



## Creative metaphors in video lessons: the relationship between the novel and the conventional

### *Metáforas criativas em videoaulas: a relação entre o novo e o convencional*

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**Abstract:** The metaphors used in non-poetic contexts are mostly conventional. This study, which is part of a broader research, analyzes the emergence of – and the relationship between – conventional and novel/creative metaphors in Biology video lessons.<sup>2</sup> The theoretical basis is composed of the Theory of Conceptual Metaphor (LAKOFF; JOHNSON, 2002; LAKOFF; TURNER, 1989) and the Perspective of Metaphor in Discourse (SEMINO, 2008). Thus, the general objective of this paper is to verify the emergence of conceptual and linguistic metaphors produced by teachers in Biology video lessons, as well as to analyze their degree of novelty and/or conventionality. The data analyzed came from YouTube video subtitles, and the methodology used to identify metaphors in speech was the MIP (PRAGGLEJAZ GROUP, 2007). The results indicate that creative metaphors are present in the discourse of these teachers and play a relevant role in the presentation of scientific content.

**Keywords:** metaphor; creativity; conventionality; video lessons; textual patterns.

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**Resumo:** As metáforas empregadas em contextos não poéticos apresentam-se majoritariamente de forma convencional. O presente estudo, que faz parte de uma pesquisa mais abrangente, trata da análise da emergência de – e da relação entre – metáforas convencionais e novas/criativas em videoaulas de Biologia. O aporte teórico é composto pela Teoria da Metáfora Conceptual (LAKOFF; JOHNSON, 2002; LAKOFF; TURNER, 1989) e pela Perspectiva da Metáfora no Discurso (SEMINO, 2008). Desse modo, o objetivo geral deste artigo é verificar a emergência de metáforas conceptuais e linguísticas produzidas por professores em videoaulas de Biologia, assim como analisar seu grau de novidade e/ou convencionalidade. Os dados analisados são provenientes de legendas de videoaulas do *YouTube*, e a metodologia empregada na identificação de metáforas no discurso foi o MIP (PRAGGLEJAZ GROUP, 2007). Os resultados indicam que metáforas criativas estão presentes no discurso desses professores e desempenham um papel relevante na apresentação de conteúdos científicos.

**Palavras-chave:** metáfora; criatividade; convencionalidade; videoaulas; padrões textuais.

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## 1 Introduction

In the 1980s, following the wave of advances in the field of Cognitive Linguistics, the pioneering studies by Lakoff and Johnson (2002) demonstrated that, in opposition to what literate, rhetorical, and some philosophers postulated, metaphor is not only restricted to the literary scope. According to Lakoff and Johnson (2002 [1980]), metaphors are present in our daily lives. This position can be verified by looking at the amount of metaphors we use in our most ordinary interactions. Given the common use we make of some metaphors, Lakoff and Turner (1989) classify them as conventional. However, according to these authors, there is a special group of metaphors that, because of their novel and creative character, are used in a more restricted way, especially in literary contexts. Authors such as Semino (2008), on the other hand, argue that metaphors considered creative are not restricted to poetic contexts, but disagree with the idea that the metaphorical locus is only the speaker's mind, a position advocated by Lakoff and Johnson

(2002) and Lakoff and Turner (1989). Furthermore, Semino (2008), as well as others (CAMERON, 2003, 2010), argues that creative metaphors have often been employed for pedagogical purposes.

After this brief contextualization, we present the basis of this research, starting with the following guiding question: is there any conventional and especially creative metaphorical emergence in non-literary contexts, such as in Biology classes? Therefore, the main goal of this study is to verify the occurrence(s) of conventional metaphors and, especially, the creative ones in non-literary contexts – in this case, in Biology video lessons. This research has the following specific goals: (a) to verify the nature of this emergence(s), in other words, to examine which textual and/or cognitive patterns are involved in the emergence of these metaphors, (b) to propose discursive metaphors that can potentially be conceptual (cognitive), not yet described in the current literature; and (c) to find out the extent to which metaphors, especially creative ones, are used as tools in the explanation of scientific concepts.

## **2 From cognition to discourse: a two-way process for the emergence of creative metaphors**

Lakoff and Johnson (2002) argue that metaphors are the result of a series of unidirectional mental mappings that shift from one mental/conceptual domain to another. Conceptual domains are background knowledge constructs in our conceptual system, that is to say, they are stable, experiential, and cultural knowledge structures that are part of our mental life, situated in long-term memory, and thus responsible for conceptualizations (LAKOFF, 1987, 1993, 1994; LAKOFF; JOHNSON, 2002; LANGACKER, 1987; FAUCONNIER, 1999). Although Lakoff and Johnson (2002) and Lakoff (1993) recognize the role of language in the metaphorical emergence process, they establish a distinction between metaphorical expressions (linguistic metaphors) and conceptual metaphors. For these authors, metaphor is, in essence, a cognitive phenomenon.

As an example of how unidirectional domain mappings work, one can cite the conceptual metaphor ARGUMENT IS WAR.<sup>3</sup>

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<sup>3</sup> It is conventional in Cognitive Linguistic studies to write metaphors considered as conceptual in capital letters.

According to Lakoff and Johnson (2002), this metaphor can be inferred from the observation of metaphorical expressions that we employ in everyday interactions such as, for example, *it destroyed my arguments, I lost the discussion, I won the debate*. As stated by the authors, the presence of these expressions indicates the realization of a conceptual metaphor, consisting of set mappings or projections between the elements of two domains – from the target domain to the source domain. Thus, based on this evidence and on these theoretical assumptions, the foundations for the Conceptual Metaphor Theory were laid.

