

Metaphors among titles of medical publications: an observational study

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Abstract

In this study, we attempted to determine the frequency and types of metaphors in a corpus of titles from a single medical journal collected over one year. The frequency of metaphor tokens (4.6%) was highest among editorials and other opinion articles and consisted predominantly of primary metaphors, which require explanation using a visual, cultural or other physical vehicle. When the metaphor was used only in the title and not in the body of the text, as was common in letters to the editor or in editorials, the metaphor may constitute a para-textual device used for engaging the reader. Other metaphors among research article titles were present not only in the title, but also used repeatedly in the body of the text. Among these research articles, metaphors were frequently used to endow the focus words of the metaphor with a precise and meaningful significance which, when used repeatedly in the text, may constitute a mechanism by which sub-technical language or internal jargon may arise. Being syntactically simple but endowed with a high communicative import, titles as a text type may help improve academic literacy, among beginners.

Key words: metaphors, medical literature, academic literacy, cognition, comprehension skills.

Resumen

Las metáforas en los títulos de las publicaciones médicas: un estudio observacional

En el presente trabajo pretendemos determinar la frecuencia y los tipos de metáforas de un corpus de títulos recopilados de una revista médica concreta durante un año. Es entre los editoriales y otros artículos de opinión donde se registra el mayor número de metáforas (4,6%), siendo éstas metáforas primarias

principalmente, que requieren explicaciones y para ello se valen de recursos visuales, culturales o físicos. Cuando la metáfora únicamente se utiliza en el título, y no en el cuerpo principal del trabajo, como es lo habitual en las cartas al editor o en los editoriales, constituye un dispositivo para-textual gracias al cual se capta la atención del lector. En los artículos de investigación se registraron otra serie de metáforas que, además de utilizarse en el título, aparecían de forma repetitiva en el texto principal del artículo. Estas metáforas se utilizan con frecuencia para dotar las palabras de un significado preciso y relevante que, cuando aparecen de forma repetitiva en el texto, constituyen un mecanismo que puede dar lugar a la aparición de una variedad subtécnica del lenguaje o a una especie de jerga interna. Puesto que los títulos resultan sencillos desde un punto de vista sintáctico, y al mismo tiempo están dotados de un significado enormemente comunicativo, desde un punto de vista didáctico los títulos pueden utilizarse como tipos de texto que ayuden a mejorar la destreza de la comprensión escrita en un entorno académico y en el caso de estudiantes principiantes.

Palabras clave: metáforas, publicaciones médicas, conocimiento académico, cognición, destrezas de comprensión.

1. Introduction

It is well known that many factors contribute to academic literacy (Johns, 1997) and knowledge about the genres specific to the type of literature are particularly important in shaping and improving literacy in tertiary education (Mavor & Traynor, 2001; Rowley-Jolivet & Carter-Thomas, 2005). Literacy is also greatly shaped by knowledge about the norms of the community of practitioners (Bazerman, 1988; Berkenkotter & Huckin, 1995; Wenger, 1998), which confers on a piece of written text the “significance of discourse” (Hyland 2002: 43). But reading skills, primarily concerned with the ability to disambiguate meaning, is the topic of considerable debate as to the role of first language in L2 reading and the nature of the relationship L1-L2 in academic literacy (Bernhardt & Kamil, 1995). Besides this, disambiguation of meaning is made difficult by the use of constantly emerging new metaphors, (Cameron & Deignan, 2006). These combined difficulties make the acquisition of L2 reading skills particularly difficult, especially for beginner students. Here, we will focus our attention on the frequency and types of metaphors in written medical texts.

A major contribution to our understanding on how metaphors are realised and perceived has come from the area of cognitive linguistics (Lakoff & Johnson, 1980; Turner & Fauconnier, 1995). These authors proposed a

constructivist approach in which their underlying premise holds that metaphors are a phenomenon of thought and that metaphor creation forms part of the ongoing process of communication. An elaboration of this idea of transfer, furnished by Fauconnier & Turner (2002) has been useful in explaining the analysis or unpacking of metaphors. They describe the essence of the metaphor creation process as a Blending Theory (BT) as follows:

A conceptual blend operates in two mental spaces, called the inputs, in order to yield a third space, the blend. Properties from the input spaces are projected into the properties of the blended space, which are conceived as having a new structure of its own. (Fauconnier & Turner, 2002: 150-151)

In this paper, we will adhere to the Lakoff & Johnson's (1980) definition of metaphors: the result of the transfer of properties of the metaphorically used word or phrase from one cognitive domain to another unrelated domain. Metonymy, often confused with metaphor formation, relies instead on the juxtaposition of adjacent cognitive domains without the transfer of properties from one to the other but both may work together to capture meaning (Geeraerts, 2002).

