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FRAMING MIGRAINE IN DIGITAL DISCOURSE

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Abstract – According to the WHO (https://www.who.int/news-room/fact-sheets/detail/headache-disorders), headache is an underestimated, under-treated and under-recognized disease throughout the world, despite the fact that half of the adult world population experiences at least one headache per year. Headache is one of the painful features of primary headache disorders, which include migraine, tension headache and clusters. Amongst migraines, "migraine with aura" occurs in 2% of migraineur population. To illustrate a "migraine with aura", the migraine textbook *Headache in Clinical Practice* shows a photo of the walled city of Palmanova, Italy. Such a neurological disorder, literally represented as a fortress, frames patients' descriptions of the zigzag lightning they perceive (but do not see) before a migraine attack. If clinical practitioners reframe "migraine with aura" as a fortress – with the WAR metaphor implications it carries – how do patients frame migraine with aura when they speak freely about it on social media? By combining quantitative and qualitative approaches to investigation, this paper will assess in what way the process of information is affected by issues of frame inclusion and exclusion in textual construction. This can help to understand the discourse about migraine, so as to improve professional tools for migraine detection and evaluation.

Keywords: framing; medical discourse; metaphor; corpus linguistics; digital communication.

1. Introduction

The World Health Organization defines migraine[1] as an underestimated, under-treated and under-recognized disease throughout the world (https://www.who.int/news-room/fact-sheets/detail/headache-disorders). It is triggered by deep neurological activity that releases pain-producing inflammatory substances around nerves and blood vessels in the head. It is recurrent, often life-long, and characterized by recurring attacks. Amongst migraines, "migraine with aura" is the one which occurs in 2% of migraineurs. It is a type of migraine which is characterized by visual disturbances lasting from 5 to 20 minutes and usually less than an hour before a migraine attack.

The first description of migraine with aura can be found in the 12th century, but it was only in the early 1940s that *sketches* of visual aura helped neurologists to identify that the aura

> probably results from a wave of intense excitation of the visual cortex (producing the visual illusion of scintillations or bright flashes) followed by complete inhibition of activity (resulting in temporary and partial blindness) (https://www.migrainetrust.org/about-migraine/types-of-migraine/migraine-with-aura/).

[1] Migraine is considered to be a neurovascular disease, characterised by a flow of neuronal deactivation spreading from the occipital cortex followed by vascular changes in turn involving the release of inflammatory mediators. The trigeminal nerve which innervates the meninges is thus activated, though the triggering events causing the activation of migraine are not completely understood (Radat *et al.* 2013; cf. also Silberstein, Lipton and Goadsby 2002).

More recently, a "migraine with aura" has been illustrated by the migraine textbook *Headache in Clinical Practice* by showing a photo of the walled city of Palmanova, Italy (Silberstein *et al.* 2002, p. 63; cf. O'Shea 2020).

A study carried out by Young *et al.* (2012) stresses the role that language plays in describing a medical problem and how such descriptions can affect public perceptions and institutional responses. With regard to migraine, Young *et al*. (2012) claim that the language used to describe it should avoid any stigma and bias and this would help professionals to communicate amongst themselves and with the community at large. The investigation they carried out shows that a "disease" is such when it has a group of signs and symptoms. This has evidenced that migraine is preferably defined as a "disease" or a "condition" (although it is perceived as a less serious "disease"), while other terms tend to be avoided. For instance, the term "disorder" applied to migraine tends to connotate it as "psychiatric", while the terms "syndrome" or "illness" are rarely used (Young *et al.* 2012, p. 287). The point is that migraine, different from any other diseases, is invisible. Patients who suffer from migraine do not have any visible physical conditions or symptom, other than inflammation of the brain. In addition, most migraine sufferers believe that migraine is not a real disease and has a psychological origin (Radat *et al.* 2013); furthermore, aura is caused by intense activity of the visual cortex that causes hallucinations. The inability to communicate both the severity and quality of pain before a diagnosis is well analysed by Bullo (2020), who explains that patients resort to imagery (Bullo, Hearn 2021), since there are no words to describe it. If even clinical practitioners frame (Entman 1993) "migraine with aura" as a fortress –which, as we will see later in this contribution, triggers the WAR metaphor scenario, with the suggestions it carries – how do patients frame migraine with aura when they speak about it freely on social media? The implications resulting from this contribution may help medical practitioners to better align patients' descriptions of pain to medical tools employed to measure the intensity of pain.

Drawing from framing analysis, this paper will analyse how migraine is framed by both specialists and migraine sufferers in digital texts. More precisely, we will see how framing is metaphorically adapted in digital texts. For this purpose, this contribution will be developed as follows: in Section 2 a brief overview of framing will be offered, accompanied by a literature review related to the definition of pain and migraine from the applied linguistics perspective. Section 3 describes the methodological approach, while data analysis and discussion are presented in Section 4, which are followed by the conclusion (Section 5).

1.1. Framing, metaphors and pain – an overview

As Entman (1993, p. 52) claims, the notion of frame involves the concepts of *salience* and *interpretation*. To frame means selecting some aspects of the perceived reality and making them more salient in a communicative text to emphasize a problem, an interpretation, an evaluation or a recommendation. This notion, first introduced by Burke (1937), was taken up by Bateson (1972) and definitively established by Goffman (1974). Framing research has been characterized by significant levels of conceptual obliqueness and sometimes even fallacious reasoning (Scheufele 1999), given its interdisciplinary roots in sociology (Gamson, Modigliani 1987, 1989; Goffman 1974); psychology (Kahneman 2003; Kahneman and Tversky 1979, 1984); and linguistics (Lakoff, Johnson 1981).