Although the impact of the postulates of Conceptual Metaphor Theory can still be strongly felt to the present day, there are researchers, such as Cameron (2003, 2010), who are critical of some of its points. The author's main criticisms refer to the fact that, in the Conceptual Metaphor Theory (hereafter CMT), the linguistic dimension is relegated to the background, while the cognitive facet is in excessive evidence. According to Cameron (2003; 2010), although it is consensual that cognition participates in the metaphorical emergence, in her view, not all metaphors can be explained by the occurrence of conceptual mappings or projections. In this author's view, the flow and the dynamics of discourse play a decisive role in explaining the functioning of this phenomenon.

Thus, amid this disagreement between theoretical positions, the perspective of Discourse Metaphor, proposed by Semino (2008), emerges as a more moderate perspective, as it is placed between the cognitive view and the discursive view of metaphor functioning. Semino (2008, p. 1) defines the metaphorical phenomenon as follows: "by 'metaphor' I mean the phenomenon whereby we talk and, potentially, think about something in terms of something else". In addition to this definition, the author argues that the assumptions of Lakoff and Johnson (2002) and Lakoff (1987, 1993, 1994) should be taken into account, but, at the same time, the findings of authors such as Cameron (2003, 2010), Charteris-Black (2004), Musolff (2004) and Deignan (2005), who studied metaphor in authentic discourses, should also be considered. This, by the way, is one of the points on which Semino (2008) criticizes CMT. According to the author, the results of CMT research are questionable because they do not consider linguistic data from authentic interactions or discourses. In addition, Lakoff and Johnson (2002) have proposed conceptual metaphors based on fictitious or invented examples to

support their positions. Moreover, in their pioneering work, they did not make clear the methodological procedures by which they departed from metaphorical expressions toward the deduction of underlying conceptual metaphors. Therefore, Semino (2008) states that, in his view, the notions of conceptual domains and image schemas are not always sufficient to explain the behavior of metaphor in language contexts of use; thus, other aspects such as discursive/textual ones have to be considered to satisfactorily understand the functioning of the phenomenon. In other words, although the author does not deny the importance of the cognitive facet of metaphor, she argues that the phenomenon has to be studied taking into account both cognitive and linguistic factors in order to enable researchers to provide a satisfactory description.

Moreover, according to Semino (2008), one of the most salient aspects of the nature of metaphors is that they can present themselves in two ways: conventionally or creatively. By conventional metaphors, Semino (2008) defines them as those whose occurrence is usual in our discourse; they can be conceptual or linguistic. If they are conceptual, they tend to have stable mappings between domains, whereby, according to Lakoff and Turner (1989), and Lakoff and Johnson (2002), speakers usually conceptualize one concept in terms of another. In the hypothesis that they are linguistic, one of the criteria to classify them as such is to verify whether they are registered in dictionary entries; if so, this would prove its prominent level of recurrence, thus indicating a use already crystallized in the community of speakers. On the other hand, novel or creative conceptual metaphors do not perform the same fixed and stable mappings but modify them through some cognitive strategies. (LAKOFF; TURNER, 1989; SEMINO, 2008). To Lakoff and Turner (1989), conventional, conceptual metaphors are a kind of basis upon which poetic (novel/creative) metaphors are created. Briefly, the typology of mental/cognitive operations proposed by Lakoff and Turner (1989) to explain conceptual metaphorical creativity consists of extension, elaboration, questioning, composition, and image metaphors.

The extension comes down to the use of additional mappings to those already conventionally employed. As an example, we can take the conventional metaphor DEATH IS SLEEPING. If one wants to extend it, not only the conventional elements of the SLEEP domain can be mapped, such as *inactivity* or *horizontal position*, but it is also possible, for example, to map the *dream* element, which is not conventionally mapped in this metaphor.

In turn, the elaboration process, as advocated by Lakoff and Turner (1989, p. 67), results in the filling of domain elements in unusual ways. Lakoff and Turner (1989) cite a passage from the poet Horace in which he refers to death as the eternal exile of the raft with the purpose of exemplifying this mental strategy. Thus, in the metaphor DEATH IS DEPARTURE, the target domain is understood as a journey typically with no return, but by filling up the domain DEPARTURE with the element *exile*, it can be understood that there is a possibility that the deceased may, one day, return from the this state; thus, the conceptualization of DEATH becomes distinct from the conventional one.

The cognitive strategy of questioning is equivalent to pointing out the limitations or inadequacies of a conventional metaphor in a given use. As an example, Lakoff and Turner (1989) present an excerpt from a Catullus poem in which the LIFE TIME IS A DAY conceptual metaphor is used. However, while conceptualizing LIFE as a DAY, this metaphor's validity is questioned. The limitation of this metaphor has to do with the conceptualization of mortality. In other words, if one day consists of sunrise and sunset successively, and if, through this metaphor, our lifetime is conceived in terms of the length of a day, consequently, following these metaphorical mappings, our lives should start over/be reborn every morning. That is not what happens here with these metaphors; therefore, we have an inadequacy/limitation that gives rise to the strategy of questioning.

The process of composition consists in employing two or more conceptual metaphors to refer to the same concept, in the same passage or in the same sentence, as pointed out by Lakoff and Turner (1989); in this way, there is a mixture of metaphors, in which one metaphor influences the other.

The last mental strategy pointed out by Lakoff and Turner (1989) concerns image metaphors. These metaphors do not involve systematic mappings from one domain to another to generate other inferential patterns, but function through an instantaneous superposition of images. This is mainly due to the similarity between the shapes/images represented by each domain. The metaphor *your body is a guitar* is an example of this type.