Much work has been done on identifying, classifying and describing metaphors in narrative fiction and in the poetic literary fields but in professional literature of specialist areas, relatively few studies have been done perhaps, in part due to the fact that the tools for analysis have not been well-defined and corpus studies have been rarely used. In Economics and Finance, metaphors have been studied (Charteris-Black & Musolff, 2003; White, 2003), and frequencies of metaphors in a comparison between academic and popular scientific texts on the genetic code have been published by Knudsen (2003). A cross-linguistic study of medical metaphors was done by Salager-Meyer in 1990 and more recently, problems in the identification of metaphors in doctor-patient interviews about cancer have been studied by Gibbs & Franks, (2002) and Semino et al. (2004).

Divasson & León (2006) classified metaphors culled from a medical dictionary according to their conceptual origin and patterns of analogy. In a comparative translation of these metaphors, they propose that metaphors become lexicalised in each language in order to maintain their metaphoric value and thus become invested with a precise meaning. This taxonomic approach, though valid for translation studies, draws on data from medical dictionaries and not from current medical journals. With this in mind, we

attempted to identify metaphor frequencies among the titles of all the issues of an authoritative medical journal, such as the *New England Journal of Medicine* (NEJM), to observe the frequencies of metaphors occurring in a current medical journal. Titles were chosen because we believe that they are syntactically simple and easy to read for beginners and although syntactically simple, titles furnish a high communication potential (White et al., 2007). This study is a necessary first stage of our investigation as to why our beginner students have reading difficulties.

2. Method

2.1. Description of the corpus of titles

The corpus was assembled from the titles of articles in all the issues of the NEJM published between September 2005 and August 2006. The NEJM is considered one of the core medical journals in the database PubMed, run by the US National Library of Medicine at Bethesda¹, and is perhaps one of the most widely read medical journals in North America because of its general non-specialist medical orientation. For this reason, it was selected for this study. All the issues were retrieved electronically and examined statistically for word counts, and linguistically for the presence of metaphors in the titles, or *metaphor title tokens* as described in section 2.2 below. The term *metaphor title token* is used to mean the focus word (Steen, 1999) or vehicle in the phrase.

In order to classify the tokens found according to text type, we examined the journal website to see how it classifies publications and found that the journal recognises 7 categories of articles:

1. Original Articles or research articles (RAs): these are defined by the NEJM website URL² as “scientific reports of the results of original clinical research” and may include Special Articles, which the journal considers “scientific reports of original research in such areas as economic policy, ethics, law, and health care delivery” as part of the same genre set.
2. Editorials: they usually provide commentary and analysis concerning an article in the issue of the Journal in which they appear.

3. Perspective articles: they cover a wide variety of topics of current interest in health care, medicine, and the intersection between medicine and society.
4. Cases and clinical problem-solving papers: they present the traditional patient symptoms-diagnosis-resolution format of unusual or difficult cases.
5. Clinical Implications of Basic Research articles: they discuss single papers from preclinical journals.
6. Correspondence or Letters to the Editor: they provide a forum for readers to comment about articles recently published in the Journal.
7. Book Reviews: they evaluate new texts or re-editions.

2.2. Analytical tools: identification of metaphors tokens and types

The titles of all publications from the NEJM were scanned for immediate comprehension and all candidates for being considered metaphors were then assessed using a modified version of the procedure outlined by Steen (1999). In his procedure (see Table 1), Steen identified the focus word in a text and then formulated propositions arising out of the focus word and its adjacent words.