Framing is resolved in three conceptualizations:

(i) Framing as reception/interpretation;
(ii) Framing as communication;

(iii) Framing as interaction.

The conceptualization of framing as reception/interpretation (i) is grounded in cognitive processes: we interpret information depending on how it is contextualized or framed; this guides people in information processing and orients the way they understand it. This notion of framing has influenced research on artificial intelligence (Schank, Abelson 1977), cognitive psychology (Rumelhart 1984) and linguistic semantics (Chafe 1977; Fillmore 1975, 1976).

The notion of framing as communication, which is strongly connected to the notion of framing as cognitive representation, is based on the idea of message construction, by means of which the author of a text selects certain aspects of reality and makes them salient. This perspective has contributed to investigations in anthropology (Frake 1977), sociology (Goffman 1974) and linguistic anthropology (Gumperz 1982; Hymes 1974).

As far as framing as interaction is concerned, this "refers to a definition of what is going on in interaction, without which no utterance (or movement or gesture) could be interpreted" (Tannen, Wallat 1987, p. 206). Being based on the interactions between individuals it considers "how people use multiple frameworks to make sense of [communicative] events".

For the purposes of this study, the notion of framing considered here entails the conceptualization of framing as communication.

Recently, scholars (see, for instance, Park *et al.* 2020) have carried out research about communication in social media also in relation to popularization (cf. Gough *et al.* 2017; Beacco 2002). The latter aspect has been thoroughly investigated, especially in the case of medical popularization (cf Maci 2013; see also Calsamiglia 2003; Calsamiglia, van Dijk 2004), while aspect of popularization and framing have been investigated from the gender perspective (Doan 2019). In studies of framing, recent investigations about the relationship between framing and communication have been carried out by Baker *et al*. (2020) and by Atanasova and Koteyko (2017), focussing their attention on the way in which the media frame the notion of obesity.

For the purpose of this contribution, attention will be mainly paid to metaphorical frames in communication. In studying about framing, special attention has been devoted to metaphorical frames which are widely used as they help come to terms with complex conceptualisations as theorized in Cognitive Metaphor Theory (Lakoff, Johnson 1980). They also contribute to highlighting aspects to be presented as salient and activating alternative ways of understanding issues (cf. Semino 2008; Semino *et al.* 2018a, 2018b). Metaphors, in particular, frame the experience of illness in different ways (Demjen, Semino 2017), by drawing from areas of experience, and therefore help to understand pain in meaningful ways (Gwyn 1999; Loftus 2011; cf. also Bullo, Hearn 2021). In particular, metaphors have special added value in cases of undefined or invisible illnesses (Bullo, Hearn 2021), which is what migraine is.

Normally, migraine is described from a medical perspective (Schulle, May 2004). Usually, population studies in medicine have been relevant in the understanding of migraine as a disease, but when they come to pain description, they rely on retrospective self-reports of pain, which are subject to memory error and, therefore, can be inaccurate (Lewandoski *et al.* 2009).

As Bullo (2020) underlines, when there is lack of physical visibility of pain, sufferers rely on language tools to externalize their internal experience of pain (Lascaratou 2007) in terms of physical boundaries and linguistic frameworks, "leading to a reliance on

imagery (e.g. Gosden *et al.* 2014) and/or metaphorical language (e.g. Schott 2004) to communicate internal pain experience/s" (Bullo 2020, p. 479).[2]

According to Cognitive Metaphor Theory (CMT), a metaphor is a linguistic phenomenon whereby we speak and potentially think about an abstract entity or a conceptual domain in terms of another (Semino 2010). So, for instance, the abstract domain of "love" (target domain) may be understood in terms of another, more familiar sensation such as a "journey" (source domain). Pain is usually expressed metonymically, because its metaphorical pattern relies on common CAUSE-EFFECT associations for the experience of nociceptive or physical pain (source domain) used to describe the target domain. However, when describing pain, pain descriptors are usually used metaphorically in the sense that they convey the idea of a pain experience not resulting from a direct painful experience. For instance, Semino (2010, p. 205) explains that when describing the pain of migraine, patients may use the metaphor of a "stabbing" pain – although it does not mean that they have ever experienced being physically stabbed. In this case, Semino (2010) points out, given its abstract nature, neuropathic or chronic pain is the target domain, and the pain caused by physical damage due to stabbing (having a concrete nature) is the source domain (cf. also Bullo 2020; Schott 2004; and Lakoff and Johnson 1980). The taxonomy of metaphorical expressions used to describe neuropathic pain as physical pain derives from an analysis of the descriptors of the standard McGill Pain Questionnaire (MPQ)[3] and collocates[4] of pain in the BNC (cf. Semino 2010, p. 210; Semino *et al.* 2020; see also Bullo 2020, p. 481).

Drawing on the notion of primary metaphor (Grady 1997)[5] and the metaphorical description of PAIN IS THE CAUSE OF PHYSICAL DAMAGE (Semino 2019, 2013), we will see how migraine, aura and migraine pain are metaphorically framed on the Web from specialists and on Twitter from non-specialist Twitter users.