On the other hand, according to Semino (2008), the emergence of creative linguistic metaphors cannot be only explained based on the mental operations described by Lakoff and Turner (1989); on the contrary, since

metaphors are also a linguistic phenomenon, one must take into account the discursive/textual processes involved. In other words, although she takes into account the position of Lakoff and Turner (1989) to explain the emergence of novel/creative conceptual metaphors, as she advocates a cognitive-discursive view to study the phenomenon, Semino (2008) proposes that metaphorical creativity should be explained by joining the typology of mental processes assumed by Lakoff and Turner (1989) to a typology of its own, in which textual patterns influence this emergence. The textual patterns postulated by Semino (2008) are: repetition, recurrence, grouping, extension, combination, mixing, opposition between metaphorical and literal, signaling and intertextual relations.

The repetition consists of, as its name implies, repetition patterns of metaphorical expressions throughout the text/discourse.

The recurrence is a phenomenon remarkably similar to repetition; however, instead of repeating the same metaphorical expression in discourse, different expressions or lexical items recur. In other words, they belong to or are related to the same source domain; they are not in a cluster, but along the body of the text/discourse.

The grouping consists of a pattern of metaphor presentation through clusters in the text. Semino (2008) argues that there are parts of the text that have a higher density of metaphors. In other words, the distribution of metaphors in discourse is often uneven, with certain portions of the text where there are more metaphors than others.

The extension, which is also considered a subtype of cluster, occurs when multiple metaphorical expressions linked to the same source domain are used very close to each other with respect to the same topic or elements of the same target domain (SEMINO, 2008). For practical purposes, Semino (2008) defines an extension as follows: “I use the term when at least two metaphorically used words belonging to different phrases describe the same target domain/scenario in terms of the same source domain/scenario” (SEMINO, 2008, p. 25). In order to illustrate this strategy of textual organization of metaphors, we reproduce an excerpt from Semino’s own research data, in which this operation is noticeably clear.

The Tories start their conference... desperately sick - and tired. Leading lights in the party are crippled by life-threatening anemia, loss of appetite and delusions of grandeur. Troops have been laid low by the Ukip superbug, which devastated the Hartlepool by elections and threatens to spread its spores nationwide”. (SEMINO, 2008, p. 25).

As it can be seen from the above excerpt, the highlighted lexical items or expressions belong to the same source domain, in this case, DISEASE, and are clustered in two sentences.

The interaction is a process that occurs between different metaphorical expressions, coming from different source domains. Semino (2008) explains that such a process can occur in two ways: by combination or by mixing. In order to explain the combination, the author presents as an example the same excerpt that we cited earlier. Lexical items like *troop* and *devastated* are being used in conjunction with lexical items that represent the metaphor of the DISEASE domain, which have already been extended. In other words, there is a combination of metaphors from the WAR domain with the DISEASE domain or scenario, representing the party members as soldiers who are falling ill; in other words, losing the war.<sup>4</sup> Therefore, in order to have a combination, metaphors must be able to, in this interaction, produce a more complex metaphorical scenario. In this same excerpt, there is a kind of interaction that is different from the combination called mixture. More specifically, the lexical item *lights*, which is used metaphorically to represent party leaders cited in the previous excerpt, and given its metaphorical meaning, is not compatible with metaphors from the domains of WAR and DISEASE to create a more complex metaphorical scenario; consequently, it demonstrates an incongruous interaction. Therefore, the process of combining does not occur in this case; instead, such is a mixing process.

The opposition between the use of the literal meaning and the metaphorical meaning, according to Semino (2008), consists in evoking both the literal meaning (most basic sense of the lexical item) and the metaphorical meaning simultaneously in a given textual excerpt, through the same lexical item or expression. As an example, the author cites the metaphor *a diplomatic desert* used in a newspaper article that addresses the conflict between South Africa and Morocco over control of the western side of the Sahara Desert. Obviously, considering the metaphor, the diplomatic meeting between the leaders did not bear fruits.

The signaling is described as another pattern through which the metaphors appear in text/discourse. It consists of the use of certain expressions in the immediate co-text, in order to guide the reader, or listener, to possible metaphorical interpretations, such as “[...]”

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<sup>4</sup> The party of the Tories.



metaphorically speaking, literally, as it were, so to speak, sort of, imagine” (SEMINO, 2008, p. 27).

The last textual pattern of metaphor emergence in discourse mentioned by Semino (2008) in her typology is the intertextual relations. Metaphors can demonstrate intertextual relationships in diverse ways, as well as be linked to the original producer of a given metaphor or to a specific subject/topic. Regardless of the way in which they relate through different texts, they are often explored later by other writers or speakers, just to refer to either the producer or the topic. As an example, Kövecses (2010) cites the metaphors JESUS IS A SHEPHERD and PEOPLE ARE SHEEPS, from the Bible, stating that they are historically recycled and explored by other authors.

### **3 Metaphors as a pedagogical tool**

According to Semino (2008), metaphors are used in scientific discourse, mainly for two reasons: in the first place, she argues that the observed phenomena which are studied by scientists, in many cases, are not available to our perceptual system, that is, to our senses, such as sight, touch or hearing. In other words, they cannot be observed directly. In some cases, the use of instruments for indirect observation is required, and the results of this observation still require, to some extent, interpretation. This, of course, happens when the instrumental observation of phenomena does not occur partially and yet it is necessary to make inferences, in order to fill in the gaps involved in explaining the phenomenon; some examples are the behavior of subatomic particles, black holes, big bang, genetic code and the greenhouse effect. The second reason is that, to report the observed (or partially observed) phenomenon, scientific knowledge or “scientific facts” are constructed via language use and social interactions, which involve negotiation, argumentation, persuasion and compromise.

