

Metaphor in Ebola's popularized scientific discourse

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Abstract

This article identifies, describes and analyzes specific instances of metaphors used to represent and explain ten “frame elements” in popularized scientific articles devoted to the Ebola disease or virus, within the overall “health frame”. The descriptive and explanatory metaphors studied derive from culturally salient objects or experiences which allow scientists, medical professionals and journalists to effectively communicate scientific information and knowledge about Ebola to non-experts in less complex, understandable and down-to-earth terms. Apart from the identification and characterization of specific instances of Ebola metaphors (corresponding to general framings such as EBOLA IS WAR or RECOVERY IS A ROAD), this work also focuses on the purposes, functions and effects that these metaphors, usually considered as reformulation techniques (Jacobi, 1994), have in the popularization of such an important health threat which has quite recently caused general hysteria and almost a global crisis. By “popularization” we mean the communicative function that metaphor plays in approaching a scientific issue to the world population or to society in general, or the process of bringing science to everyday life (Väliverronen, 1993). For such purposes, a sample of articles from *Scientific American* has been considered.

Keywords: popularized scientific discourse, scientific dissemination, disease metaphors, Ebola metaphors.

Resumen

La metáfora en el discurso científico divulgativo sobre el Ébola

El presente artículo identifica, describe y analiza casos específicos de metáforas, dentro del más general de la salud o de las enfermedades, utilizados para representar y explicar diez elementos o dominios destino en artículos de popularización científica dedicados a la enfermedad o el virus del Ébola. Las

metáforas descriptivas y explicativas se derivan de objetos o experiencias culturalmente relevantes, que permiten a los científicos, a los profesionales de la medicina y a los periodistas comunicar de forma efectiva a destinatarios no expertos en un lenguaje menos complejo y más comprensible y llano información científica sobre el Ébola. Además de la descripción de casos específicos de metáforas sobre el Ébola (correspondientes a marcos generales como EL ÉBOLA ES LA GUERRA o LA RECUPERACIÓN ES UN CAMINO), este trabajo aborda los fines, funciones y efectos que estas metáforas, normalmente consideradas como técnicas de reformulación (Jacobi, 1994), tienen dentro de la popularización de una importante amenaza para la salud que recientemente ha provocado la alarma general. Por “popularización” entendemos la función comunicativa que tiene la metáfora al acercar una cuestión científica a la población mundial o a la sociedad en general, o el proceso de llevar la ciencia a la vida cotidiana (Väliverronen, 1993). Para nuestro análisis se ha estudiado una muestra de artículos procedentes de la revista *Scientific American*.

Palabras clave: popularización del discurso científico, divulgación científica, metáforas sobre enfermedades, metáforas del Ébola.

1. Introduction

The most recent outbreak of Ebola, a viral disease transmitted through direct contact with blood or bodily fluids of infected patients or animals, whose symptoms include fever, headache, vomiting, nausea, diarrhea, and hemorrhage (Smith, 2006; Meyers et al., 2015), began in West Africa in March 2014. It was soon perceived as a global threat, as it is one of the highest fatality rate viruses nowadays (Smith, 2006) but also for the widespread highly politicized media coverage it received (Vellek, 2016: 1).

According to the World Health Organization (WHO, 2015) and the Centers for Disease Control and Prevention, between 2014 and 2015 Ebola had infected 28,616 people and killed 11,310, having a fatality rate of approximately 50 percent (Meyers et al., 2015). At the time of the outbreak these figures and even lower ones created a perception of an overwhelming threat and a general state of confusion and hysteria. Conscious of this and unable to understand purely scientific and expert medical explanations, citizens might have also turned to a different and “half-way” type of discourse: popularized scientific/medical discourse, that is, scientific/medical articles aimed at the general public. This is probably one of the main sources of information used by Western and/or non-African

population to easily understand and learn about the Ebola virus. Reformulation techniques, including metaphor (Jacobi, 1994), play a major role in the popularization of scientific discourse (on this, see Välvirronen, 1993) or in the process of bringing science to everyday life, especially in the interactions between scientific or technical discourses and lay discourses (Black, 1962; Hesse, 1970; Brown, 1986). As has been stressed by cognitive approaches, metaphors contribute to the organization of our thoughts and to the understanding of abstract issues or concepts by making them “easier to grasp” (Lakoff & Johnson, 1980: 115; Goatly, 1997; see also Lakoff, 1987a, 1987b; Kövecses, 1990; Ortony, 1993; Gibbs & Steen, 1999; Lakoff & Johnson, 1999; Stern, 2000; Ricoeur, 2003; Kövecses, 2006; Semino, 2008; Dirven & Ruiz de Mendoza, 2010; Kövecses, 2010; Gibbs, 2011a, 2011b; or Zwicky, 2014). In medical discourses for lay audiences, metaphors allow people to immediately understand and know the meaning of a specific health situation, concept or topic by relating it to a familiar, concrete or generalized experience, concept or issue, as we shall see below.

