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KNOWLEDGE DISSEMINATION AND EVIDENTIALITY IN THE GENRE OF POSTERS
Anatomy of a condensed medical discourse*

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Abstract – The genre of scientific posters is a very complex one, because it implies combining written and oral modes in communication. Such complexity is further increased by the fact that posters are created in such a way as to stand alone and do the *talking*, while *showing* medical research, all in a single visual plan. Such extreme conciseness is possible only if redundant information, seen as accessory matters, is deleted. As pointed out by Hobbs (2003, p. 459), this means that in the medical context the cohesion usually provided by explicit linkage is supplied by the reader's background knowledge. In this context, the evidential markers, while facilitating the understanding of poster cognitive mapping, indicate the author's level of expertise towards knowledge. Given the fact that consistent linguistic investigations of posters are almost absent from an applied linguistics perspective, it is the aim of this study to describe how evidentiality is realized in such a condensed and specialized genre. More specifically, drawing on Chafe (1986), this investigation will be focused on those linguistic forms regarded as evidential markers and showing various degrees of knowing within the written form of medical posters, in order to illustrate how evidentiality is linguistically realized, and what, if any, pragmatic functions it has. This investigation, based on the analysis of the verbal components of a corpus of 28 medical posters published online between 2002 and 2011, has been carried out on *attested* language use in the written discourse of medical posters. The findings highlight the fact that evidentiality is dependent on the socio-interactional work the speaker does to construct authority, responsibility and entitlement in a particular context and with particular recipients.

Keywords: Knowledge dissemination; Corpus Linguistics; Evidentiality; Medical discourse.

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1. Introduction

Efficiency in Academia is seen positively as a form of *speed* (Kress 2010), which is ambiguously identified under 'publish or perish'[1] pressure, according to which academic members acquire professional acknowledgment if they publish before others do. In the medical sciences, in particular, such speed identified under 'publish or perish' pressure is indirectly reinforced by the rapid increase of specialised journals, a place where research can be printed and prestige can be acquired, but also by international conferences, a place where research can be 'shown'. For instance, in November 2017, MEDLINE[2] counted 30,000 journals and books for biomedical literature of which 5,278 indexed medical journals;[3] in addition, a Google® search for the phrase 'medical conferences 2017' yielded 530,000,000 'hits'.

As regards conferences in particular, efficiency has often been identified with the organizing of poster sessions, because "[g]iven the limitations of time, the poster format does provide for the maximum number of presentations to be scheduled in a given period, space permitting" (Pearce 1992, p. 1680), which is in line with some data gathered by the author of this paper, namely:

- information obtained from the Research Director of the Publishing Activities Unit of Istituto Superiore di Sanità, the National Health Institute of Italy (http://www.iss.it);
- analysis of the data emerging from the ethnomethodological approach adopted for this investigation (see section 3);
- data collected from an online background survey (http://freeonlinesurveys.com) carried out by the author of this paper (cf. also Maci 2016);
- records obtained from some British and US doctors involved in the academia who were interviewed at the 2011 Meningitis Research Foundation Conference and the 2011 National Cancer Research Institute Conference (see section 3);
- general information about poster sessions provided by previous literature (cf. Dubois 1985a, 1985b; D'Angelo 2010, 2012, 2016a, 2016b; Maci 2011, Maci 2012a; Maci 2012b, Maci 2015a, Maci 2015b, Maci 2016; Rowe, 2012; Rowe 2017).

This is also evident by the fact that most medical conferences have a call for posters only, as, for instance the 10th National Cancer Research Conference (November 2018; cf. https://conference.ncri.org.uk/abstract-submission-2/),

[1] This expression was first mentioned by Wilson (1942).
[2] MEDLINE is the U.S. National Library of Medicine, available at: http://www.nlm.nih.gov/ (08.03.2018).
[3] Data retrieved from PUBMED at http://www.nlm.nih.gov/tsd/serials/lsiou.html (08.03.2018).

where the conference scientific committee selected what poster abstract, amongst all the abstracts received, would be turned into a presentation. Apart from 'logistical' reasons, the reason why medical poster sessions seem to be preferred by researchers lies in the fact that the organisation of poster sessions offers a chance to create relaxed interaction between poster author and audience, from which they can all benefit in terms of scientific support and communication exchange. In addition, the informality created by a poster session forum encourages the development of new research projects. Moreover, although posters must conform to the 'editorial' requirements of the organizing committee, as far as size and format are concerned, authors write creatively in order to attract a potential audience, to inform and persuade. From a more practical point of view, researchers may prefer poster presentations rather than oral ones because the abstract of their poster can be published in major medical journals, which is a convenient means for furthering medical careers. Yet:

> [t]he purpose of medicine is to serve the community by continually improving health, health care, and quality of life for the individual and the population by health promotion, prevention of illness, treatment and care, and the effective use of resources, all within the context of a team approach (Calman 1994, p. 1140).