Still, in this regard, Temmerman (2012) also argues that the emergence of metaphors seems to be, in some scientific fields, very necessary, as, for example, in Genetics, in which the use of metaphors is necessarily included in the terminology of the area, a process which this author defines as metaphorical lexicalization; and, in our view, these ones are especially conventional metaphors.

Cameron’s research (2003), which deals with the systematic presence of metaphors in interactions between students and teachers in

schools, also points to the importance of the role that metaphors play in teaching and didactic materials, as they present themselves as a valuable pedagogical tool to teach and explain different subjects. Analyzing the accuracy of the explanations and representations that each metaphor provides for scientific concept, she proposed a classification or distinction among them.

Thus, based on the review of the literature, it can be said that metaphors can play a relevant role in teaching, understanding and conceptualizing scientific concepts, especially in Biology.

#### **4 Methodological procedures**

The data that constitutes our research corpus was collected from two YouTube video lessons, specifically in the tab that gives access to subtitle transcripts automatically generated by a platform's speech recognition software. The chosen area was Biology, more specifically the subareas that address the immune system and Virology. We have selected the Biology field for the following reasons: in the first place, we had the intention to confront the claimed sharp distinction made between the objectivity of the scientific discourse, especially in sciences considered to be "harder" than Human, Social or Language sciences, and metaphorical subjectivity. Secondly, while we were in the stage of literature review, we have found only a few researches on metaphors in areas such as Chemistry and Physics, and only one research was found in Biology (TEMMERMAN, 2012). Thus, as we have once identified a gap in research that covers this field, Biology has been chosen as our research's field for the study of metaphors. The selection of subjects or subfields in Biology was based on the following criteria: relevance to school curriculum, compliance with the new BNCC, and number of classes available on the topic.<sup>5</sup>

After that, the transcriptions were copied and pasted into *.doc* files for the subsequent corpus compilation step, which consisted of checking the transcriptions with the audios.<sup>6</sup> The transcriptions were formatted

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<sup>5</sup> BNCC are the initials in Portuguese for National Common Curriculum Base. It is a document, approved on December 20, 2017, which regulates 60% of the content that should compose the curriculum of each subject of elementary schools across Brazil.

<sup>6</sup> It is a file format that allows text editing on computer application programs such as Microsoft Word.

in Courier New font and size 10. We decided to do so for the following reasons: (a) by opting for this format, we are following the tradition in the presentation of this type of data, as it happens in research fields that routinely present talk data, such as Conversation Analysis; (b) by choosing this font and size, the distinction between text and transcripts is clearer, which, in our opinion, helps the reader to follow the text easily.

Regarding the methodological procedures for analysis, we performed the following procedures: (i) identification of linguistic metaphors through the use of MIP (PRAGGLEJAZ GROUP, 2007), signaling them in the transcription through bold and underlined formatting; (ii) inference of conceptual metaphors through the linguistic metaphors identified (metaphorical expressions), based on the relation of conceptual metaphors pointed by cognitive semanticists, such as Grady (1997, 2007), Grady; Oakley; Coulson (1999), Kövecses (1986, 1990, 2010, 2015), Lakoff (1993, 1994), Lakoff and Johnson (2002), Lakoff, Espenson and Schwartz (1991), and Lakoff and Turner (1989); (iii) classification of conceptual metaphors found in conventional or novel/creative metaphors, taking into account the cognitive processes pointed out by Lakoff and Turner (1989), as well as the textual patterns that are possibly involved in the process; (iv) proposition of more general discursive/linguistic metaphors, with conceptual potential, inferred through the metaphorical expressions used throughout the text and based on Semino's (2008) works; (v) submission of linguistic and discursive metaphors underlying to them (potentially conceptual) to the procedure (iii); and (vi) analysis of the relationship between the metaphors employed by teachers in the video lessons and the scientific concepts presented in class, especially with regard to the creative ones.

The MIP procedure (PRAGGLEJAZ GROUP, 2007), which we referred to earlier, consists of the steps that are described below:

1. Read the entire text-discourse to establish a general understanding of the meaning.
2. Determine the lexical units in the text-discourse.
3. (a) For each lexical unit in the text, establish its meaning in context, that is, 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.  
(b) For each lexical unit, determine whether 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:

- 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.

(c) If the lexical unit has a more basic current-contemporary meaning in other contexts than in 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 as metaphorical”. (PRAGGLEJAZ GROUP, 2007, p. 3; SEMINO, 2008, p. 12).

## 5 Results and data analysis

In this section, we deal with the analysis of two video lessons about the immune system and viruses.

The video lesson that addresses the immune system is taught by a teacher called Beth, from the *Beth Biologia* channel, which had, on October 25<sup>th</sup>, 2019, 5.462 subscribers. In addition, on that same date, this video lesson had 60,930 views.<sup>7</sup>

We have identified the following underlying conceptual metaphors described in the literature, which are shown on chart 1.

CHART 1 – Conceptual Metaphors in the Immune System Video Lesson

PEOPLE ARE MACHINES (LAKOFF; TURNER, 1989).
HUMAN BODY IS A BATTLEFIELD (LAKOFF; ESPENSON; SCHWARTZ, 1991; LAKOFF, 1994).
DISEASE IS AN ENEMY (LAKOFF; ESPENSON; SCHWARTZ, 1991; LAKOFF, 1994).
EASE IS LIGHT/DIFFICULTY IS WEIGHT (GRADY, 1997).