2. Aims

From a medical perspective, clinical practitioners frame "migraine with aura" as a fortress (cf. Silberstein, Lipton, Goadsby 2002, p. 63; see also O'Shea 2020): aura is like a fortress and as such it cannot be breached because it is fortified; it is therefore impenetrable, and not open to any treatment.

[2] Sontag (2001, p. 67) argues against the use of metaphor for describing illness, and in particular when "the cause of illness is not understood". Her view, however, focusses on the doctor perspective, rather than on the patient one, which is the one we are approaching here.

[3] The McGill Pain Questionnaire primarily consists of three major classes of word descriptors – sensory, affective and evaluative – that are used by patients to specify subjective pain experience.

[4] The central concept in corpus linguistics about collocates has been offered by Firth (1957, p. 6) as "the company that words keep". When two words collocate with each other, they co-occur (i.e., they appear next one to the other) more often that it would be expected if all the words in a corpus appeared in random order (Baker 2016).

[5] Grady's (1997) notion of *primary metaphor* refers to the relation existing between subjective/ abstract experiences and concrete ones expressed through metaphors. So, for instance, the subjective experience 'good' and the concrete idea 'up' is metaphorically rendered as a primary metaphor GOOD IS UP. In the case of metaphors to express neuropathic pain, Semino (personal email, cf. also Semino 2010) describes them as a 'primary metaphor': PAIN IS THE CAUSE OF PHYSICAL DAMAGE.

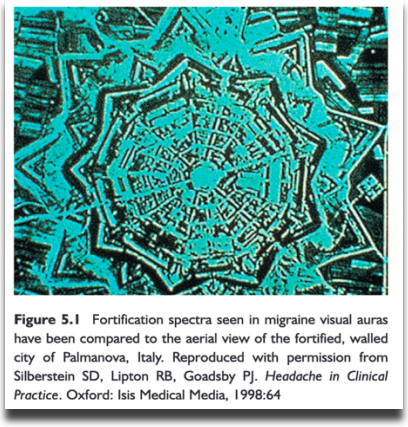

Figure 5.1 Fortification spectra seen in migraine visual auras have been compared to the aerial view of the fortified, walled city of Palmanova, Italy. Reproduced with permission from Silberstein SD, Lipton RB, Goadsby PJ. *Headache in Clinical Practice*. Oxford: Isis Medical Media, 1998:64

Figure 1
Migraine with aura (Silberstein, Lipton and Goads 2002, p. 63).

Recently, studies have shown that Twitter is a powerful source of knowledge for migraine research (Nascimento *et al.* 2014) on retrospective self-reports of pain in relation to migraine. Indeed, Twitter has proved to be "a unique and innovative way to understand how communication and sharing of pain distress evolves" (Nascimento *et al.* 2014, p. 2), thanks to the possibility of instantly uploading spontaneous reports naturally self-expressing issues in relation to pain and migraine. In addition, these spontaneous reports show that the suffering experience is not communicated through the words commonly used in MPQ employed by specialists to score pain levels, but rather with non-McGill descriptors or profanities (Nascimento *et al.* 2014, p. 6).

Given that, and considering that imagery is the linguistic strategy employed to communicate the personal pain experience (Bullo 2020), our overarching research question is: *How is the notion of migraine framed in digital discourse?*
More specifically:

a) How are the notions of *migraine, aura* and *pain* metaphorically framed in specialised medical discourse occurring on the Web?
b) How are the notions of *migraine, aura* and *pain* metaphorically framed on Twitter in popularized[6] medical discourse?
c) Are there any differences in the two metaphorical frames?

The methodological approach to carry out this investigation is described in the next section.

3. Methodological approach

The investigation of the metaphorical framing of migraine will be based on cognitive linguistic studies (Lakoff, Johnson 1980; cf also Semino *et al.* 2018a; Steen 2018). In

[6] Maci (2013) deals with the discourse of popularization and explains that popularized discourse can be intended as the discourse of specialised texts which are used to set scientific knowledge in a readable and meaningful way addressed to non-specialist readers, as well as the discourse of those type of texts used by expert members of the scientific community to disseminate scientific knowledge across specializations. She provides for a distinction between the two types of discourse, by naming the former as the discourse of popularized science, and the latter as the discourse of scientific popularization. In this paper, by popularized medical discourse we mean the discourse of popularized science for laypeople.

particular, the framework of conceptual/ semantic domains in metaphor investigation (namely, cross-mapping domains; cf. Deignan 2005) follows MIP (Pragglejaz Group 2007, p. 3; cf also Steen 2005). In addition, Goatly's (1997, pp. 166–199) approach has also been used for the identification of linguistic expressions used in migraine experiences expressed metaphorically. Furthermore, we will apply Grady's (1997) notion of *primary metaphor* and Semino's (2010, 2019) notion of primary metaphor of PAIN IS THE CAUSE OF PHYSICAL DAMAGE and its further elaboration when applied to pain and to migraine.

In order to carry out this investigation, two corpora were collected from both the Web and Twitter. We were not interested in gender or geographic location of the Web and twitter users and their texts, because we were not interested in diastratic and diatopic variation. We were however interested in investigating about migraine discourse (both from the Web, produced by specialists, and from Twitter, produced by laypeople) during the time span in which the Migrain World Summit occurred. Both corpora were thus collected during the 2021 Headache Migraine Summit week (22–29 March 2021), which was held online. The reason for collecting corpora during that week lies in the fact that that week we saw that the word 'migraine' was in trend on Twitter.