So, medical research, roughly speaking, is about improving health, the prevention of illness and treatment to let people live well. The only way to find out whether a health treatment works and is safe is to test it. The results of these tests are 'evidence'[4] and medicine based on these tests is called 'evidence-based medicine'. More specifically, evidence-based medicine is

> the conscientious, explicit and judicious use of current best evidence in making decisions about the care of the individual patient. It means integrating individual clinical expertise with the best available external clinical evidence from systematic research. (Sackett et al. 1996, p. 71).

This has nothing to do with the concept of *evidentiality* in linguistics, which is the topic of this paper. Evidentiality in English is a semantic category expressed with lexical markers asserting a factual claim and indicating a source of knowledge (Anderson 1986). The purpose of this paper is that of showing the extent to which, if any, knowledge is linguistically conveyed through evidentiality in the genre of medical posters. The analysis moves from the introduction of the notion of evidentiality and the literature review about evidentiality (Section 2), followed by a description of the methodological approach adopted (Section 3) to a focus on the results both in quantitative and qualitative terms (Section 4), which will be interpreted by looking at the

[4] For a definition of evidence in medicine, see https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4338513/ (08.03.2017).

pragmatic aspects evidentiality has in relation to the poster sections. The concluding remarks (Section 5) will offer a summary and reflection about the role evidentiality has in the genre of medical posters.

2. Evidentiality in linguistics

Boas (1911, p. 43) was possibly the linguist who first, indirectly, introduced the concept of evidentiality by referring to the suffix denoting the source of information in native American Kwakiutl. The term evidentiality, however, was probably coined by Roman Jakobson (1957) as a label for a verbal category indicating the source of information on which the speaker's/writer's statement is based. However, in the mid-1980s a great interest in evidentiality, started with the work of Chafe and Nichols (1986), and continued with Willet (1988), which still seems to be pertinent (DeLancey 1997, 2001; Kamio 1997; Dendale, Tasmowski 2001; Fitneva 2001; Lazard 2001; Nuyts 2001, 2015; Plungian 2001; Aikhenvald, Dixon 2003; Aikhenvald 2004, 2007, 2018; Squartini 2008, 2012, 2018). Nowadays, evidentiality is defined in various ways. The different theories can be grouped into two main approaches, a narrow and a broader definition of evidentiality.

In a narrow definition of evidentiality, "evidentials express the kinds of evidence a person has for making factual claims" (Anderson 1986, p. 273) and include those linguistic markers indicating the source of information, i.e. whether information has been acquired by being seen, heard, inferred or told (Aikhenvald 2003). This approach acknowledges that, in about a quarter of the world's languages, marking information sources is obligatory and that these languages have a grammatical category of evidentiality, while other languages have evidential extensions of non-evidential categories (Aikkhenvald 2007). Yet such a narrow approach to evidentiality considers as evidentiality only certain grammaticalized expressions, in particular morphemes (Aikhenvald 2004, p. 6; Mushin 2001, p. 35). This results in the almost total exclusion of English from such research (Bednarek 2006).[5]

The broader definition of evidentiality is based on the assumption that "[l]anguages typically provide a repertoire of devices for conveying […] various attitudes toward knowledge" (Chafe, Nichols 1986, vii; cf. also Chafe 1986, p. 262), including the source and reliability of people's knowledge. As such, the term evidential "covers much more than the marking of evidence per se" (Chafe, Nichols 1986, vii). In this approach, evidence is just one, but not

[5] This also explains why evidentiality was not studied in languages which do not have grammaticalized expressions of evidential markers until the 1980s. Indeed, the very fact that there are languages that express evidentiality in non-grammaticalized terms made linguists think that, for those languages, evidentiality did not exist.