Source: produced by the authors.

<sup>7</sup>This video lesson is fully available at: <https://www.youtube.com/watch?v=mSFy3GINMjs>. Access on: Oct. 25, 2019.

Regarding the type of metaphors we found, we consider that all are conventional and emerged mainly through textual patterns of repetition, recurrence, and extension. The conceptual metaphor that has most licensed linguistic metaphors in this video lesson is HUMAN BODY IS A BATTLEFIELD (LAKOFF; ESPENSON; SCHWARTZ, 1991; LAKOFF, 1994). Nevertheless, the conceptual metaphor DISEASE IS AN ENEMY (LAKOFF, ESPENSON; SCHWARTZ, 1991; LAKOFF, 1994) also seems to motivate, according to our analysis, some of these linguistic metaphors. Excerpt 1 shows the occurrence of these metaphors, as well as their form of organization through textual patterns.

EXCERPT 1<sup>8</sup>

75: So, my beloved ones<sup>9</sup>  
 76: we have two types of active immunity  
 77: natural: the humoral immunity that is  
 78: one that acts as if it were  
 79: an elite battalion like the Bope<sup>10</sup>, the Bope  
 80: look guys look Bope's little song  
 81: so, in reality this song this process of action  
 82: of little soldiers right as if  
 83: you had really been hit  
 84: by an enemy that you will really  
 85: fight a war, fire guns,  
 86: machine guns at the invaders  
 87: they characterize our humoral immunity

<sup>8</sup> The subtitles that compose the corpus of this research were originally collected in Portuguese; however, because this publication is in English, subtitles have been translated and adapted to this language.

<sup>9</sup> As stated in the section presenting the methodological procedures, the linguistic metaphors identified in the video lessons are presented both in bold and underlined on the excerpts.

<sup>10</sup> BOPE are the initials in Portuguese for Special Police Operations Battalion, which is as specialized police squad from Rio de Janeiro city. On the excerpts, we decided to maintain the original initials.

88: it is the great defender  
 89: the Bope's general  
 90: it's called Helper T lymphocyte  
 91: the Helper T lymphocyte, my beloved ones, is who  
 92: first sees the presence of a  
 93: microorganism of an allergic or  
 94: even a toxin in your body  
 95: so, what is he going to do?  
 96: He will call the guys, the folks  
 97: who will go to work because he remains sitting at his desk  
 98: answering the phone only watching  
 99: on the screen of his monitor where the invaders are  
 100: in your body but he doesn't leave his place  
 101: this T lymphocyte, the helper  
 102: then he calls the folks who are going  
 103: for combat rat-at-at-at-at-at  
 104: they are the guys called B lymphocyte  
 105: What is B lymphocyte going to do?  
 106: If you have been hit by  
 107: an artificial antigen we call a vaccine

Source: adapted from Profa. Beth (2016).<sup>11</sup>

As it can be seen in excerpt 1, although there are repetitions and recurrences, linguistic metaphors are eminently emerging through textual (SEMINO, 2008) or cognitive (LAKOFF; TURNER, 1989) extensions of the WAR domain. In the metaphor THE HUMAN BODY IS A BATTLEFIELD (LAKOFF; ESPENSON; SCHWARTZ, 1991; LAKOFF, 1994), we can highlight the extensions *have been hit by an enemy, fire guns and fire machine guns at the invaders*.

Regarding the presence of more general discursive metaphors with conceptual/cognitive potential, we identified the following in chart 2.

<sup>11</sup> “Profa.” is the abbreviation of the word “*professora*”, which in Portuguese, means “teacher”. We decided to maintain it in Portuguese because of the original references are on this language.

CHART 2 – Discursive Metaphors in the Immune System Video Lesson

SUBJECT/CLASS CONTENT IS A SUBSTANCE/RAW MATERIAL TO BE HANDLED.
LYMPHOCYTES ARE SOLDIERS THAT DEFEND OUR ORGANISM.
LYMPHOCYTES ARE WEAPONS/GUN MACHINES.
ANTIGENS ARE ENEMY SOLDIERS /INVADERS.
LYMPHOCYTE T IS FEARLESS/CUTTHROAT.

Source: produced by the authors.

The most productive discursive metaphors in the video lecture in question are LYMPHOCYTES ARE SOLDIERS THAT DEFEND OUR ORGANISM, ANTIGENS ARE ENEMY SOLDIERS /INVADERS, and LYMPHOCYTE T IS FEARLESS/CUTTHROAT. Most of the linguistic metaphors licensed by these metaphors above are organized into discourse via textual extension. Excerpt 2 illustrates an occurrence of the functioning of the extensions involved in the metaphor LYMPHOCYTE T IS FEARLESS/CUTTHROAT.

EXCERPT 2

138: the <b><u>beast</u></b> , the <b><u>strength</u></b> , the <b><u>killer</u></b> T lymphocyte
139: the cytotoxic, the <b><u>guy</u></b> who is the really the <b><u>guy</u></b>
140: he is <b><u>Superman</u></b>
143: <b><u>warned</u></b> by interleukin and phagocyte
144: the macrophage it kills the virus, <b><u>babies</u></b> , that is
141: he is a <b><u>superhero</u></b>
142: <b><u>he will get</u></b> where the virus is
145: in there and viral infection is over

Source: adapted from Profa. Beth (2016).