2. Metaphor and the popularization of Scientific Discourse. Disease as metaphor

At first sight, science might not seem to be an appropriate field for metaphors, as its discourse is allegedly precise, specialized, unbound to culture, depersonalized, and objective (Widdowson, 1974). However, as Weinrich (1995) states, the generalized idea that scientists do not use metaphors is simply a myth as, in fact, modern science is based on metaphors. Metaphors are an integral part of scientific thinking and writing as well as of interaction between scientific and other discourses (Black, 1962; Hesse, 1970; Brown, 1986).

Metaphors may even be regarded as “omnipresent” (Keller, 1996), although some are now lexicalized and hence they are no longer perceived as metaphorical (Fourez, 1994), but rather as indispensable in scientific discourse. Science resorts to theory-constructive metaphors, which fill a lacuna or lexical need in specialized vocabulary, and are consequently absolutely necessary in scientific discourse. In addition, the so-called pedagogical or exegetical metaphors, used in science though they are not strictly necessary and replaceable by a non-metaphorical scientific term or expression, contribute to explain, describe or illustrate a scientific

phenomenon or object in a metaphorical way (Boyd, 1993: 485-486). However, this distinction is not clear: Knudsen argues that “[w]hether the metaphor belongs in one category or another does not depend on the specific metaphorical expression itself, but on the context and its purpose” (2003: 1259).

In general, metaphors are primarily used in scientific discourse to generate, reason or explain hypotheses and theories (Hesse, 1970; Leatherdale, 1974). They constitute a tool for effective communication of scientific knowledge and research (Prelli, 1989) and are therefore necessary. For a scientist or researcher, conceptual metaphors may mean an auto-clarification or advance in the resolution of a problem, a hypothesis or even a new theory, and may also yield an important number of new metaphorical terms (Cuadrado & Durán, 2013). For non-specialists, metaphors used to communicate scientific knowledge may allow them to conceptualize and understand abstract and technical phenomena and concepts by associating them with familiar objects and notions. Accordingly, scientists may “reformulate” their message, with or without a mediator’s intervention, depending on the addressee (Lewenstein, 1995; Ciapuscio, 2003: 209). Metaphor is one of the reformulation techniques or mechanisms which establishes a “common ground” between scientific and non-scientific discourses (for metaphors in the media see, for example, Väliverronen, 1993; Hellsten, 1997). To some extent, metaphors allow the simplification and popularization of scientific knowledge or scientific discourse and appeal to the shared knowledge between experts and non-experts, which is reflected in the linguistic choices made by those writing popularized scientific texts. Hence, scientific metaphors are not only present in discourses addressed to scientists or specialists, but also in those aimed at general readers. In fact, metaphors may be virtually the only way for non-professionals to understand abstract scientific issues (Lakoff & Johnson, 1980) which, otherwise, would not have been successfully “popularized”, transmitted or translated to them.

Apart from that, metaphors in scientific texts addressed to non-experts may strengthen scientific and/or professional authority, persuasion and emotiveness, as well as other political or economic interests (be these biased or not), but they may also have different interpretations and conceptualizations depending on the addressees (Haack, 1994). In other words, people interpret scientific information and metaphors according to their experience and previous knowledge, but scientists’ or writers’ selection

and use of metaphors may highly condition laypeople's understanding and attitudes towards science.

The use of metaphors for the portrayal of illnesses and diseases has been often debated in the literature (for a general account on mental health metaphors see Tay, 2017; for physical health ones, see Demjén & Semino, 2017). Sontag argued that discourses on illness should be completely exempt of metaphors, as they emphasize the negative consequences of illnesses on patients; e.g. military metaphors contribute to the stigmatizing of certain illnesses and patients (Sontag, 1978; Gwyn, 1999: 207). Conversely, Czechmeister (1994: 1231) describes metaphor as a “two-edged sword”, which can be a “rich resource” or a “potential burden”, depending on how it is used (cf. Semino et al., 2015). The metaphor DISEASE IS WAR may have positive implications, when it becomes a source of empowerment, that is, if the patient is portrayed as a fighter (Reisfield & Wilson, 2004). Sontag (1989), after reviewing her ideas, acknowledged that metaphors cannot be avoided in medical-related discourses, although “that does not mean there aren't some metaphors we might well abstain from or try to retire” (1989/1991: 93). Similarly, Larson, Nerlich and Wallis (2005) argue in favor of eliminating some metaphors and promoting others. Independently of these arguments, an approach now widely accepted is found, amongst others, in Reisfield and Wilson (2004), Hanne and Hawken (2007), or Loftus (2011), who highlight the effectiveness of metaphors in the communication and popularization of health-related issues.

Unlike other illnesses that have deserved much linguistic attention for their impact in the so-called “developed countries” (e.g. cancer or AIDS; see, amongst others, Guerrero, 1990; Clarke, 1992 & 1999; Sharf & Freimuth, 1993; Haane & Hawken, 2007; Hidalgo Downing & Kraljevic Mujic, 2009; Williams Camus, 2009; Demmen et al., 2015; Hauser & Schwartz, 2015), the linguistic or sociolinguistic study of Ebola has only produced a few studies. To our knowledge, the four main academic publications are Ungar (1998), Joffe and Haarhoff (2002), Trčková (2015), and Vellek (2016), apart from the purely scientific and technical articles on Ebola as well as Ebola popularized articles like those used as sources of our sample. Kamara (2016), despite its promising title, “Ebola: In search of a new metaphor”, is a report-like article of a fund/awareness raising event on “voices against Ebola” based on Causal Layered Analysis (CLA) (Inayatullah, 1998). The four pieces of research just mentioned focus on newspaper portrayals of Ebola: Vellek (2016) presents a contrastive diachronic study of Ebola framing in