the only one, of the "epistemological considerations" that are linguistically encoded in the concept of evidentiality (Chafe 1986, p. 262). "Evidentiality in this sense is concerned with matters of truth, certainty, doubt, reliability, authority, confidence, personal experience, validity, inference, reporting, factual and imaginative stance, evidence, confirmation, surprise, and expectedness" (Bednarek 2006, p. 637). The broad categorization of evidentiality offered by Chafe (1986, p. 262) includes the concept of *attitude* toward knowledge, which in Palmer's wording (1986), is an expression of *modality*. In the relationship between modality and evidentiality, Dendale and Tasmowski (2001, p. 342) identify *disjunction*, *inclusion* and *overlap* approaches. The *disjunction* approach sees evidentiality and modality in opposition, as the former asserts the source of information, while the latter evaluates a proposition (see also De Haan 1999, Aikhenvald 2003, 2004). In the *inclusion* approach, one definition includes the other (cf. Givón 1982, Chafe 1986, Palmer 1986, Willett 1988, Papafragou 2000, Mushin 2001, Ifantidou 2001). In the *overlap* approach, evidentiality and modality 'intersect' whenever 'inductive evidentiality' is identical to the "modal value of epistemic necessity" (Dendale, Tasmowski 2001, p. 342; cf. also van der Auwera, Plungian 1998, Plungian 2001). According to Dendale and Tasmowski (2001), these three approaches are possible and coexist because there are languages whose evidential systems allow both the sources of information and "the speaker's attitude towards the reliability of that information" (Dendale, Tasmowski 2001, p. 343; cf. also González 2005, Cornillie 2007).

Any scholar focusing on the concept of evidentiality must decide whether to adopt the narrow or the broader view of evidentiality (Mushin 2001, p. 51). If we take into consideration the narrow definition of evidentiality, we consider just one part of the greater study of epistemological positioning: the aspect of language that marks the speaker's/writer's source of information.[6] If we analyse evidentiality in its broader definition, there is much more: we look at the basis of the speaker's/writer's knowledge, as well as his/her attitude.

For the purposes of this paper, the type of evidentiality analysed here will follow the broader definition drawing from Chafe (1986) and Mishun (2001), but will not take into consideration the author's attitude. Indeed, as De Haan (2012) claims, the function of evidentiality is that of asserting the factual claim rather than of evaluating the factual claim (see also Aikhenval 2003).

Chafe's definition of evidentiality involves several concepts. The first concept relates to the notion of the *mode of knowing*, i.e. the way in which knowledge is acquired. There are four distinctive modes of knowing: *belief*, *induction, hearsay* and *deduction*. Each mode of knowing depends on different

[6] I would like to thank the anonymous reviewer who underlined here that the expressions "source of information" and "source of knowing" are used by scholars as synonyms, though normally those (as Chafe does) who use the latter expression also includes the notion of "modes of knowing".

sources of knowledge: belief and/or opinion are concerned with absence of *evidence* (Chafe 1986, p. 266), induction with presence of *evidence*; hearsay depends on *language*, and deduction on *hypothesis*.

In Chafe's (1986, pp. 266-269) opinion, knowledge deriving from *belief* can be expressed by mental or cognitive verbs such as 'think', 'believe', guess', 'suppose' and so on; when knowledge comes from *induction*, the most common marker is the modal verb 'must', together with such lexical items as 'obvious', 'clear', 'evidently', 'seem'. He further claims (1986, p. 268) that evidence can also denote a *sensory* source of knowledge. In this case, the evidential makers most commonly employed are 'look', 'see', 'hear', 'feel', 'sounds like', 'look like'. When knowledge is acquired through language, its source is based on *hearsay* (Chafe 1986, pp.268-269), normally realized with such verbs as 'say', 'tell', 'suggest', 'apparently', 'seem', 'suppose to'; when metaphorically used with a rumour-like meaning, and in academic discourse, by citation and quotations. *Deduction* is a source of knowledge based on hypothesis (Chafe 1986, pp.269-270), and normally expressed by such markers as 'should' and 'presumably', and, to a lesser degree, 'can', 'could' and 'would'.