The lexical items *beast* and *strength* are elements from the ANIMAL domain. On the other hand, the *superman* and *superhero* metaphors are elements from the HERO domain. Thus, there are extensions in both domains, either conceptual (LAKOFF; TURNER, 1989) or textual (SEMINO, 2008). We also verified that there is another

textual and potentially cognitive pattern responsible for the emergence of the metaphor LYMPHOCYTE T IS FEARLESS/CUTTHROAT, which is an interaction by combination. In other words, the linguistic metaphors *T lymphocyte is a beast* and *T lymphocyte is a superhero* combined gave rise to this more complex discursive metaphor which, unlike the other discursive metaphors above, can be considered, according to Lakoff and Turner (1989) and Semino (2008), as relatively novel.

In addition to these, we verified the occurrence of linguistic metaphors that we consider novel or imaginative according to Semino (2008). Among them, there are two similes arranged in excerpt 1: *as if it were an elite battalion* and *like the Bope*, which can be understood as unconventional forms and, therefore, as extensions that give rise to new ways of conceptualizing the lymphocytes. The same imaginative or novel extension process for conceiving the lymphocytes occurs through the use of the linguistic metaphors *Bope*, *Bope's general* and *fire machine guns*. Thus, although they are cognitive and textual extensions of the WAR domain, the metaphorical simile *like the Bope* also seems to be influenced by the textual pattern of intertextuality, as it refers to elements of a sequence of two movies called *Elite Squad*.<sup>12</sup> Concerning similes, Semino (2008) states that when a simile is used to understand one concept in terms of another, and if it is possible to recognize elements as well as the correspondence between them, then one can consider, beyond its most basic sense, also the metaphorical one. Therefore, according to the author, similes also perform the function of metaphors, even though they may vary from those in the formal aspect for which they are presented.

Another simile we find acting with a novel or creative metaphor function is *as if it were some flashing lights*. Excerpt 3 demonstrates its occurrence.

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<sup>12</sup> They are Brazilian movies from 2007 and 2010. The first one, in Portuguese, is called *Tropa de Elite* (in English, *Elite Squad*), and the last one is called *Tropa de Elite: o inimigo agora é outro* (in English, *Elite Squad: the enemy within*). These movies have been submitted for consideration to the Academy Award for Best Foreign Language Film.



## EXCERPT 3

132: macrophage the macrophage arrives and phagocytes the virus  
133: And what does it do?  
133: it starts to  
134: release, people, **as if it were some flashing lights,**  
135: a protein called  
136: interleukin exiting on macrophage membrane

Source: adapted from Profa. Beth (2016).

According to our analysis, when using the concept of flashing lights to represent interleukin, teacher Beth intends to demonstrate that the interleukin released by the macrophage acts as a kind of signal for lymphocytes to attack the antigen. Keeping this in mind, this simile seems to be a textual (SEMINO, 2008) and potentially a conceptual (LAKOFF; TURNER, 1989) creative extension of the WAR domain, similar to the soldiers, when they mark the target to be bombarded with a laser light signal during military conflicts.

Therefore, the data points to a close relationship between extensions and creative similes in this video lesson. In addition, in excerpt 2, we identified two more creative novel metaphors, the *beast* and *strength* lexical items, also being considered extensions of the ANIMAL domain, as we already mentioned.

By analyzing the relationship of conventional and creative/novel metaphors with the scientific concepts presented by teacher Beth in her video lesson about the immune system, we came to some results: the first one is that both conventional and creative metaphors are used as an explanatory pedagogical tool, which confirms Semino's (2008) and Cameron's (2003) positions, although the conventional ones are more numerous (given their nature, it is perfectly reasonable). Thus, our analysis of the results also indicates that the use of metaphors as a pedagogical tool for the explanation of scientific concepts confirms Semino's (2008) view: metaphors are used for pedagogical purposes in classes, especially to fill in the gaps involved in explanation of concepts related to phenomena that are not easily accessible to our perceptual system.

Our analysis suggests that the novel/creative metaphors, besides being used as an explanatory pedagogical tool like the conventional ones, seem to be used for other purposes such as drawing the student's attention to a particular concept.

The second video lesson, which we analyze here, is taught by teacher Guerra from *Mundo Biologia* channel, which had, on November 15th, 2019, 392.543 subscribers.<sup>13</sup> This video lesson, at that same date, had 120.233 views.<sup>14</sup>

After applying the methodological procedures, we had, as a result, the conceptual metaphors expressed in chart 3.

CHART 3 – Conceptual Metaphors in the Virus Video Lesson

KNOWING/UNDERSTANDING IS SEEING (LAKOFF; JOHNSON, 2002; LAKOFF; ESPENSON; SCHWARTZ, 1991; LAKOFF; TURNER, 1989; LAKOFF, 1994; GRADY, 1997).
THEMES/SUBJECTS ARE AREAS (LAKOFF; ESPENSON; SCHWARTZ, 1991; LAKOFF, 1994).
IMPORTANCE IS SIZE (GRADY, 1997, 1999, 2007).
ACTIVITY IS WAKEFULNESS/INACTIVITY IS SLEEP (GRADY, 1997).
TIME IS A LANDSCAPE WE MOVE THROUGH/TIME IS SPACE (LAKOFF; ESPENSON; SCHWARTZ, 1991; KÖVECSES, 2015).
EMOTIONAL INTIMACY IS PROXIMITY (GRADY, 1997).
PURPOSES ARE DESTINATIONS – ACHIEVING A PURPOSE IS TO GET TO A DESTINATION (GRADY, 1997; LAKOFF; TURNER, 1989; LAKOFF; ESPENSON; SCHWARTZ, 1991; LAKOFF, 1994; KÖVECSES, 2010).