American, British and Singaporean newspapers, Joffe and Haarhoff (2002) and Trčková (2015) synchronically concentrate on either British or American press. For their part, Joffe and Haarhoff (2002) analyze whether Ebola is seen as a threat, how media and lay representations of Ebola interact, and whether there is a uniform depiction of Ebola in Britain through the study of British broadsheets and tabloids. Similarly, Trčková (2015) focuses on Ebola metaphors but by resorting to liberal American newspapers, whereas Ungar (1998) explores the media's response to Ebola, focusing on whether and how they reassured or alarmed their Western audience.

The present study, which may be included within research on metaphor and illness in public communication (Demjén & Semino, 2017: 387-391), aims to continue with the research on representations of Ebola as done in the four articles mentioned above. However, unlike them, it also attempts to fill the lacuna of empirical studies on metaphoric portrayals of the most recent outbreak of Ebola in popularized scientific discourse by analyzing a sample of articles from *Scientific American* (URL: <http://www.nature.com/scientificamerican/information/aims.html>). Disregarding their implicit educational component, this paper primarily identifies the metaphors used to explain Ebola to lay readers as well as, secondarily, the empowerment or disempowerment resulting from the selection and employment of such metaphors.

3. Data and method

As mentioned, this study is based on the analysis of data from *Scientific American*, which describes itself as “the world's premier magazine of scientific discovery and technological innovation for the general public” (see <http://www.nature.com/scientificamerican/information/aims.html>; accessed 02/01/2017). Our sample consists of ten “hard-news” articles on Ebola (over 15,000 words altogether), published between November 2014 and February 2016 and collected from the online version of *Scientific American*. These articles, written by a medical doctor, medical reporters, journalists and associate editors for health and medicine, were carefully read and manually analyzed. Metaphor selection was performed following the Metaphor Identification Procedure (MIP/MIPVU; Steen et al., 2010), whereby a metaphor is basically identified if “the contextual meaning contrasts with the basic meaning but can be understood in comparison with it” (Pragglejaz

Group, 2007: 3). Once identified, the metaphors were classified according to their target domain or frame element, first, and to their metaphorical source domain(s), secondly. We also attended to the purposes or functions that these metaphors serve in the popularization of Ebola discourses and their potential effects in educating, informing objectively or, on the contrary, potentially (mis)leading non-experts or society's perceptions at large, by highlighting some aspects and disregarding others.

4. Analysis and discussion of the data

The sample yielded 630 metaphorical expressions, including lexical and conceptual metaphors and their mappings, strictly representing Ebola as well as other participants or agents in the fight against it; this means an approximate average of over 4.2 metaphors every 100 words. Other metaphorical expressions found in the sample, like “Nath believes that years of research *invested* in studying HIV ...”, corresponding to the conceptual metaphor TIME IS MONEY, have been left out from the study because they refer to neither Ebola nor Ebola-related issues.

Ten target domains or frame elements were identified in the sample, namely, (1) the disease itself (sections 4.1 to 4.5); (2) patients or victims (4.6); (3) the body and its parts (4.7); (4) symptoms and consequences (4.8); (5) recovery or healing (4.9 & 4.10); (6) health workers (namely, doctors, researchers and experts; section 4.11); (7) research, knowledge, information and findings (4.12); (8) treatment, vaccination and drugs (4.13 to 4.15); (9) other preventive measures (4.16); and (10) authorities (4.17).

As we shall see (Table 3 and below), these frame or target elements were associated to different and varied source domains and subdomains or mappings (around 50, which we grouped into 17 subsections), many of them revolving around the almost omnipresent military metaphor EBOLA IS WAR, although other conceptual and lexical metaphors have also been identified, as Tables 1 and 2 show.

Conceptual metaphors

- EBOLA IS WAR
 - EBOLA IS A BATTLE
 - EBOLA IS AN ATTACK
 - EBOLA IS A KILLER
 - EBOLA IS A FORCE OF PHYSICAL DESTRUCTION
 - EBOLA IS A VILLAIN
 - EBOLA IS A TORTURER
 - PATIENTS/SURVIVORS ARE FIGHTERS
 - VICTIMS/PATIENTS ARE PRISONERS
 - THE BODY AND THE IMMUNE SYSTEM ARE VICTIMS
 - HEALING IS KILLING OR DESTROYING EBOLA
 - HEALTH WORKERS OR EXPERTS ARE WARSHIPS
 - HEALTH WORKERS OR EXPERTS ARE FIGHTERS (WITH ARMS)
 - HEALTH WORKERS OR EXPERTS ARE GROUPINGS, CONTROLLERS & LEADERS
 - TREATMENTS ARE PRISONERS
 - TREATMENT/VACCINES ARE BULLETS, ARMS OR SHIELDS
 - TREATMENTS ARE INVADERS
 - DRUGS ARE LEADERS, FIGHTERS & WINNERS
 - AUTHORITIES ARE VILLAINS
- EBOLA IS MOVEMENT
 - EBOLA IS A PATH OR A ROAD
 - PATIENTS ARE RUNNERS
 - RECOVERY IS A ROAD
 - RESEARCH AND PROGRESS IS A ROAD
 - RESEARCH IS A HUNT
 - MEASURES ARE STEPS
- EBOLA IS HIDDEN OR INSIDE
- THE BODY IS A BUILDING OR A CONTAINER
- RECOVERY OR HEALING IS CLEANING
- (EBOLA'S) KNOWLEDGE IS LIGHT
 - RESEARCH IS A SOURCE OF LIGHT

Table 1. Conceptual Metaphors and their mappings.