Knowledge is information conveyed by the speaker/writer with evidential markers on a continuum of *reliability*, ranging from the most reliable to the least reliable knowledge. The (un)reliable knowledge we acquire from different sources and in different modes is normally checked against what we already know, which in our mind forms categories and frameworks of the world. When there is no match, we have low codability verbally expressed by means of *hedges*; when a match occurs, it is in line with *expectations*. According to Chafe (1986, pp. 264-265) *reliability* is expressed by means of epistemic expressions (adverbs, adjectives, modals etc.) indicating certainty, closeness or remote possibility; as well as epistemic modals. *Hedges* are present whenever we try to match the categories and frames of the world we already know with what we are learning. This tentative match is normally expressed with nouns, verbs, adjectives or predications such as 'sort of', 'about'. If, on the other hand, a match is possible, we have *expectations*, lexically realised with such expressions as 'of course', 'in fact', 'actually', in general, with connectives or adversatives, "which relate in various way to expectations" (Chafe 1986, p. 271). Yet, as Mushin (2013, p. 634) claims, although there is no link between evidentiality and evaluation, between source of knowledge and reliability, or attitude, in Chafe's term, it is true, however, that the selection of evidential markers by the speaker/writer may indicate a form of evaluation. "In other words, grammatical evidentials are a resource that speakers use to express their stance towards their knowledge" (Mushin 2013, p. 635). In De Haan's (1999, 2001, 2005, 2012) opinion, however, evidentiality cannot be used to reveal attitude and evaluations, because its main

function is that of validating a factual claim (Anderson 1986), rather than the speaker' attitude.

A summary of Chafe's evidential model can be seen in Table 1, below:

EVIDENTIALITY		
(un)reliable ***knowledge*** (un)matching with speaker's/writer's previous experience (hedges/boosters/)expectations		
language	⟷	Hearsay
lack of evidence	⟷	Belief
sensory/cognitive evidence	⟷	Induction
hypothesis	⟷	Deduction

Table 1
Adapted from Chafe's (1986, p. 263) notion of evidentiality.

Clearly, in discourse, knowledge (un)reliability and matches against previously acquired experience overlap with knowledge source and mode; in contrast, knowledge source and knowledge mode are inextricably dependent one upon the other.

2.1. Poster Literature review

Posters can be realized in varying sizes, contain varying numbers of tables and graphs, may have neither references nor abstracts. Nevertheless, medical posters in their written form have an extreme standardization of their narrative pattern.

The narrative pattern they describe is always vertical and the reading path offered is strategically indicated according to the various sections, called, as we will see later, *Introduction*, *Methods*, *Results* and *Discussion* (cf. for instance, Swales 1990; Gross et al. 2002, and also Cargill, O'Connor 2010) whose headings are always signposted in the text. Therefore, by following the labels, the reader can construct the correct reading pattern.

Although there is a large amount of literature and guidelines available on scientific posters by medical authors (cf., for instance, AIFA 2005; American Heart Association 2018), from the perspective of applied linguistics, the genre of posters has undergone little investigation. The first description of posters was offered by Dubois (1985a, 1985b), who examined the generic features of posters and the ways in which they are presented. She underlined their main function of *popularizing* scientific communication by exploiting elements used to attract a (medical) professional, as well as a layman, audience in order to create potential networks amongst research teams. Swales and Feak (2000, p. 81) suggest that for many years posters have been "the poor country cousin of papers, but recently they have gained in status"; their approach is mainly pedagogical and aimed at helping novice writers to produce effective posters, defined by the authors as the public display of academic writing

(conclusions which are also reached by Burgess, Fagan 2004). Swales (2004, p. 21) considers the genre of posters to be a hybrid form falling between "elements of the research paper and conference visuals or handouts". Indeed, he sees posters as a multimodal communicative event, with text, graphics, colour and (interactive) speech used to convey meaning. On the other hand, MacIntosh-Murray (2007) claims that learning to communicate scientific knowledge through posters is about much more than mastering poster fonts, colours and sizes: posters form a complex genre because of the multiple role they play in both written and oral communication, which has to be consistent with (a) professional, editorial and generic constraints, (b) interaction with an expected audience and (c) professional prestige. In addition, posters are meant to stand alone, without the presenter. In other words, posters are supposed to *do* the talking (MacIntosh-Murray 2007, pp. 351-352) and *show* medical research. As far as we know, the only contributions about posters are those made by D'Angelo (2010, 2012, 2016a, 2016b) and Maci (2011, 2012a, 2012b, 2015a, 2015b, 2016). While D'Angelo is interested in the ways in which multimodal interactional and interactive strategies are exploited to guide the readership through verbal and visual elements characterizing posters in a dialogic interaction with the poster's author, Maci focusses her attention on the poster genre, its diachronic development as well as on syntactical and multimodal aspects of poster generic structure.