The keywords used to select the texts to be included in the two different subcorpora were the hashtags:

- #migraine
- #aura
- #pain&headache.

The Web subcorpus was collected with the aid of SketchEngine's 'Create a corpus' tool. Sketchengine is an online tool with which corpus linguistic analysis can be carried out. It can also serve as corpus building software which uses WebBootCaT technology (a web service for quickly producing corpora for specialist areas), to automatically create a text corpus from relevant web pages. Data downloaded from the internet with SketchEngine were cleaned, deduplicated and non-text is eliminated to obtain linguistically valuable text material.

The Twitter subcorpus was collected with the help of Socialbearing.com. Socialbearing.com offers Twitter analytics for tweets and timelines and can carry out a search for free for 7 days from the day of the inquiry but can carry out any search for any time with a subscription.

We read through both subcorpora to better contextualize the texts; as to the Web subcorpus, we then selected specialised texts only; as to Twitter, we selected only those tweets that did not contain specialised terminology, trying to include only those tweets expressing the migraineurs' first-hand experience of migraine. All sensitive data have been deleted.

The corpus collected from the Web was tested against subresearch question (a); the corpus collected with Twitter was tested against subresearch question (b). Details as to corpus types and tokens can be seen in Table 1, below:

corpus	*tokens*	*types*	*authors*
Web	32,494	4,932	specialists to specialists
Twitter	133,227	23,759	migraineurs/ laypeople

Table 1
Sub-corpora types and token.

As the Web and Twitter subcorpora are different in size, quantitative findings have been normalized.

In order to detect how migraine pain is described by both specialists and migraineurs, we used the McGill Pain Questionnaire terminology (see Fig. 2, below) and checked it both in the Web subcorpus and in the Twitter subcorpus. Developed by Dr Melzack at McGill University (Montreal, Canada), the questionnaire is generally used to assess a patient's intensity and quality (first two columns), in *sensory* (1–10), *affective* (11–15), *evaluative* (16) or *miscellaneous* (17–20) terms, and type of subjective pain (last three columns). Each descriptor group contains from two to seven indicators listed in order of increasing intensity of pain. For instance, group 1 has 'flickering' as indicating the lowest intensity of pain and 'pounding' the highest. Semino *et al*. (2020) have already demonstrated that the MPQ questionnaire has some weaknesses when it comes to communicate pain, because the descriptors are based on expert opinion and fail to include the descriptors patients report. However, we are not here testing the validity of the MPQ questionnaire, but rather using the MPQ questionnaire as a device offering a list of descriptors that can be used for linguistic analysis in both corpora to detect the pain experience and the possible metaphorical uses to describe pain.

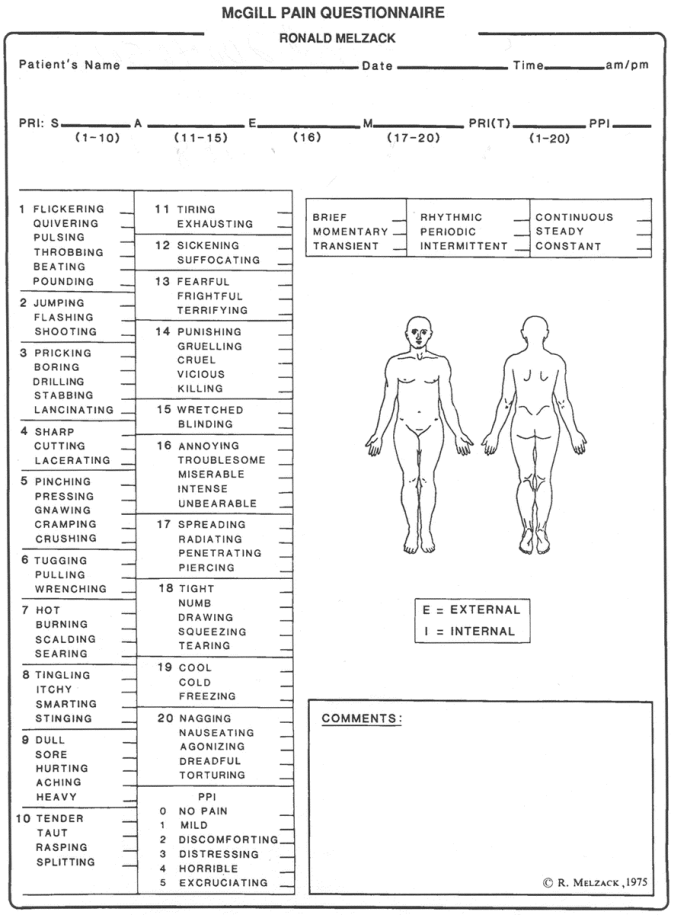

Figure 2
McGill pain questionnaire (Melzack 1975).

The corpus-based analysis, carried out with the Sketch Engine, tried to detect all the MPQ sensory, affective, evaluative, and miscellaneous descriptors through the concordance[7] tool (as indicated by Semino *et al.* 2020); this allowed us to identify expressions reporting pain descriptions and those carrying possible metaphorical implications in the texts. We also checked all the linguistic markers for metaphor identification as indicated by Goatly (1997). The metaphorical expression was then detected following the MIP procedure.