Lexical metaphors

- EBOLA IS A PLAGUE
- EBOLA IS A STORM
- EBOLA IS QUICKSAND
- EBOLA IS FIRE
- EBOLA IS A SPIDER
- EBOLA IS A LYON
- EBOLA IS A PLANT
- EBOLA IS AN OBJECT OR A BURDEN
- EBOLA SYMPTOMS & CONSEQUENCES ARE PHYSICAL MARKS
- EBOLA CONSEQUENCES ARE A GHOST AND A MYSTERY
- HEALTH WORKERS AND EXPERTS ARE GROUPS OF STARS
- LACK OF TREATMENT(S) IS A DROUGHT
- EXCESS OF TREATMENTS IS A FLOOD
- DRUGS ARE COCKTAILS

Table 2. Lexical metaphors.

The target or frame element	Metaphors and mappings
Ebola (the disease or virus)	<ul style="list-style-type: none"> • EBOLA IS WAR • EBOLA IS A BATTLE • EBOLA IS AN ATTACK • EBOLA IS A KILLER • EBOLA IS A FORCE OF PHYSICAL DESTRUCTION • EBOLA IS A VILLAIN • EBOLA IS A TORTURER • EBOLA IS A (DANGEROUS) NATURAL PHENOMENON • EBOLA IS A PLAGUE • EBOLA IS A STORM • EBOLA IS QUICKSAND • EBOLA IS FIRE • EBOLA IS A SPIDER • EBOLA IS A LION • EBOLA IS A PLANT • EBOLA IS AN OBJECT OR A BURDEN • EBOLA IS A PATH OR A ROAD • EBOLA IS HIDDEN OR INSIDE
Patients or victims	<ul style="list-style-type: none"> • PATIENTS/SURVIVORS ARE FIGHTERS • PATIENTS/VICTIMS ARE PRISONERS • PATIENTS ARE RUNNERS
The body and its parts	<ul style="list-style-type: none"> • THE BODY AND THE IMMUNE SYSTEM ARE WEAPONS • THE BODY IS A BUILDING OR A CONTAINER
Symptoms and consequences of Ebola	<ul style="list-style-type: none"> • EBOLA SYMPTOMS AND CONSEQUENCES ARE PHYSICAL MARKS • EBOLA CONSEQUENCES ARE A GHOST & A MYSTERY
Recovery from Ebola or healing	<ul style="list-style-type: none"> • HEALING IS KILLING OR DESTROYING EBOLA • RECOVERY OR HEALING IS CLEANING • RECOVERY IS A ROAD
Health workers (doctors, researchers, & experts)	<ul style="list-style-type: none"> • HEALTH WORKERS OR EXPERTS ARE FIGHTERS (WITH ARMS) • HEALTH WORKERS OR EXPERTS ARE WARSHIPS • HEALTH WORKERS OR EXPERTS ARE CONTROLLERS AND LEADERS • HEALTH WORKERS AND EXPERTS ARE GROUPS OF STARS
Research, knowledge, information and findings	<ul style="list-style-type: none"> • RESEARCH AND PROGRESS IS A ROAD • RESEARCH IS A SOURCE OF LIGHT • RESEARCH IS A HUNT
Treatment, vaccination and drugs	<ul style="list-style-type: none"> • TREATMENT/VACCINES ARE BULLETS, ARMS OR SHIELDS • TREATMENTS ARE INVADERS • DRUGS ARE LEADERS, FIGHTERS, RUNNERS & WINNERS • TREATMENTS ARE PRISONERS • DRUGS ARE COCKTAILS • TREATMENTS ARE NATURAL PHENOMENA OR DISASTERS <ul style="list-style-type: none"> ○ LACK OF TREATMENT(S) IS A DROUGHT ○ EXCESS OF TREATMENTS IS A FLOOD
Other preventive measures	<ul style="list-style-type: none"> • MEASURES ARE STEPS
Authorities	<ul style="list-style-type: none"> • AUTHORITIES ARE VILLAINS

Table 3. Metaphors found in Ebola's popularized discourses organized according to Frame Elements.

As we shall see below, the metaphors identified in our sample contribute to educating and providing information on Ebola (“That’s the new normal ever since Ebola began *ravaging* communities throughout Liberia, Sierra Leone and Guinea”) but also to non-experts’ understanding of the disease and its related components and agents (“Ebola also can trigger a *massive ‘cytokine storm’* - cytokines are chemical messengers between cells, highly active during *an immune attack* - causing veins to leak and burst”; “These vital structures are at risk of *collateral damage* when the immune system *wages war* on foreign *invaders*”). Furthermore, they produce negative perceptions on the readers, related to threats, risks, or fears (“the virus has *devastated* chimpanzee and gorilla populations as well”; “And some affluent countries will surely buy supplies as a *shield* against *bioterrorism*”) and most of the time they also represent victims’ disempowerment (“The people of Guinea have been *locked in a life-and-death struggle* with Ebola virus since last December”).