To the best of our knowledge, no study has ever considered the way in which evidentiality intersects with medical discourse in posters. In other words, the aim of this paper is to investigate the extent to which knowledge acquired by a medical researcher is linguistically realized in terms of source of information in medical posters. More precisely, the investigation will focus on the following research questions (RQs):

- What are the evidential markers whose mode is defined in terms of hearsay, belief, induction and deduction and used to show various degrees of knowing?
- What evaluative/pragmatic functions do they have, if any?

The analysis of evidentiality will be drawn on Chafe (1986) and De Haan (1999, 2001, 2005, 2012). In order to describe how evidentiality is realized in the genre of posters, it seems necessary to investigate *attested* language use rather than assuming any theoretical implications applicable to them. For this reason, we will also draw on corpus linguistics. Broadly speaking, corpus linguistics is "the study of language based on examples of real life language use" (McEnery, Wilson 1996, p. 1). It is an empirical approach, since the enquiry starts from authentic data and aims to analyse and describe language use as realised in texts (Tognini-Bonelli 2001, p. 2). Consequently, the study carried out to answer the RQs may qualify as a corpus-based approach, in that

it relies on both quantitative and qualitative techniques (Biber, Conrad 2001; Mair 1991).

3. Methodological approach

Following an on-line background survey carried out with the help of the on-line medical journal *il Pensiero scientifico* and some interviews made at medical conferences (namely the 2011 Meningitis Research Foundation Conference and the 2011 National Cancer Research Institute Conference), the following sites were suggested, from which posters were randomly selected, as indicated in Table (2) below:

Websites	**No. of posters**
Istituto Superiore di Sanità (http://www.iss.it)	3
Barts and The London NHS Trust (https://web.archive.org/web/20160423000317/http://www.ihse.qmul.ac.uk/cme/bscmeded/poster/index.html	1
New York City Health and the Mental Hygiene Department (https://web.archive.org/web/20120114004140/http://www.nyc.gov/html/doh/html/dires/epi_posters.shtml)	7
International Conference on Retroviruses and Opportunistic Infections (CROI) (http://www.croiconference.org/abstracts/search-abstracts/)	7
2011 International Conference on Meningitis (http://www.meningitis.org/posters)	1
Eposternet (http://www.eposters.net/)	3
F1000 (https://f1000research.com/f1000posters-message)	2
Posters uploaded (www.slideshare.net)	4
TOTAL	**28**

Table 2
Breakdown of poster selection.

Twenty-eight posters were downloaded from the above-mentioned websites (41,587 words). Copyright permissions to use the posters collected and published online have been granted by all the institutions and journals listed above. All downloaded posters, in secure pdf. and in jpg. formats, were converted into word format with Abbey Transformer, an OCR software, and then saved as .txt to allow analysis with Wordsmith Tools 6 (Scott 2012).[7]

An already established theoretical framework was used, following the broader definition of evidentiality by Chafe (1986), and drawing from Chafe's categories to classify data. Yet the approach used was also *text-driven*, similar to Tognini-Bonelli's (2001) concept of corpus-driven linguistics.[8] Thus, the

[7] "WordSmith Tools is an integrated suite of programs for looking at how words behave in texts." Available at https://lexically.net/downloads/version7/HTML/index.html # (15.11.2018).

[8] According to Tognini-Bonelli (2001), corpus-based linguistics is a linguistics that uses a corpus to explain a theory, whereas corpus-driven linguistics is a linguistics that formulates a theory on the basis of a corpus.

exploitation of any preconceived classification of evidential markers was avoided (as, for instance, Aikhenvald 2004), which might bias the investigation. Indeed, already-existing categorizations of evidentials are certainly valid for the corpora they are extrapolated from, but they may give completely different results when applied to other specialised corpora such as the medical corpus; for instance, certain evidentials which can occur in the genre of medical posters may be disregarded in other genres simply because the evidentials here detected may not occur in those genres or in other scholars' theoretical classifications of evidentials or because they may be realized with lexical markers that are not present in those genres (and vice versa). For this reason, a sample sub-corpus from the medical poster representative corpus needed to be created in order (a) to have random samples of the types of evidential markers most commonly occurring in medical posters, and (b) to support claims regarding the frequency and distribution of these features (i.e. types of evidentials). Indeed, the study was preceded by the manual analysis of a small-scale text sub-corpus, rather than by an approach based on automated large-scale corpus analysis. For this reason, five posters were randomly selected out of the above described and indicated in Table (2), above, and read in order to detect potential evidential markers, without categorizing them on an a priori basis. The markers were first identified according to the *source* of knowing. In other words, the first step was to detect whether there was a source of knowing or not, or whether the author of the text was using language as the source of knowing or forming a hypothesis. For instance, in (1) below, the item *thought* represents an evidential marker with no source of knowing (my emphasis):