4. Data analysis: key findings

Analysis of the corpus, through 1) Goatly's linguistic approach to metaphorical detection, and 2) the McGill questionnaire terminology, was carried out with SketchEngine, which allowed us to detect 383 potential metaphorical expressions on Twitter and 271 potential metaphorical expressions on the Web. These were manually checked to determine whether they could be classified as figurative speech or similes, following the MIP procedure. Of these, only 188 are real metaphorical framings for the Web and 88 for the Twitter sub-corpora (see Table 2, below):

Corpus	Potential metaphors	Metaphorical framing
Web	271	188
Twitter	383	88

Table 2
Breakdown of potential and real metaphorical framing.

Following Goatly (1997), Semino *et al.* (2020), Semino (2019) and Grady's (1997) notion of *primary metaphor*, we have then grouped the metaphors so detected according to the way in which migraine, aura migraine and migraine pain are discursively framed, namely:

(a) The framing of migraine
(b) The framing of migraine aura
(c) The framing of migraine pain.

We reproduce here the main results found in our data, offering the most relevant examples of discoursal metaphorical framing in a qualitative approach.

4.1. The framing of migraine

4.1.1. The Web sub-corpus

When in medical discourse a definition of migraine is offered, analysis of the Web sub-corpus revealed that two main metaphorical patterns are mainly used:

- MIGRAINE IS CHANGE; CHANGE IS MOTION
- MIGRAINE IS A CATEGORY; CATEGORIES ARE REGIONS.

Following Grady (1997, p. 106), the motivation behind the metaphorical framing depicting migraine as CHANGE IS MOTION is based on "the correlation between perceiving motion and being aware of a change in the world state around us". In other words, *change* is

[7] A concordance is a listing of each occurrence of the word under investigation in a corpus (Baker, Brooks and Evans 2019).

metaphorically perceptualized as motion. Indeed, the examples below show that migraine is framed as something 'moving' and therefore changing (our emphasis here and there):

(1) Starting a migraine is the body's way of **revving up** the system and increasing the flow of blood and delivery of nutrients to the brain

(2) Warning Signs Some people who have a migraine often experience warning signs in the **second phase**. This **second phase** of migraine is […].

In example (1), migraine is responsible for the body's rise in activity because of a quick movement or progress and with increasing speed (cf. OED and MacMillan English Dictionary online). This movement is categorized in phases, as excerpt (2) shows: the fact that a 'second phase' exists implies that the migraine has been triggered in the first phase. A movement or change of state has occurred. The neurological status of a migraineur therefore changes because of a conceptualized 'perceived' movement making the normal function of the brain move from one state to another. Interestingly, in (2) there is the indication of *warning signs* that will be dealt further on in this contribution.

The medical experience also indicates that within the migraine domain there are many entities which can be grouped together. This is why migraine can be categorized into types. This CATEGORIES ARE REGIONS metaphor is motivated by the fact that these have shared features: migraines can be grouped into various *types* as they are conceptualized as objects that cluster together (Grady 1997, p. 139). This is evident in the excerpts below:

(3) Read on to learn more about the **types of migraine** with aura and the available treatment options.

(4) […] classic migraine, focal migraine, aphasic migraine, and complicated migraine. Other, rare **types of migraine** that cause auras include: Hemiplegic migraine.

4.1.2. The Twitter corpus

As mentioned above, the Twitter corpus includes metaphors as used by laypeople in the popularization of medical discourse about migraine. In the definition of migraine, there are two main features:

1. who migraineurs are; and
2. what migraine is.

Here, there is not just a definition of migraine, but a more complete understanding of the migraine experience.

The descriptions of migraineurs fall into the WAR METAPHOR:

(5) Calling All Migraine **Warriors**! It's time to wear your status proudly.

(6) Calling all Migraine **Superheroes** – Please watch this film! Winner of the American Migraine Foundation's short film contest.

The migraineur is a *warrior* or even a *superhero*. While the conceptualization of the migraineur as a *warrior* immediately establishes a relationship with the *war* domain, which includes battles, armies, winners and losers, the idea of a migraineur as a *superhero* connotates the WAR METAPHOR with positivity: superheroes usually have superpowers, unexpected abilities and capabilities that 'normal' people, i.e. non migraineurs, cannot have. In addition, superheroes never die and always fight for a good reason and to re-establish peace and harmony in society.

When it comes to describing what a migraine is, the metaphorical framings used can be defined in the following patterns:

- MIGRAINE IS NON-SIMILARITY; SIMILARITY IS PROXIMITY.
- MIGRAINE IS CHANGE; CHANGE IS MOTION.
- MIGRAINE IS A CATEGORY; CATEGORIES ARE REGIONS.
- MIGRAINE IS NON-EXISTENCE; EXISTENCE IS VISIBILITY.

Similarity is a proximity type of metaphor that tends to show that objects can be clustered together or that there is a tendency for adjacent objects to appear similar or in a similar condition (Grady 1997). However, when migraine is defined with the metaphorical frame of SIMILARITY IS PROXIMITY, the metaphors employed always define what migraine is *not*, in a sort of a negative realization: they are used to reject such similarity. Indeed, migraine is *not just a headache* or *not a bad headache*:

(7) We hear about this a lot from our patients @NatMigraineCtr #Migraine **is NOT just a headache**.