In general, but for a few exceptions like “some affluent countries will surely buy supplies as a *shield against bioterrorism*” which may function as rhetorical devices for decoration or hyperbole, the metaphors used aim at reformulating and simplifying scientific language to bring the discourse closer and make it more easily understandable to non-experts, but they also serve to reinforce the persuasive nature of the texts. Metaphors successfully convey and communicate scientific-technical, medical, and disease-related knowledge, but simultaneously portray Ebola as a negative and fearful virus with the intention of producing specific reactions and effects on the readers, especially making them aware of its threatening and killing nature. The overall effect pursued by the metaphor, which may be perceived in most of the examples below, is (1) to ensure vividness and offer powerful descriptions that may “move” readers at an enormous geographical and sociocultural distance (journalists and doctors have frequently been witnesses to the disease, whereas readers are very unlikely to ever see an Ebola case), and (2) to emphasize the threat Ebola poses, in spite of such distance, even if “as a side effect”, as we shall see, it sometimes disempowers the patients.

4.1. Ebola is war

Ebola and related agents are generally associated with military images which orbit around the metaphor EBOLA IS WAR (“We saw as the *war* went on – I mean, the epidemic went on – [...]”), like EBOLA IS A BATTLE (“When Fallah talks about Ebola he often refers to the epidemic

as a *pitched battle*”), EBOLA IS AN ATTACK (“*an immune attack* -causing veins to leak and burst”; “the *outbreak* that has killed 7,000”; “The three countries worst *hit* by Ebola”), EBOLA IS A KILLER (“Ebola, which has *killed* more than 5,000 people [...]”), or even EBOLA IS A FORCE OF PHYSICAL DESTRUCTION (“The epidemic that already killed almost 10,000 people in west Africa also *upended* daily life and *scuttled* plans to vaccinate thousands of kids against preventable diseases”), that causes disorder (“Fears of Ebola and the *disruption* of health services have stalled vital childhood immunizations in west Africa”) and destruction at all levels (“The virus has *devastated* chimpanzee and gorilla populations as well”; “Health care is *decimated*”; “ever since Ebola began *ravaging* communities throughout Liberia, Sierra Leone and Guinea”; “the disease is *wreaking havoc* in their communities”). The war metaphor is extremely effective, insofar as it emphasizes the threat, and also carries other interesting nuances, such as the idea that all efforts are justifiable and that neutrality is not a feasible option.

Apart from an aggressive killer, EBOLA IS A VILLAIN or A TORTURER that “torments”, makes matters worse and hurts (“victims say they are *tormented* by brain deficits and more”; “Ebola certainly laid bare preexisting health problems, but it also *exacerbated* them in profound ways”). The metaphor reaches a peak of vividness when it says that “the Ebola outbreak *festered* for about 18 months”.

4.2. Ebola is a (dangerous) natural phenomenon

Following with this negative or frightening depiction of the disease (“Ebola presented a particularly rare *threat* because not only did it occur across a wide geographic region but it also *engendered fear* that often kept people from using available health care services”), other fear-instilling images not related to war are Ebola is a (dangerous) natural phenomenon, a plague (“the massive viral surge still *plaguing* west Africa”; a storm “Ebola also can trigger a massive ‘*cytokine storm*’ - cytokines are chemical messengers between cells, highly active during an immune attack - causing veins to leak and burst”; or quicksand “This outbreak is like *quicksand*. It’s continually moving.”). The aggressive, dangerous and destructive power of Ebola is also conveyed through the metaphor EBOLA IS FIRE, the paradigmatic image of destruction and/or damnation ever since the Bible (“her knees *burning* with pain”; “Outbreaks *flare up* unexpectedly”; “it could *spark* more outbreaks”; “Ebola Crisis Could *Fuel* Measles Outbreak in West Africa”) or also in

expressions like “*hot zones*” or “This month’s *hot spot* may have few patients next month when a trial begins”.