Step	Procedure
1	Read the entire text/discourse to establish a general understanding of the meaning
2	Determine the lexical units in the text/discourse
3a	For each lexical unit in the text, establish its meaning in context, i.e. how it applies to an entity, relation or attribute in the situation evoked by the text (contextual meaning). Take into account what comes before and after the lexical unit
3b	For each lexical unit, determine if it has a more basic contemporary meaning in other contexts than the one in the given context. For our purposes, basic meanings tend to be: <ul style="list-style-type: none"> - more concrete; what they evoke is easier to imagine, see, hear, feel, smell, and taste - related to bodily action - more precise (as opposed to vague) - historically older Basic meanings are not necessarily the most frequent meanings of the lexical unit
3c	If the lexical unit has a more basic current/contemporary meaning in other contexts than the given context, decide whether the contextual meaning contrasts with the basic meaning but can be understood in comparison with it
4	If yes, mark the lexical unit or group as metaphorical

Table 1. Steps used by Steen (1999: 57) to identify metaphors.

Using Steen's steps 1 to 5, we then formulated similarities and indirect forms of reference and analogies to arrive at a metaphorical mapping. At this point we then considered the title a metaphor token with a focus word and a frame.

Step 1. Focus identification: in this step, the Things in the Process “cannot be literally applied to the referents in the world evoked by the text” (Steen, 1999: 61). Example: “The **grey literature** is...” The verb expresses a Situational Process of Being so it cannot have the referent quality of “greyness”, coming from the domain of colour. So there must be a metaphorical meaning to the example. The word “grey” is identified in Steen’s scheme as being the *focus word* of the metaphor, where the term “focus” (Black, 1962) refers to the word bearing metaphorical meaning, as opposed to the rest of the proposition called the “frame”.

Step 2. Propositional analysis: it consists of the identification of the sequence of propositions. This step was necessary when the metaphor was not explicit or if the frame or the terms of comparison of the focus was not clear. In the example above, the entire sentence is a simple proposition. This step is necessary since, formally, a proposition requires an Actor and a Process.

Step 3. Nonliteral comparison identification: in this step, a formal logic approach identifies the Process (F) of association together with the Actors *y* and *y'*. The words in the metaphor or focus are associated so that, according to Steen (1999: 67):

$$\{\text{words in metaphor}\} \rightarrow (\exists F) (P y, y')$$

which may be read as “for the focus in the metaphor, there exists a process or a relationship F such that *the actor or attribute y* refers to or means *y'*”. Applied to the example given, then:

$$\{\text{grey literature}\} \rightarrow (\exists \text{ be}) (P \text{ black } (y), \text{ represents published material thus visible}(y'),$$

while $\text{white}(x)$, represents unpublished material or $\text{invisible}(x')$. Thus, this equation reads: the focus words in the metaphor {grey literature} refers to a relationship (F) of being or existing or representing two entities: black (y) and white (x) such that there is a similarity between the entity black(y) represents a new Thing or Attribute $\text{visible}(y')$ and the entity white (x) represents the Attribute $\text{invisible}(x')$.

In this study, we modified Steen’s (1999) steps 2 and 3 by omitting them if the relationship between the source and target domains was obvious or explicit, as in the example.

Step 4. Nonliteral analogy identification: the step consists of the interpretation, whereby a literal expression is filled in to replace the metaphorical Process and the Thing or Vehicle identification. Thus, for the example “greyness” refers to “a mixture” of “two opposites of published VISIBILITY”. In this way, some elements or Attributes of the source domain evoked by the metaphorical focus can be identified and corresponds to the elaboration procedure proposed in by Fauconnier & Turner (2002).

Step 5. Nonliteral mapping identification: this step involves the identification of “the complete non-literal mapping (...) by filling out the conceptual structure of the two sides of the non-literal analogy, the source and target domain” (Steen, 1999: 71). Mapping was important among conceptual metaphors.

Once the metaphor token with its focus word(s) had been identified, a usage check was carried out to see how frequently the metaphor was used in the body of the text of the article.

3. Results

3.1. Frequencies

The corpus consisted of all the titles published in 54 issues of the journal between September 2005 and August 2006. There were 1426 titles consisting of 10314 words. Of these, there were 62 tokens or titles with metaphors, corresponding to 4.35% of all titles in the corpus. Table 2 lists these token metaphor titles and the focus word of the metaphor is highlighted in bold.

Figure 1 shows the occurrence of metaphor tokens in the corpus according to text type. The text type used is that given in the journal itself.

