Cancer and the End of Life: A Corpus-based Study*. New York: Routledge.
- Sontag, S.** 1979. *Illness as Metaphor*. Allen Lane..
- Thibodeau, P. H., R. K. Hendricks, and L. Boroditsky.** 2017. 'How linguistic metaphor scaffolds reasoning,' *Trends in Cognitive Science* 21/11: 852-63.
- Vervaeke, J. and J. Kennedy.** 1996. 'Metaphor in language and thought: Falsification and multiple meanings,' *Metaphor and Symbol* 11: 273-284.