Source: produced by the authors.

It was not possible to determine which of the above conceptual metaphors is in evidence because they motivated very equivalent amounts

<sup>13</sup> This is the original name of the channel in Portuguese, which, in English, means Biology World.

<sup>14</sup> This video lesson is fully available at: [https://www.youtube.com/watch?v=oFHH-Ss7FnA&list=PLh1nSI6Y-RoMkTa357\\_rh0J2xO7MJE29T&index=8&t=3s](https://www.youtube.com/watch?v=oFHH-Ss7FnA&list=PLh1nSI6Y-RoMkTa357_rh0J2xO7MJE29T&index=8&t=3s). Access on: Nov. 15, 2019.

of linguistic metaphors throughout the discourse. Moreover, it can be said that the above conceptual metaphors are conventional; at the same time, we found that the linguistic metaphors licensed by them emerge in the discourse of this video lesson through the textual strategies of metaphorical repetition and recurrence.

Regarding the emergence of discursive metaphors that are potentially conceptual, the following were identified:

CHART 4 – Discursive Metaphors in the Virus Video Lesson

CLASS IS A PLACE.
VIRUS IS A MACHINE.
VIRUS IS AN AGENT INFILTRATED IN THE CELL.
VIRUS IS AN ENEMY/INVADER SOLDIER.
MANIPULATING A VIRUS DNA IS EDITING A PHOTO.
FACTS/EVENTS ARE NEWS.

Source: produced by the authors.

The discursive metaphor VIRUS IS A MACHINE, which we consider as potentially cognitive/conceptual, has presented the largest number of linguistic metaphors linked to it and can be considered novel/creative. Its emergence in teacher Guerra’s discourse occurred through linguistic metaphors that were presented mainly by means of the textual strategy of recurrence. The other discursive metaphors proposed above emerged through different strategies; the most productive one was the extension. As an example of the productivity of the extension process, whether conceptual (LAKOFF; TURNER, 1989) or textual (SEMINO, 2008), we present the following excerpt for the class in question, demonstrating the emergence of the novel/creative discursive metaphor VIRUS IS AN AGENT INFILTRATED IN THE CELL.

## EXCERPT 4

78: the virus enters in the host dismounts  
 79: capsid and infiltrates its genetic  
 80: material in the middle of host's genetic material  
 81: but doesn't break anything  
 82: in this case, the genetic material of the virus  
 83: stays there, hidden, clandestine, sneaky,  
 84: illegally infiltrated in the genetic material  
 85: of the host, the host cell  
 86: will divide will multiply  
 87: but multiply several times  
 88: multiplying with it the genetic  
 89: material of the virus that stays quiet there,  
 90: silent, keeping a low profile, until conditions  
 91: are favorable, when everything is  
 92: ready the virus will be activated all of them at  
 93: same time, as if it was a conspiracy...

Source: adapted from Prof. Guerra (2017).

In addition, we have identified novel/creative/imaginative linguistic metaphors or metaphorical expressions as *a virus is a molecular machine*, presented in the excerpt, and its metaphorical expressions *assembled*, *parts*, *disassemble*, *assemble*, and *box*, emerging through textual recurrence, which together make up the MACHINE domain. The metaphor VIRUS IS AN AGENT INFILTRATED IN THE CELL is also motivated by textual extension through metaphorical expressions such as *hidden*, *clandestine*, *sneaky*, *quiet*, *illegally infiltrated* and *keeping a low profile* in excerpt 4. We also consider that the metaphorical simile *as if it were a cursed hidden inheritance* used by that same teacher in this video lesson also fits this classification. We have come to the conclusion that the simile is used metaphorically to refer to viral DNA; however, at the same time, it establishes an intertextual relationship (SEMINO, 2008) with a horror movie originally called *Hellraiser*. In Portuguese, which is the teacher's mother tongue, the title of this movie that has been chosen by Brazilian producers and translators is *Herança Maldita*, which,

when freely translated to English, means *Cursed Inheritance*. Therefore, from our analytical point of view, there is an elaboration of the metaphor VIRAL DNA IS INHERITANCE to form a novel metaphor, in which, due to the interrelationship and mappings between the different domains and its elements, such as VIRAL DNA (virus, genetic inheritance, attacks the cells) and CURSED INHERITANCE (mother, sequelae of postpartum depression, causes trauma in her progeny), a whole novel metaphor emerges; in this case DNA IS CURSED INHERITANCE.

Another linguistic metaphor that emerges in the transcription of this video lesson is the lexical item *hacking*, as can be seen in excerpt 5. Therefore, it is evident that teacher Guerra describes the biological virus in terms of a computer virus.

#### EXCERPT 5

106:	the damage the virus causes to us,
107:	multicellular organisms, and exists in the
108:	it Consumes our resources
109:	to produce its own <b><u>parts</u></b>
110:	it is <b><u>hacking</u></b> your cell to
111:	produce its own proteins

Source: adapted from Prof. Guerra (2017).

In this excerpt, teacher Guerra employs the *hacking* metaphor for viral functioning. Although it is known that the term virus is used in the computer field and that its origin is from the metaphorical meaning of biological virus, it is no longer prudent to analyze this occurrence as the result of the relation between the literal and the figurative, as explained by Semino (2008), since two Brazilian Portuguese dictionaries, CaAu (2019) and DPLP (2019), already accept the second sense as not figurative. Thus, the most that can be said is that, in addition to the relationship between literal and figurative meanings, according to this excerpt, there is evidence that a metaphor producer can also use the semantic ambivalence strategy to create novel or creative metaphors.