(8) Perhaps because too many people still think #migraine is just **a bad headache**? Because when we are in the midst of a debilitating attack, no one sees all the symptoms' intensifiers.

In some cases, the definition of what migraine *is not* is framed via a direct metaphor or a simile between unlike things (Semino 2019), as excerpt (9) below shows:

(9) **Saying migraine is just a headache is like saying Godzilla is just a lizard**.

Here, the simile is between a headache and a migraine. Given that most people think that a migraine attack is identical to a headache fit, the most convenient way to explain the difference between the two phenomena is by creating a simile between a lizard and a dinosaur: they are both reptiles, but of incredibly different size. The cognitive representation of the two animals conveys a concrete idea of the difference existing between the two diseases in implied terms of pain intensity.

With respect to the metaphorical representation of migraine as CHANGE IS MOTION and CATEGORIES ARE REGIONS, there are no differences from what we have described for the Web sub-corpus, as can be seen in the two examples below:

(10) The second #migraine **phase** is called aura and it is experienced immediately before the #headache.

(11) There are many **types** of #InvisibleEntities that may attach to our #aura or #InnerBeing.

Example (11) is also interesting because migraine is referred to as *#InvisibleEntities*, thus giving way to blended metaphors, where MIGRAINE IS A CATEGORY; CATEGORIES ARE REGIONS go together with a new metaphorical framing. Migraine is here overtly depicted as a ghost disease, whereas a new frame is offered: EXISTENCE IS VISIBILITY. Such a metaphorical pattern is based on the correlation between our awareness of objects or knowledge of their existence and their presence within our field of vision. As migraine is something that cannot be seen, it is an *invisible entity*. It is precisely for this reason that people cannot tell a headache from a migraine attack: since migraine cannot be visible, it has no existence.

4.2. The framing of migraine aura

4.2.1. The Web sub-corpus

The representation of migraine aura is realized in the Web sub-corpus in cognitive processes by means of which the metaphorical frame EXISTENCE IS VISIBILITY is offered. As described above, the metaphor is created by a correlation between our awareness of knowledge of objects' existence and their presence within our field of vision. This is indeed what happens when aura occurs: it is a *visual hallucination* (12) or a *visual* symptom by means of which you *see flashes*, or *flickering/shimmering light.* In addition, in all our findings, aura is defined as 'flickering', giving the idea of light flashing up and dying, in an annoying way.

(12) As the **wave** spreads, you might have **visual hallucinations**. The best-known visual aura is called a **fortification spectrum because its pattern resembles the walls of a medieval fort**.

(13) The most common **visual symptoms** of migraine aura without headache, or silent migraine, include: **Seeing flashes**, or **flickering** or **shimmering light.**

Aura exists because migraineurs see it. However, aura is a *fortification spectrum because its pattern resembles the walls of a medieval fort.* A *fort* is a defensive construction, defined by MacMillan English Dictionary as "a strong building, often with a high wall around it, used by soldiers for defending a place". Given that the basic meaning. This implies the presence of the AURA IS WAR metaphor has further implications. Besides framing battlefields where armies fight, where there are soldiers, losers and winners, the fact that aura is a *fortified wall of a medieval fort* implies that it cannot be defeated: a fort is a fortified place for defensive purposes, usually surrounded by a ditch, ramparts and parapets, and garrisoned with troops to make the enemy stay outside. This means that nobody or nothing can defeat aura and that, implicitly, in this battle, the migraineur is alone.

The defensive idea of aura is explicitly indicated in the MIGRAINE AURA IS A WARNING SIGN metaphor, as can be seen in (14) below and literally indicated on example (2) above:

(14) The migraine aura is a **sign** that a migraine has begun and the body is now going into **protective mode**. The body will actually use a migraine to protect [itself].

The *fortified wall* of (12) is a *warning sign* that the migraineur has to go into *protective mode* (14): the fortress indeed works.

4.2.2. The Twitter sub-corpus

On Twitter, aura is framed with the metaphorical pattern EXISTENCE IS VISIBILITY we saw in 4.2.1. An aura exists because it can be seen by the migraineur. There is therefore a correlation between awareness about the knowledge of an object and its existence.

In particular, this metaphor is realized in three main ways:

- AURA IS A KALEIDOSCOPE
- AURA IS A STROBE
- AURA IS A FLASHING ZIGZAG.

The AURA IS A KALEIDOSCOPE metaphor can be seen in (15) below, where the pattern is accompanied by humour and sarcasm (*Truly beautiful. Had I not been distracted by dry heaves*) realized through disjunction.

(15) Postdrome from yesterday's #migraine. Slight tinnitus and mild euphoria. Minimal brain fog. **Kaleidoscopic visual aura** during the peak of the headache. Truly beautiful. Had I not been distracted by dry heaves, I might have enjoyed the show.

This metaphor is blended with the AURA IS A SHOW metaphor: the kaledoiscopic nature of aura resembles a beautiful *show*, the whole to be interpreted in a sarcastic way, given the nausea the migraineur experiences. As Semino (2010, p. 12) claims, "humour is well known to be a way of dealing with adversity, defusing difficult situations, empowering oneself and strengthening social bonds with others, including in the context of illness (Demjén 2016)".

The AURA IS A STROBE metaphor is indicated in (16) below.