The majority of metaphors were seen among “Editorials”(15/62) and the text-type called “Perspective”(16/62) Since these two types both express opinions in a scholarly fashion but are not above recurring to cultural idioms and they both serve to review new ideas or findings in the context of research or health care legislation in a single country, they may be considered as sub-types belonging to the same set of text types. A substantial number of clinical cases (12/62) also contained metaphors. A smaller group of metaphors was found among “book reviews” (6/62) and in the “correspondence” sections (6/62). The remaining metaphors were distributed among other miscellaneous text types.

genetic profiling	bleeding blue and gray	the big chill
panic disorder	old enemy, new tricks	Dwarfism
silent epidemic	silent revolution	hostile use of life sciences
social anxiety disorder	family business	caput medusae
forgotten cousin	ring around the diagnosis	jumping frogs endangered toads
mitochondrial medicine	medical missionaries	where's my medal
treatment triangle	lung recruitment	pulmonary sequestration
linebacker	disciplining the stem cell	"grandfather's " experience
genes on the web	charisma CHARISMA	commensal bacteria
mind has mountains	landscape of myeloma	costimulation blockade
ethical brain	hiding elephants in mouseholes	betting on a vaccine
salt&pepper retinopathy	twiddler syndrome	stress testing
right turn of a toothpick	long and the short of therapy	mitral regurgitation
transition zone	radiation recall reaction	a tale of Janus
Inhibitor: dark side	orphan drugs	Hapmap
arterial line	no stem cell is an islet	trajectories of growth
clean hands	dissection of differences	fatal flows
one disease, two epidemics	terrors of the table	neurodegeneratory tangles
genomic profiling	research in the hot zone	offshore haven
hard lessons	burden of illness	translational science
outside the box	Milwaukee shoulder	

Table 2. List of metaphor tokens and their focus word (in bold).

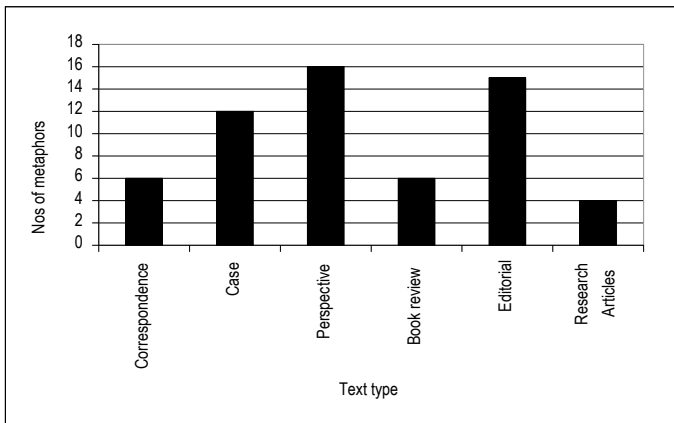


Figure 1. Frequencies of metaphors.

3.2. Distribution of metaphors within the body of the text

If the metaphor is used in the body of the text, it may be considered either a para-textual device by the editor of the journal to engage the reader's attention alone or it may have assumed the role of a conceptual metaphor and can thus be used as a stand-alone expression in the body of the text. The raw data of the use of the metaphor tokens are shown in column A of Table 3. Column B shows the calculated frequency of token metaphors in the body of the text according to text type. Again both editorials and perspective articles contain the largest number of focus words in the body of the text. Surprisingly, research articles, though having the lowest frequencies of metaphors in the titles, have among the highest frequencies of focus words in the body of the text (see Figure 2 for details).

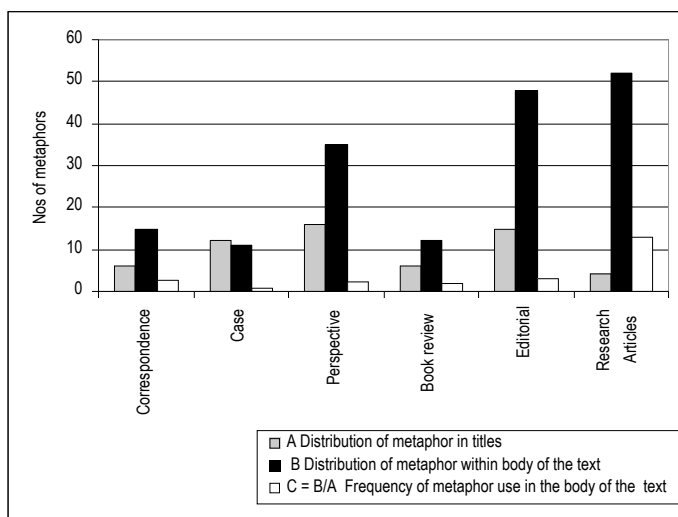


Figure 2. Distribution and frequency of the use of the focus word (vehicle) in the body of the text.