4.3. Ebola is other living beings

Although the Ebola virus is certainly a living being, some lexical metaphors attribute features typical of other living entities: humans, animals, and plants. Hence, Ebola is also portrayed as other living beings, either as a human, through personification, or with plant and animal attributes, which reinforces vividness in descriptions (literally) and presents Ebola as not only a concrete entity, but one capable of acting of its own accord: EBOLA “responds” (“changes to the Ebola *response*”), “perpetuates” itself (“Yet if Ebola does become truly endemic – *perpetuating itself* through the human population – [...]”) and “in recent months Ebola has only *tightened its grip* in his area”, but it “may rapidly *move* to another county” and even it has capacity to “engender” (“But Ebola presented a particularly rare threat because [...] it also *engendered* fear that often kept people from using available health care services”). Alongside these relatively general portrayals, Ebola is at times represented by an animal, a spider or a lion: Ebola is a spider, a symbol of death, mystery and cunning in some Western cultures (and a phobic image for many), which creates a complicated web to access to, “to help trace the complex *web* of Ebola’s spread”, or a lion that has an indomitable power (“they want to chase the spots where the infection is just more *rampant*”). Apart from those, the strength of the disease is seen when Ebola is a plant that has roots (“Five of the co-authors of that paper died from Ebola in the course of researching the epidemic’s *roots*”) and stems (“Most of those earlier outbreaks *stemmed from* people finding, butchering and eating apes found dead in the forest”), grows (“Despite the fact that the outbreak is not *growing* at projected rates, ...”), “crops up” (“Ebola may still *crop up* sporadically in the years to come...”), or “flourishes” (“underestimating the power of Ebola to spread across west Africa is how the virus was able to *flourish* in the first place”). Interestingly enough, the positive connotations of some of these metaphors in other contexts are reversed: in the discourse of Ebola, verbs like “flourish” lose that optimistic or promising aura and take an unnerving tone, at least for the lay reader, unaware that expressions like “flourishing infection” are usual in expert-to-expert medical communication.

4.4. Ebola is a(n) (static) object but also a path or road

Apart from Ebola's description as a living being, it may also be quite the opposite, although a tangible threat as well: Ebola is an object or a burden that can be inadvertently carried ("And there's no chronic *carrier* of this virus who appears to harbor the virus even after it has been eliminated from a community"; "Fruit bats are the most likely *carriers* of Ebola"), a metaphor that reinforces the dangerous and mysterious character of the virus. In addition to this, the complexity of Ebola allows other metaphor framings such as those involving movement, resulting from its physical tangibility: EBOLA IS A PATH or A ROAD and "relatively few scientists understand the Ebola disease *course* thoroughly".

4.5. Ebola is hidden or inside

One of the characteristics of things that instill fear is that sometimes they are hidden from view before they attack. Thus, from instances like "if Ebola *hides out in* people who seem healthy, only to *reappear from* compartments deep within the body to make them sick and potentially contagious, it could spark more outbreaks", it follows that EBOLA IS HIDDEN or INSIDE where BODY PARTS (AND ANIMALS) ARE CONTAINERS, that is, HARBORS, HOSTS or SANCTUARY SITES for Ebola (see section 4.7) ("it is unclear how or even if the disease *jumped* from bats to humans or if there was an intermediate *host*, such as apes"; "three kinds of bats from the region are believed to *harbor* the deadly filovirus"; "The eyeball is not the only *hiding place* for Ebola"). The source of fear is not only real, but also an evasive one, and can attack when least expected.

4.6. Patients are fighters and runners but also prisoners

Very closely related to the abovementioned EBOLA IS A BATTLE, metaphors may be found where PATIENTS/SURVIVORS ARE FIGHTERS ("Why Ebola Survivors *Struggle* with New Symptoms"; "Thousands of Ebola Survivors *Face* Persistent Joint Pain and Other Problems") and PATIENTS ARE RUNNERS IN A RACE ("The difference between responding to an epidemic versus an endemic disease is as great as the difference between preparing for a *sprint* versus a *marathon*"). Against this "active" or empowering view of patients, other metaphors assign them passive, inactive or disempowering roles, where they can neither act nor attempt to exert control over the virus or disease ("The 2014-16 west

African Ebola epidemic has left 17,000 survivors *at risk* of post-Ebola syndrome”), or PATIENTS/VICTIMS ARE PRISONERS who fight unsuccessfully (“The people of Guinea have been *locked in a life-and-death struggle* with Ebola virus”).

4.7. The body is a building or container

As seen above (section 4.1), THE BODY AND ITS PARTS ARE BUILDINGS (CONTAINERS) THAT SERVE AS HIDING PLACES (for the virus) but “These *vital structures* are at risk of collateral damage when the immune system wages war on foreign invaders”. Accordingly, they are described as “sanctuary sites”, “hiding places/spots”, “place to hide out”, or “protected sites”, as in “Fallah worries the uterus may be another *sanctuary site* for Ebola, offering the virus *a safe place to hide*”, “Ebola can take months to be cleared from certain *protected sites* in the body like the gonads”, or “If Ebola *hides out in* people who seem healthy, only to reappear from *compartments deep within the body* to make them sick and potentially contagious”.

4.8. Ebola symptoms and consequences are physical marks but also ghosts

The framings in our sample condition the readers’ perception and awareness of their own bodies and the consequences of Ebola and may even generate mistrust and suspicion about apparent healthy and asymptomatic people. Despite the fact that Ebola consequences are patent physical marks (“The Ebola virus is leaving *an indelible mark* on survivors”; “At 8 A.M. each morning she meets with other health care workers before embarking on a full day of Ebola *tracking*”), the reverse effect is also sought in Ebola is a ghost (there is a specific section in one of the articles entitled “Ebola’s ghost”) and a mystery in “The cause of the pain and why it is so common are *mysteries*”.