(16) I wish that movies & television would have warnings before **strobe/ flashing lights**. Ugh. #migraine.

Different from the flickering light found in (13), the strobe implication reveals a more annoying and pulsating type of light that a migraineur 'sees' when suffering a migraine attack.

Furthermore, nowhere on Twitter is aura described as a *fortress*: it is rather a *flashing zigzag light*, as depicted in (17):

(17) Hate having a silent #migraine where I get the **flashing zigzags** with no pain and end up not being able to see properly whilst it passes in 15 mins. At least I'm at home!

Migraineurs, in other words, frame aura as something that can be seen.

4.3. The framing of migraine pain

According to Semino (2010), migraine pain is not an abstract experience but a subjective one, which makes it invisible. The characteristic of pain 'invisibility' is a challenge for communication. The type of pain deriving from physical damage to the body, in contrast, is well-defined, concrete and poignant in imagery when described, whether or not it is realistic or plausible. Whenever pain is described, it is conveyed as a physical sensation. The main purpose is to explain what it is like to have that kind of pain, so that others know or even feel what that pain is like, through a process that can be described as embodied simulation (Semino 2010). Often, this is done by outlining scenarios that are not familiar or accessible from previous direct experience. In these descriptions, Grady (1997) and Semino (2019) show that primary metaphors have a fundamental role, as they draw on the correlation between physical harm and affective response, and as such they involve associations between concepts that are grounded in universal – rather than culturally-determined – aspects of human experience. There are, namely, connections between subjective experiences and sensorimotor experiences that are particularly experienced in so-called 'primary scenes' (Grady 1997), which are repeated situations that tend to occur early in human experience. In infancy, for example, intimacy (subjective experience) with other people correlates with being in physical proximity (sensorimotor experience). As Semino (2019) explains, in the case of pain, the relevant primary scene involves nociceptive pain, i.e. a correlation between the subjective sensation of pain and an external

process that causes damage to the body.

4.3.1. The Web sub-corpus

The Web sub-corpus is mainly characterized by the primary metaphor PAIN IS THE CAUSE OF PHYSICAL DAMAGE

The main metaphorical pattern used to frame discourse in HARM IS PHYSICAL INJURY. Through this metaphor, the text author establishes a correlation between physical harm and affective response as elaborated in the primary scenes described above. The identification of the type, intensity and quality of the pain felt by the patient has been made possible thanks to MPQ, which has revealed that pain is mainly described in terms of *medium* (*high*) *sensory* intensity, as revealed by excerpts (18) and (19), where migraine pain is always defined as *throbbing* or *pulsing*, as well as in *medium (low) evaluative* intensity terms, as revealed by the use of the adjective *intense* in (20):

(18) …with aura and the available treatment options. Migraine headaches are characterized by symptoms such as severe **throbbing or pulsing head pain**, sensitivity to light, sound, and smells, and nausea. Of those who experience migraine headaches…

(19) The feeling of pulsating pain is not in phase with the **pulse** that could be defined as that constellation of symptoms occurring once the acute headache has settled.

(20) …symptoms include temporary visual or other disturbances that usually strike before other migraine symptoms – such as **intense head pain**, nausea, and sensitivity to light and sound. Migraine aura usually occurs within an hour before head pain…

4.3.2. The Twitter sub-corpus

The Twitter sub-corpus is characterized by a different way of framing migraine pain when compared to the Web sub-corpus. Indeed, metaphors are used to describe what (a) having a migraine fit means and (b) how pain can be described.

In the first case, (a) what a migraine fit means, the migraineur tries to explain the experience s/he has by assigning a meaning to migraine, intended as a migraine fit. This is possible via the primary metaphor PAIN IS THE CAUSE OF PHYSICAL DAMAGE realized either as a direct metaphor or as a SIMILE between two unlike things (Semino 2019). The analogy thus created is to compare extreme cases of already known experiences, as revealed in (21), below:

(21) I've had a sleep, drunk about a gazillion gallons of water, had something wee to eat, taking the manky meds but still **feeling like I have been hit by and then reversed over by a bus**. Any quick fix suggestions? 😊 @EllieSandercock @JenniKeebab

In some cases, there is a preference for ontological direct metaphors realized through personification. The pattern used is MIGRAINE IS A CAUSE OF EXTINCTION. However, since extinction is a form of death, this is represented in its movement toward disappearance. Migraine is responsible for the migraineur's DEATH and DISAPPEARANCE:

(22) **Migraine lately feels like parts of myself are slipping away**. The pain I can get over, but it's the #cognitivedysfunction, #brainfog, and #memory issues that have me feeling **like this disease is slowly making me disappear**. #chronicmigraine #intractablemigraine #patientadvocate!

A third way of representing a migraine fit is by means of cognitive metaphors. It is in this particular representation that the metaphor MIGRAINE MEANS SOMETHING is employed. Migraine is here metonymically employed for pain. The meaning assigned is combined with the metaphor OUR OWN ATTITUDES ARE THE MENTAL PRODUCTS [OF OTHER PEOPLE] (see Lakoff, Johnson 1980). According to Grady (1997), the motivation in using this metaphor lies in the apparent independent existence of thoughts (especially those in verbal form, which may therefore have a cognitive representation similar to remembered speech), and/or the correlation between interacting with other people and responding to their subjective mental states. As Semino (2019) explains, in Blending Theory terms, the interpretation of the statement involves the blending of elements from two inputs:

(23) **Not being allowed to move off the sofa because got the migraine from hell means my boy is making me lots of drinks and making sure I'm okay**. #migraine #sundaychillday #myboy".