Category	A. Total no. times metaphor used in body of the text	B. Average occurrence of metaphor in the text
Correspondence	15	2.50
Case	11	0.92
Perspective	35	2.19
Book review	12	2.00
Editorial	48	3.20
Research Articles	52	13.00
Clinical implication of basic research	19	6.33

Table 3. Frequencies of metaphor focus word in the body of the text according to text type.

3.3. Types of metaphors

The list of publications of the corpus which have metaphors in their titles is given in Appendix 1 and the list of metaphoric focus words is shown in bold in Table 2. We grouped these linguistic metaphors according to their structural formation and divided our categories according to the input domains. Below we describe a few examples for each category. The numbers in square brackets after each metaphor indicates the publication number in our corpus.

(a) Primary metaphors

In this category of metaphors, we include all those which have a straightforward reference to the tenor and vehicle. They generally refer to bodily or descriptive domains. Such metaphors correspond to the taxonomic categories of architectural, phyto- zoo-or anthropomorphic domains of Divasson & León (2006).

(a.1) Metaphors which draw on visual images: similar to those seen in the literature on radiographs, as shown in examples (1) to (4).

- (1) *Salt-and-pepper retinopathy* [C12].
- (2) *Neurological tangles* [C60] or tangles of nerves.
- (3) *Commensal bacteria* [C51] which feed together. This metaphor was used 6 times in the body of the text, indicative of its descriptive aptness, in which bacteria are viewed as persons having a meal together.
- (4) *Mitral regurgitation* [C55], which refers to the sound of blood flowing around an improperly closed valve of the heart. This metaphor was used five times in the body of the text; a fact which indicated that its descriptive impact is so apt that it may be used repeatedly and readers will know exactly what it means. This is one example of a new metaphor which is a potential candidate for becoming part of medical jargon.

(a.2) Metaphors which use a descriptive physical domain as a tenor or as a vehicle, such as:

- (5) *Forgotten cousin* [C5], which uses a family relationship which has become loose and hence ignored.

- (6) *Twiddler syndrome* [C33], implying the tendency to twist an object so as to adjust its position to make it more comfortable.
- (7) *Medical missionaries* [C27], referring to the activity of proselytizing in this case, drawing on the domain of RELIGION, transferred to MEDICINE.
- (8) *The mind has mountains* [C10], implying that understanding the meanderings of the mind is a daunting process (just as climbing a mountain is a daunting undertaking). In this metaphor, the tenor implies an INSURMOUNTABLE BARRIER, overcome with some EFFORT.

(a.3) Cultural, mythological or biblical metaphors.

- (9) *No stem cell is an islet* [C37], with a cultural reference to the line “no man is an island” from the poem by John Donne³ that people are not isolated from one another, and death is a natural outgrowth of life. *No Stem Cell Is an Islet (Yet)* implies that the key to stem-cell therapy is the ability to generate large numbers of undifferentiated cells. These represent neighbours who help but in the case of stem cell-therapy in restoring insulin production. The author in the article specifically mentions the Edmonton protocol, which has been used successfully for the transplantation of human pancreatic islets.
- (10) *Caput medusae* [C46] or literally the “head of the medusa”, which in mythology appears as ringlets. This refers to the appearance of bulging veins on the abdomen of a patient with a cirrhotic liver and hypertension.
- (11) *A tale of Janus* [C56]. Janus was the double-headed mythological god of beginnings and endings whose name gave rise to the first month of the year, January. The doors of temple of Janus in Republican Rome remained open during war-time and were ceremonially closed at the end of war to symbolise peace-time. This metaphor refers to the deleterious effects of therapy on the immune defence mechanism whose primary function is to wage war on infection and the reference to the double-headed Janus implies a double-edged effect of therapy.
- (12) *Milwaukee shoulder* [C42]. This description⁴ was introduced in 1981

to describe the condition in four elderly women from Milwaukee, Iowa, who had recurrent bilateral shoulder haemorrhage, severe radiographic destructive changes of the gleno-humeral joints, and massive tears of the rotator cuff of the shoulder. In medicine, a syndrome might be named after the pathology itself, or after the physician who first identified it or by the location of a cluster of cases, as in this example.