4.9. Healing is cleaning or destroying Ebola

Given Ebola’s post-marks and consequences, RECOVERY/HEALING IS CLEANING (“the virus could be replicating in the eye long after it has been *cleared from* the blood”, “Ebola can take months to be *cleared from* certain protected sites in the body like the gonads”). OVERCOMING EBOLA implies KILLING/DESTROYING IT/MAKING IT DISAPPEAR (“Ebola expert Daniel Bausch, who has worked to *quash* Ebola during

planning sessions”; “the virus [...] is on the correct path to be *stamped out*”). In general, no empowering functions are assigned to patients who fight against the virus; rather the discourse becomes here quite agentless but for experts who appear as the heroes that fight to “stamp it out”, while patients have a passive role, as in “a man who had been *discharged from* an Ebola treatment unit”.

4.10. Recovery is a road

Overcoming Ebola, however, is not easy, and implies going through a long road, although such a journey at least assigns an active role to the victims. Accordingly, RECOVERY IS A ROAD (“Liberia was *on track* to be declared Ebola-free”; “The first snapshot of health complications facing Ebola survivors in Sierra Leone presents a dismal picture of their *road to recovery*”; “And in the past few months that nation has *made strides against* its Ebola outbreak; it is currently *on track* to be declared Ebola-free if no new cases develop through early April”; “requires an entirely different mindset and extensive resources *to go the distance*”; “wary top health officials must draw up blueprints for the current crisis while eyeing *the unpredictable road ahead*”).

4.11. Health workers are groupings and leaders

Doctors, researchers, experts and health workers are depicted with active and positive involvement in dealing with Ebola, which probably aims at enhancing readers’ faith in them and reflect the journalists’ admiration. Once again, the war metaphors “come to the rescue”, and HEALTH WORKERS AND EXPERTS ARE groups of stars or WARSHIPS, FIGHTERS (WITH ARMS), CONTROLLERS AND LEADERS (“A *constellation* of global health *heavy hitters* have come together to propel products that were far from ready to the red carpet”; “*a fleet* of community health volunteers and district health offices”; “Some are now suffering from vision loss or blindness, and health workers are *struggling* to address this burgeoning need”; “Nothing in the *medical arsenal attacks* the virus directly”; “wary top health officials must *draw up blueprints* for the current crisis while *eyeing* the unpredictable road ahead”; “Their health will be *monitored* at semiannual checkups for five years”; “the organization is to *marshal* massive resources in an emergency”).

4.12. Research is a (dark) road or a hunt that brings light and desirable objects

Research, knowledge, information and findings are the means and the aims of those health workers to put an end to the mystery and darkness of Ebola. On the one hand, as was the case with recovery, RESEARCH/PROGRESS IS A ROAD (“Five of the co-authors of that paper died from Ebola in the *course* of researching the epidemic’s roots”), which sometimes remains OBSCURE, an image that highlights the metaphor EBOLA IS A MYSTERY (see above) (“testable research is *murky* at best”; “And it remains *far from clear* that bats are the hosts of the deadly zoonotic disease”, “And it still *remains unclear* where the virus came from when it made the leap into humans”, “There are other *puzzling findings*, too”, “The semen results [...] are particularly *intriguing*”, “it’s a *guessing game*. Even for top scientists”). In view of such darkness ahead, RESEARCH IS A HUNT (“researchers are still *hunting* for answers”) for FINDINGS which ARE (DESIRABLE) OBJECTS TO BE COLLECTED (“Emerging findings, *amassed* by tracking unprecedented numbers of people”), metaphors that strengthen efforts by health professionals. Also against such darkness, RESEARCH/ INFORMATION IS A SOURCE OF LIGHT (“Each new report of their symptoms provides a *clearer window* into the health care needs of this population”; “Traces of the virus have been found in semen 284 days after infection, according to new research *unveiled* by the World Health Organization on August 7”) which highly contributes to the fight against the disease.

4.13. Treatments are prisoners but also bullets or arms

Apart from the perception that EBOLA INFORMATION IS A (DARK) PICTURE (“The first *snapshot* of health complications facing Ebola survivors in Sierra Leone presents a *dismal picture* of their road to recovery”), TREATMENTS ARE PRISONERS (“That work – designed to determine if TKM-Ebola is safe and what a dose should entail – is actually *on a partial clinical hold* ... Still, the drug can be *released* under ‘emergency use’ rules”; “there were valid reasons why no experimental Ebola vaccine had *made it out of the regulatory pipeline*”) that need to be released (“you compare the rate of new infections in areas that have already received the vaccine with those in places where *rollout* has not yet taken place”; “vaccination campaigns were *rolled out* every few years”) and, when released, they progress slowly (“The work to get the clinical trials up and running has been ... *agonizingly slow* when measured against Ebola’s rampage”). These metaphors suggest the

difficulty of finding the right treatment and making it work. Treatments are necessary to fight against the disease, which takes us back to the war scenario: TREATMENT/VACCINES ARE BULLETS, ARMS or SHIELDS (“But the lack of Ebola-specific treatments has not deterred the search for magic *bullets* – or *ammunition* of any sort”; “But the vaccine cannot *trigger* the disease itself”; “It is expected the NewLink vaccine will require only one *shot*”; “And some affluent countries will surely buy supplies as a *shield* against bioterrorism”).