In the second case, (b) how pain can be described, the realization is possible via the primary metaphor PAIN IS THE CAUSE OF PHYSICAL DAMAGE, as described above thanks to the MPQ. Here, however, the description indicates the use of *sensory medium* (*high*) intensity, as revealed by excerpts (24) and (25), where migraine pain is always defined as *throbbing* or *pulsing*, as well as in *low evaluative* intensity terms, as revealed by the use of the adjectives *troublesome* and *unbearable* in excerpts (26) and (27):

(24) It often includes **throbbing** on one side of the head that often worsens with activities (sensory medium intensity).

(25) Unable to sleep tonight! I have a **pounding** headache and my mouth hurts. I just took a couple of T1's to help hopefully with the pain so I can get some sleep. #migraine (sensory high intensity).

(26) If you suffer please get in touch as I have already helped many clients with **troublesome** headaches.

(27) Let them try being in my head when I suffer **unbearable** pain.

5. Conclusions

The purpose of this contribution is to detect how the notions of *migraine*, *aura* and *pain* are metaphorically framed in the digital discourse of the Web and of Twitter, and whether there are differences between the two subcorpora.

The types of metaphors employed to frame *migraine*, *migraine aura*, and *migraine pain* found in the Web and Twitter sub-corpora are summarized in Table 3, below, where can be seen the main metaphorical patterns used in relation to *migraine* (first row), *migraine aura* (second row) and *migraine pain* (third row) utilized on the Web (second column) or on Twitter (third column).

	WEB	TWITTER
Migraine	1. CHANGE IS MOTION 2. NORMAL IS STRAIGHT (rejection); CATEGORIES ARE REGIONS	1. WAR METAPHOR 2. SIMILARITY IS PROXIMITY (rejection) 3. CHANGE IS MOTION 4. NORMAL IS STRAIGHT (rejection); CATEGORIES ARE REGIONS
Migraine Aura	EXISTENCE IS VISIBILITY + WAR METAPHOR	EXISTENCE IS VISIBILITY
Migraine pain	1. PAIN IS CAUSE OF PHYSICAL DAMAGE METAPHOR: HARM IS	1. PAIN IS CAUSE OF PHYSICAL DAMAGE METAPHOR: HARM IS PHYSICAL INJURY

PHYSICAL INJURY (medium-high sensory intensity; low evaluative intensity)	2. MIGRAINE IS CAUSE OF EXTINCTION; DEATH and DISAPPEARENCE 3. MIGRAINE MEANS SOMETHING: OUR OWN ATTITUDES ARE THE MENTAL PRODUCTS [OF OTHER PEOPLE] 4. PAIN IS CAUSE OF PHYSICAL DAMAGE METAPHOR: HARM IS PHYSICAL INJURY (medium-high sensory intensity; low evaluative intensity)

Table 3
Breakdown of metaphors framing the topics around the disease 'migraine'.

As can be seen, there are some similarities and differences in the ways in which migraine is dealt with on the Web or on Twitter: migraine is described in both sub-corpora as CHANGE IS MOTION and with the rejection of NORMAL IS STRAIGHT; CATEGORIES ARE REGIONS, but the Twitter sub-corpus indicates migraineurs with the WAR metaphor and the rejection of SIMILARITY IS PROXIMITY.

Both sub-corpora define migraine aura as EXISTENCE IS VISIBILITY, but the Web sub-corpus differs from the Twitter one in the definition of migraine aura because it includes the WAR metaphor.

When it comes to the description of pain, both sub-corpora use PAIN IS THE CAUSE OF PHYSICAL DAMAGE and, following MPQ, the definition is made with medium-high sensory and low evaluative intensity. The Twitter sub-corpus, however, also uses PAIN IS THE CAUSE OF PHYSICAL DAMAGE to indicate what having a migraine fit means. Furthermore, it also exploits MIGRAINE IS A CAUSE OF EXTINCTION; DEATH and DISAPPEARANCE and MIGRAINE MEANS SOMETHING: OUR OWN ATTITUDES ARE THE MENTAL PRODUCTS [OF OTHER PEOPLE] metaphors.

In describing how the discourse about migraine is metaphorically framed, particular on Twitter (migraineurs), we can detect that migraineurs advocate for themselves the role of experts by experience (Semino 2019) with regard to migraine, aura and related pain. The interconnected implications of this study, which are also grounded on the migraineurs' discourse about their experience, can be relevant to provide support and medical care. Indeed, the scientific descriptions of migraine, migraine aura and migraine pain in the specialised discourse found on the Web can be implemented with ways in which people actually talk about their migraine experience. Concentrating on the main differences between the two subcorpora, focusing on the WAR metaphor used by migraineurs, and on the PAIN IS THE CAUSE OF PHYSICAL DAMAGE, together with the MIGRAINE IS A CAUSE OF EXTINCTION; DEATH and DISAPPEARANCE and MIGRAINE MEANS SOMETHING: OUR OWN ATTITUDES ARE THE MENTAL PRODUCTS [OF OTHER PEOPLE], metaphors can help professionals to understand the migraine experience when communicating about migraine in medical and non-medical settings.

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