- (13) *Jumping frogs and endangered toad* [C47], referring to the talking frog of the famous satire by Mark Twain⁵.
- (14) *Linebacker* [C8]. This sporting term refers to a part of the defence in US and Canadian football.
- (15) *Bleeding blue and gray* [C22]. This metaphor is the title of a book concerning improvements in surgical techniques by both sides in the American Civil War of 1861-1865 and their contributions to Medicine. Red is associated with blood and bleeding so this cultural metaphor contains an unusual reference for bleeding, but blue and gray were the colours of the opposing sides. The metaphor was not used in the body of the text and this fact indicates that it is a para-textual device used by the editor to capture readers' attention.

(b) Complex metaphors.

This category of metaphor may be considered cognitively more complex and may be formed by the blending of two input domains such that the new blended space acquires the properties of both inputs.

(b.1) Description of one conceptual space such that the second conceptual space assumes the characteristics of the original vehicle.

- (16) *Treatment triangle* [C7]. This expression comes from the blending of two conceptual domains: a triangle and three treatment options. From the body of the text, the author implies that, just as an equilateral triangle has three equal sides, there are three treatment options which should be used with equal frequency but are actually not used with the same frequency.
- (17) *Hiding elephants in mouseholes* [C32]. The contrast between the two conceptual domains of this metaphor implies doing an action which is near-impossible and which cannot be hidden. In the

specific reference, the author of this letter criticises an amendment to existing legislation in the US Congress by claiming that it “does not alter the fundamental details of a regulatory scheme in vague terms or ancillary provisions –it does not, one might say, hide elephants in mouseholes.” Scalia also rejected the notion that hiding “elephants in mouseholes” was an apt description of congressional intent.

- (18) *Molecular or genomic Profiling* [C1]. Coming from surveillance techniques used mainly in criminal investigative work, *profiling* defines known characteristics, deviant or not, and matches those signature characteristics, with another unknown population so as to predict which individuals have suspect or deviant behaviour. This metaphor uses profiling techniques applied to a genetic domain to identify potential Burkitt’s lymphoma.
- (19) *Silent epidemic* [C3]. One conceptual space present in this metaphor refers to “silent” meaning “not being noticed” and the other conceptual space is “epidemic” implying the burgeoning of a pathological condition. These two conceptual spaces are blended to create the idea of an undercover epidemic, involving patients unable to read, thus “silent” which develops in an unseen manner. Many researchers describe low literacy as a silent epidemic: despite its high prevalence, many physicians and other health care workers remain unaware that their patients may have reading problems.
- (20) *Genes on the Web* [C9]. This metaphor uses the conceptual domains of investigating the genetic patrimony of patients together with the conceptual domain of offering the commercialisation of such testing on the World Wide Web. This metaphor appears odd at first glance because genes exist in the DNA of chromosomes of a cell. The expansion of this headline and a clear reading of the body of the text reveal the sense of this title.

A similar mechanism of blending of two simple conceptual domains can be inferred from examples 21 to 25 below:

- (21) *Arterial line* [C11], referring to the intra-arterial insertion of a catheter for drug delivery. The property of linearity of the artery

(STRUCTURE is A LINE metaphor) is conflated with the property of movement. This implies that a line is seen to move (FICTIVE MOTION) between two points.

- (22) *Burden of illness* [C41], referring to the monetary evaluation of the social and psychology costs of an illness for the individual or for the society. In this example, the contribution of an individual to society is evaluated in monetary terms and as a consequence, an ill person cannot contribute fully to society and thus illness implies a weight or burden. Embodiment metaphors have been amply studied by Gibbs & Franks (2002) in spoken medical interviews.
- (23) *Mitochondrial medicine* [C6]: that branch of medicine or a possible cure, closely allied to biological research, which aims at identifying the irregularities of physiological mechanisms underlying the onset of a pathology. Inherent in these two word of the metaphor is the suggestion that a cure may be possible by studying the biological mechanisms underlying a disease and implies the conflation of the study of the mechanisms of a disease with its treatment.
- (24) *Adopting Orphan drugs* [C36]. These refer to drugs which have been developed but not subject to testing and therefore have not been approved thus have no putative “carer” or “parent” among the different pharmaceutical companies. This metaphor was used 13 times in the body of the editorial where it was found. In the field of legal linguistics, the expression *Orphan Drugs* as in Orphan Drug Act may be a potential candidate for jargon.
- (25) *Grandfather’s experience* [C50], where “grandfather” refers to an older physician, trained in other times and circumstances and having his own experience and set of values peculiar to his formation. This genre variation “perspective” editorial relates the experience of an old physician faced with the idea of obligatory updating his accreditation for certification.