4.14. Absence or excess of treatment are natural phenomena, disasters or invaders

Shortages of treatment are described as NATURAL PHENOMENA: lack of treatment is a drought (“When it comes to treatments for Ebola, there has been a nearly four-decade-long *drought*”; “But that *drought* could give way to a free-for-all if the world is not careful, some experts worry”) or emptiness (“The drug *vacuum* ... has inspired a curious phenomenon”) and excess of treatments is a flood (“A *tsunami* of treatment proposals has *flooded* the in-boxes of staff at the WHO and research funding agencies”). A critical view on pharmaceutical businesses is then provided, whereby LARGE NUMBERS OF TREATMENTS ARE INVADERS TO FIGHT AGAINST (“Some of the suggestions are easy to *strike* from the list, says Friede”).

4.15. Drugs are leaders, fighters, runners and winners

When treatment appears to succeed in the battle, if only partly, drugs become active tools, which reinforces their power but also leaves patients with a passive role (if a patient heals, it is because of the drug, not because of the patient, who is turned into a “battleground”). Thus, DRUGS ARE LEADERS (“The other *leading therapeutic* is the small interfering RNA drug TKM-Ebola”), FIGHTERS (“the drug has *some action against* Ebola virus in the test tube”; “The drugs are antivirals, though not specifically designed *to target* Ebola”), RUNNERS (“if neither of the *frontrunners* succeeds, maybe using company X’s vaccine as the prime and company Y’s as the boost might work”) and WINNERS (“A drug that does nothing might look like a *winner*”), which are attractively presented to Western readers as cocktails (“The monoclonal antibody *cocktail* ZMapp gained nearly mythical status last summer”; “The three antibodies in the *cocktail* [...] are generated in genetically modified tobacco plants”).

4.16. Measures are steps

In addition to treatment and vaccination, other preventive measures may be taken (MEASURES ARE STEPS: “Such quarantines, the Liberian government says, are a precautionary *step* to keep the virus from potentially moving even farther afield”), which are usually imposed by governments or by medical or political authorities. The selection of metaphors in the sample presents a critical view of those measures and makes readers aware of their wrong nature and their negative consequences on the population or on society.

4.17. Authorities are villains

Finally, an unnerving component of the war is that AUTHORITIES ARE VILLAINS, guilty or responsible for the complex war-like Ebola situation, as in “some of the steps taken by international groups and national governments, such as quarantines, may have *exacerbated* the outbreak” or “a forcefully imposed quarantine that *traps* the healthy with the sick”.

5. Conclusions

As shown in the previous analysis, metaphors used in the communication of medical information or knowledge to non-experts, allow addressees to understand and visualize Ebola, a quite unknown disease for Western populations, in terms of familiar and well-known concepts, actions and even concrete elements. However, this is by no means a neutral description, but quite the opposite: on the one hand, the ascription of negative features and the militarization of Ebola affecting all its components and agents (EBOLA IS WAR, PATIENTS ARE FIGHTERS, TREATMENTS ARE BULLETS, etc.), although yielding vivid descriptions of the disease, conditions readers’ perceptions of the virus and contributes to the stigmatization of the disease and to the general transmission of fear to society. In spite of this, the variety of metaphors, such as PATIENTS ARE RUNNERS, FIGHTERS, or PRISONERS, explains the complexity of Ebola but also provides, alongside with fear and other negative feelings, some positive images connoting hope. However, these metaphors are context-sensitive, which means that an apparently negative metaphor may become positive or vice versa, and hence they function with empowering or disempowering effects depending on the linguistic context. The role of the metaphors studied tends to be that of

enhancing and reinforcing negative and fearful views of the disease; nevertheless, military metaphors are at times used to depict patients or victims' actions with an empowering function, reflecting their power or courage to fight against the virus (“The people of Guinea have been *locked in a life-and-death struggle* with Ebola virus since last December”; “Why Ebola Survivors *Struggle* with New Symptoms”; “Thousands of Ebola Survivors *Face Persistent Joint Pain and Other Problems*”).

Although Ebola is described as a very aggressive force, sometimes health and political authorities and even patients or victims are also portrayed as responsible for, or guilty of the Ebola spread. Furthermore, the tension between dehumanization or impersonalization of human beings and, paradoxically, the personification of non-humans, is another distinctive peculiarity of the sample analyzed that perfectly and effectively represents the impact of the virus on the population. Moreover, the metaphors used appear almost as clichés, completely deprived of emotiveness, following typical patterns of Western thought, and may make the reader remain distant from the texts and the circumstances described, but at the same time strongly aware of the danger or threat that Ebola involves, where medicines/drugs and health workers and authorities are depicted as essential in overcoming Ebola.

Even though this study is by no means complete and does not attempt to exhaust the analysis of Ebola metaphors in popularized scientific discourses, we may conclude that, first, the use of metaphors in the explanation or reformulation of scientific information and knowledge is an effective simplification mechanism that facilitates understanding, further learning and education among non-expert addressees, but also produces specific reactions by resorting to familiar domains rather than more abstract ones. In further research, it might be interesting to continue analyzing these metaphorical framings, in wider corpora, and most specifically, comparing the images of (dis)empowerment used with those cases where the victims of diseases are Western citizens, who may also be exposed to the same media and resent certain connotations.

Article history:
 Received 29 January 2017
 Received in revised form 5 April 2017
 Accepted 22 May 2017

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