In addition to what we have already pointed out, it is worth mentioning that, in the video lesson in question, the novel/creative metaphors are very relevant to explain the concept of virus. Thus, our analysis of this video lesson's data, as well as occurred in teacher Beth's

video lesson, suggests that the use of novel metaphors by teacher Guerra seems to be a strategy to draw the student's attention and explain scientific concepts efficiently, as it happens in the case of the concept of virus, which is also not immediately available to our perceptual system. By using novel metaphors, he aims to explain that concept in an unprecedented way, in comparison to the use of conventional metaphors to teach the same concept. Furthermore, the results also have shown us that teacher Guerra makes use of different metaphors to explain the same concept; for example, when he teaches about the concept of virus, he employs two different metaphors – VIRUS IS A MACHINE and VIRUS IS AN AGENT INFILTRATED IN THE CELL. Our analysis of that specific result suggests that the teacher consciously makes a choice among different possible metaphors to talk about the same concept, in this case, virus. In our opinion, he proceeds like that taking into account his pedagogical goals, as well as aiming to explain the same concept through different angles or perspectives. He possibly chose that sort of metaphor considering the different elements of each domain (source and target domains); in other words, he takes into account the possible correspondences between them, which, in our view, can be considered as a criterion for the explanatory capacity of a metaphor.

## **6 Conclusion**

In conclusion, a first aspect to consider concerns the entire fulfillment of the main goal of this research, which is to verify the occurrence of conventional metaphors and, especially, the creative ones in non-literary contexts – in this case, in Biology video lessons. We found that there is a fruitful emergence of both conventional and novel/creative metaphors, which answers our research question in the same way.

Concerning the secondary goals of this research, we can say that they were also reached. Regarding the purpose of verifying the emergence of metaphors, we conclude that the conventional conceptual metaphors were, to a larger extent, under the influence of repetition and recurrence textual patterns, and, to a smaller extent, under the influence of extension textual and cognitive patterns. In respect of the proposed discursive metaphors, some of them with cognitive potential, they emerged as follows: those that behaved as conventional were more influenced by repetition, recurrence, and extension patterns. Those that presented themselves as novel/creative were mainly organized through extension and, on a smaller extent, through recurrence combination, elaboration, and intertextual relations.

In this sense, the results of our analyses suggest that extension is the most useful textual (SEMINO, 2008) and/or cognitive pattern (LAKOFF; TURNER, 1989) for the emergence of novel/creative metaphors, although this pattern can also be involved in the emergence of some conventional metaphors. At the same time, the results suggested that repetition was the most commonly employed textual pattern in the emergence of conventional metaphors; and the recurrence was the pattern involved, on a smaller scale, to the emergence of both types of metaphors: the conventional and the creative ones. Based on these results, we raise the hypothesis that the pattern of recurrence is possibly a transition pattern between the emergence of conventional and creative metaphors.

Regarding the proposition of discursive metaphors, we realize that some of them can potentially be cognitive conventional metaphors. Some of the ones that mobilized the most linguistic metaphors, mainly through repetition and recurrence patterns, are SUBJECT/CLASS CONTENT IS A SUBSTANCE/RAW MATERIAL TO BE HANDLED, LYMPHOCYTES ARE SOLDIERS THAT DEFEND OUR ORGANISM, ANTIGENS ARE ENEMY SOLDIERS/INVADERS, CLASS IS A PLACE, and VIRUS IS AN ENEMY/INVADER SOLDIER.

In respect of the relationship between metaphors and scientific concepts, the results suggest that both conventional and creative metaphors play a relevant role in explaining scientific concepts, serving as a pedagogical tool for teachers who decide to use them in their classes; however, creative metaphors, given their imaginative and original nature, can provide different angles, both to teach scientific concepts and to learn them. Our analysis of the data led us to conclude that these different ways or perspectives that teachers provide to explain some scientific concepts are, probably, choices concerning which metaphor to employ, especially the new/creative ones. In our opinion, there is a possibility that teachers also take into account the elements of each domain, in other words, the amount of correspondences between the elements of the source domain and the target domain to accomplish their pedagogical goals, which can impact, for example, on the degree of accuracy or the degree of creativity of their explanations.

Finally, the results of this research meet the theoretical positions of Semino (2008), for whom the cognitive phenomenon described by Lakoff and Turner (1989), although valid, does not seem to be sufficient to account for the richness of the processes of emergence of novel/creative metaphors that, considering that they never occur out of context, must necessarily go through the influence and pressures of discourse dynamics.

### Authorship Statement

This article was produced collaboratively by the authors John Richart Schabarum and Rove Luiza de Oliveira Chishman. Firstly, the conception and planning of the research were elaborated by both. Secondly, the summary and introduction were likewise prepared by both authors. Thirdly, the theoretical foundation section on the researched phenomenon (the metaphor) was written by John Richart Schabarum. The video lessons used for analysis are part of the data of the Master's research in Applied Linguistics, entitled *The Metaphor in Video Lessons: a study about the pedagogical, discursive and cognitive aspects*, written by John Richart Schabarum under the advisorship of Doctor Rove Luiza de Oliveira Chishman. The methodological aspects were planned and improved jointly by the authors. The results section and data analysis on metaphor in video lessons was planned and written by John Richart Schabarum. The conclusion and references were prepared by both authors.

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