(b.2) Conflicting properties from two domains or ideas to arrive at a third output space. In the transfer of similitude, the properties of both input domains are acquired by the new entity.

- (26) *Disciplining the stem cell* [C29]. The first input domain is the concept of discipline and the second input domain is that of the stem cell with its plasticity and potential to be bent in one way or another. The output domain consists of the idea that discipline, seen as the training condition for the stem cell, can serve as a measure to govern the stem cell to forge a new entity with properties of immune resistance to disease.
- (27) *Landscape of myeloma therapy* [C31]. Here, the landscape, deriving a geographical domain, is viewed as an entity under change, just as myeloma treatment has varied over time. Thus the therapeutic options for this pathological condition are viewed as eroded, altered or modified depending on factors outside of medical control. The output domain refers to the word “landscape” as a variety of therapeutic options, just as a country landscape offers a variety of hills, rivers and lakes
- (28) *Betting on a vaccine* [C53]. The two conceptual input domains consist of the world of betting and the world of competition in the race to win the title of “most useful” vaccine. The output domain is the challenge which the article poses to the reader to evaluate all the potential winners and pick the most promising one.
- (29) *Thinking outside the box* [C21]. This spatial metaphor refers to the idea of thought and imagination outside the normal scheme.

(b.3) Quasi-Jargon. This last category consists of metaphors, both primary and blended, used in the titles and extensively repeated in the body of the text of the article to which they refer. Almost all of them come from either editorials (examples 30, 31, 34 and 35) or from Research articles (examples 33 and 36). One of them (example 32) was found in a 200-word brief patient case which contained a reference using the same metaphor. The publication (example 33) referred to a prior letter to the editor.

- (30) *Genomic Cartography: presenting the Hapmap* [C57], where Hap is an abbreviation for haplotype. In the words of the author: “The article describes a map of haplotypes, colloquially called the HapMap. (A haplotype is a set of closely linked markers on a single chromosome that tend to be inherited as a group)”.

- (31) *Translational science* [C62]. This was used 24 times in the body of the research paper.
- (32) *Pulmonary sequestration* [C49] was used three times in this 200-word patient case.
- (33) *Lung recruitment* [C28]. This letter to the editor used the metaphor token 15 times. The letter refers to a prior research publication which also uses this metaphor extensively.
- (34) *The hot zone* [C40]. This is used euphemistically for the area of scientific research referring to bioterrorism and is used five times in the body of the article.
- (35) *Offshore haven* [C61] is used twice in the editorial. A haven or “safe place” is combined with the word “offshore” meaning work done in one country usually by lower-paid staff for use in another country where labour costs are lower and thus the economic return is higher. This expression has entered the English language via computer science and information technology.
- (36) *Stress testing* [C54]. A metaphor used 34 times in this research article.

4. Discussion

In this corpus, frequency data show evidence of the vitality of metaphor use among the titles of medical publication. Figure 1 shows that metaphors in titles were predominant among editorials and other opinion articles such as the corresponding member of the genre set “Perspectives”. A close examination of Table 3 reveals that most of the titles occurred among Editorials which appear to propose opinions and refer to a Research Article (RA) in the same issue of the journal (see Journal website: contribution for authors). Thus, editorials comment on and help shape further research. Perspective articles on the other hand comment on items of social importance for the community at large and aim at raising consciousness about social and community issues in Medicine, so it is not surprising that both authors and editors recur to metaphor use. However, whereas editorials appear to use metaphor mainly in the title and rarely in the body of the text, RAs tend to have metaphors both in the title and repeatedly used within the body of the text. The reason for this high frequency is open to speculation

but may be attributed to the necessity for precision in describing structures, symptoms or syndromes so both authors and readers have a clear and precise description of exactly what is being described (Gibbs & Franks, 2002). In editorials and other opinion articles, however, despite a high frequency of metaphor among titles, the relatively low frequency of metaphor observed in the body of the text may be attributed to the use of metaphor to engage the reader.

The finding that the frequency of metaphors in the titles does not always correspond to frequencies of the focus words in the body of the text is quite surprising. Data show that the frequencies of metaphors in the titles of RAs is low but when we searched for the same focus words of the metaphors within the body of the text, the focus word was repeatedly used. Such a parameter leads us to believe that the frequency of use may be an indicator of how vital the metaphor is or whether it is dying, or it could be a measure of the aptness of the metaphor which might make it a candidate for specialist jargon but it could be as well that systematic groupings or “clustering” of these metaphors play a major role in felicitous discourse structuring and development (Cameron & Deignan, 2006).

Given the necessity for precision in language in Medical English, one can only speculate about the significance of the reason why metaphor blends do in fact come about in the medical literature and one hypothesis may be that such blends fit the necessity for precise descriptive language which then slowly evolve into common use and eventually become jargon. In one sense, the category of blends may be considered a half-way house (no pun intended!) in the step to the development of technical jargon. Perhaps, it is for this reason that despite the fact that the total number of metaphors among RAs is low, focus word use within the body of the text in RAs far outstrips that of other publication types. Such metaphors then in RAs may be repeatedly used and they may also be good candidates for becoming “jargon” or technical terms. However, until they are included in a technical dictionary, they cannot be considered jargon, but high frequency usage within a text may be one mechanism (and a necessary step) by which a metaphoric focus word may eventually become technical jargon.

The next largest category of raw frequencies of metaphors is that seen in clinical cases. This may be attributed to the high frequency of primary metaphors with a visual, cultural or other physical vehicle. With respect to the types of metaphors, the entire category of primary metaphors harks back to prior experience. They generally have as their vehicle both prior

experience, embodiment or acculturate knowledge which require an explanation for proper comprehension. This kind of metaphor has been amply described by Divasson & León (2006) who suggest the need for precision by scientists in describing or explaining both concepts or physical entities.

Blended metaphors are quite vivacious in that they make use of two or more conceptual domains which are blended to create an expression that is precise, descriptive and makes use of the properties of both blended inputs. This kind of metaphor has been amply treated by Grady et al. (1999) and Fauconnier & Turner (2002). To the best of our knowledge, this is the first time that we see it written Medical specialist texts.

With respect to facilitating reading skills among students and understanding metaphors in technical journals, it is clear that while primary physical metaphors may be intuitively understood by non-native beginner students (Littlemore, 2004) more complex metaphors or cultural metaphors require an understanding of the input domains and their properties or connections with the output domains. The disadvantage of non-native speakers has already been highlighted by Magnet & Carnet (2006) in a questionnaire study among French scientists on published letters-to-the-editor. These linguists noted that difficulties in mastering irony, humour and cultural references in a foreign language may inhibit frequent contributions to the correspondence section of scientific journals and these are the same factors which we found to constitute the input domains of metaphors. It is fundamental, then, that scientists-doctors who wish to be active on the international research scene should master these reading comprehension skills.

Acknowledgements

I would like to thank the editor Prof. Ana Bocanegra and two anonymous reviewers for their insightful suggestions as well as Prof. Michael White for his kind help in procuring a publication. Thanks also go to Ms. Aura Collins for help with translation into Spanish.

(Revised paper received March 2007)

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NOTES

¹ NLM (National Library of Medicine), created in 1956, forms part of the National Institutes of Health (NIH). It established a retrieval system in 1965, in Bethesda, Md. USA. The website for consultable indexed citations, established first in 1986, has been available in Internet since 1993 at <http://www.nlm.nih.gov/>

² URL: <http://authors.nejm.org/Misc/Articles.asp>

³ From *Meditations*. Donne wrote this at a time when death was the constant companion of life.

⁴ Jensen et al. “Current concepts review - rotator cuff tear arthropathy” *The Journal of Bone and Joint Surgery* 81: 1312-24 (1999).

⁵ Mark Twain 1865: The Celebrated Jumping Frog of Calaveras County, with a frog named Dan'l Webster (at http://www.pbs.org/marktwain/learnmore/writings_jim.html)

⁶ URL: <http://en.wikipedia.org/wiki/Linebacker>

Appendix 1: Corpus of metaphors tokens

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