> (1)This inhibition is <u>thought</u> to be mediated through the cholesterol-rich domains on the cell surface (lipid rafts) through which HIV-1 emerges during viral maturation. […] Since all cholesterol is provided by the host, and since cholesterol is important to the viral life cycle, it is reasonable to hypothesize that HIV may have evolved to produce viral-host gene interactions that will up-regulate intracellular cholesterol. (P080)

Indeed, the passive form of the evidential form *is thought* introduces a factual claim that, in Chafe's terms, expresses a lack of evidence which has to be tested (as confirmed by the second part of the excerpt starting with "it is reasonable to hypothesize that…"). Not only is evidence missing, but also the source of information, as the absence of the agent reveals. Although in medical discourse, and in the hard sciences in general, this is a strategy employed to allow the focus on processes rather than on people (cf. Halliday, Martin, 1993), the absence of the agent is a way to avoid a face threat (Hyland, 2017). Indeed, the subject of the factual claim "inhibition" is the patient of the main clause which has occupied the subject position in a process called object-to-subject raising (Quirk et al. 1985, p. 731), thus creating vagueness in the source of

knowledge attribution.

In (2) below, the source of knowing is specified by the verb *demonstrate* which refers to the evidence offered by "data":

> (2)These data demonstrate the presence of substantial levels of non- and mono-sialylated core 1 O-linked carbohydrate on the gp120s of SIVmac and SIVsm [...] (P483)

In other cases, the source of knowing is offered by language, as in excerpt (3):

> (3)[…] all reported partners are true sexual, needle sharing, or social network partners (P272).

In others, the source of knowing could be a hypothesis, as in (4):

> (4)This suggests the anti-bacterial properties of RMGIC and GIC should be equally effective. (P054)

As can be seen, excerpt (1) can be categorized as 'lack of evidence', while excerpts (2)-(4) as 'evidence' realized via 'data', 'language', or 'hypothesis', respectively. Following Chafe (1986), the lexical evidential markers thus found were then grouped according to the mode of knowing as well as according to the *belief, induction, hearsay* and *deduction* categories that (1), (2), (3) and (4), respectively, belong to.

On the basis of the evidentials found in the five randomly selected corpus, the analysis of 28 posters allowed the detection of 2,158 potential evidential markers. Each evidential marker was run in Wordsmith Tools 6 to check concordancing, and each concordance was then manually checked to see whether the item was a real evidential or not. Verbs were also checked in their conjugated form, even if an item was not present in the corpus. For instance, if the item *estimate* was present in the corpus, the conjugated forms *estimates* and *estimated* were 'searched' for as well. Once all the concordancing had been checked, the items were classified according to Chafe's (1986) interpretation and grouped into *hearsay, belief, induction* and *deduction* categories. These were then compared with semantic domains computed by WMatrix, which permitted[9] the extraction of key domains by applying keyness calculations (a log-likelihood test) to tag frequency lists. The combination of keywords and key domains offered by WMatrix and the evidentials allowed the detection of further evidential markers which may have been missed. They, too, were double-checked, first with WordSmith Tools for concordancing lists, and then manually.

[9] WMatrix, a software offered by Lancaster University, is a type of automatic tagging software that assigns part-of-speech and semantic field (domain) tags.

A closer analysis of our data allowed the identification of three subcategories that were not relevant for this study. First, a large group of evidentials was actually formed by domain-specific words.[10] For instance, the term *significant* in excerpt (5) indicates a 'statistical significant correlation between two elements' rather something that is relevant, while the term *interaction* in (6) means 'mutual or reciprocal action or influence' from a genetic angle:

(5)[…] Compared to the MIC distribution of the previous year, no significant shift of the MIC values of vancomycin was observed. (P052)

(6)The HIV-host interactions were visualised as a protein interaction network. (P283)

Second, some words were evidential markers but metadiscursively so, in the sense that they guided the reader within the text in order to find information referred to. There are such poster headings, such as *introduction*, *conclusions* and *methods*, and labels, such as *figure*, *table* etc., of which we can find some examples of their contextual use below:

(7)Introduction
MolPAGE (Molecular Phenotyping to Accelerate Genomic Epidemiology) is [...] (P155)

(8)METHODS
This is an epidemiological study in which we assessed the clinical characteristics of all patients with […] (P333)

(9)Conclusions
*Density mapping enabled identification of a previously unrecognized geographic focus of HIV […] (P478)

(10) Figure 1: Data Flow in […] (P272)

(11) Table 1. Summary of Simian Retrovirus Serology. (P002)

Last, there are items that have been defined as 'co-textual' evidentials. They are items that better specify the type of evidence that the authors have at their disposal. An example can be seen in example (12) below:

(12) HCV laboratory results. (P001)

[10] All the words were semantically checked with the *Merriam-Webster* medical dictionary at http://www.merriam-webster.com/medical/interaction.

As both metadiscursive and co-textual evidentials reveal, the source of information does not validate the factual claim, thus they have not been regarded as strictly evidentials for the purposes of this paper. Indeed, they do not express the degree of knowledge reliability indicated by the author of the text, according to Chafe's (1986) framework.

Of the remaining evidentials, only those which occurred more frequently than five times were taken into consideration. This is because we observed that an item occurring five times or more is less likely to appear on one poster only, which may also convey less skewed results. We were thus left with 125 evidential occurrences.

This quantitative analysis was then followed by a qualitative one (Coffey, Atkinson 1996; Miles, Huberman 1994), which allowed interpretation of the findings of this study.

4. Preliminary results

4.1. Evidential Items and their frequency

The application of the methodological approach described in section 3 allowed the identification of the following evidentials:

- belief: think;
- deduction: estimate;
- hearsay: according to, confirm, explain, predict, describe, report, publish, recommend, suggest, scholarly quotation and endnotes;
- induction: demonstrate, indicate, result, show, detect, determine, indicate, investigate, observe, see, show, represent.

As explained in section 3, above, only those evidentials occurring more than 5 times have been taken into consideration for the investigation. Since *think* and *estimate* are hapax, they are dismissed; the investigation has, thus, focussed only on the category of hearsay and induction evidentiality. Table (3) shows the raw frequencies of evidentials grouped according to the category they belong to (indicated in rows two to four) and a number introduced in the table by the heading STTR, which indicates the Standardised Type/Token Ratio, i.e. occurrences normalised to a text length of 1,000 words (Hunston 2002):

Evidential	Raw frequency	STTR
Belief	//	//
Deduction	//	//
Hearsay	56	13.96
Induction	69	15.59
TOTAL	**125**	**23.82**

Table 3
Frequency of evidentials.

The analysis of evidentials in the corpus of 28 posters shows variation in their frequencies. Given that the evidentials taken into consideration are those which occur at least five times (see section 3, above), the table per se suggests that the most remarkable features are: (a) the absence of belief evidentials and deduction evidentials; and (b) the high frequency of inductive and hearsay evidentials. As to (a), the absence of belief evidentials may probably be justified by the fact that elaboration of the author's argumentation cannot be done in the genre of posters, as it belongs to a genre which has space constraints and is therefore devoted to in-progress research (cf. Maci 2011, 2012a, 2012b, 2015a, 2015b, 2016); it is often only later, in a paper, that the author can argumentatively elaborate a theory (as to the use of belief verbs, see, for instance, Thomas, Hawes 1994; as to how argumentation is developed in research articles, see, for instance, Nwogu 1997, Maci, 2012a, 2012b).

Also, the absence of deductive evidentials is predictable – medicine is science-based with an inductive bottom-up approach: experiments and observation may lead to a tentative hypothesis which can be further tested to yield a final theory.

Similarly, the presence rate of hearsay evidentials does not come as a surprise. Indeed, as confirmed by Biber et al. (1999, p. 372):

> [a]cademic prose reports relatively few physical, mental, or communication activities – and when such activities are reported, they are often attributed to some inanimate entity as subject of the verb.

As we can see in excerpt (13), the hearsay evidential has *studies* as a source of information:

> (13) The genetics studies and immunology studies underlined genetic predisposition combined with environmental factors playing the major roles in the etiology of autism. (P274)

Clearly, since studies cannot *suggest*, the hearsay verb has to be meant metaphorically, thus overlapping with inductive evidentials.

An examination of the semantic domain grouping hearsay evidentials, elaborated with WMatrix, which can be seen in Table (4) below, led us to

consider that scrutiny of the distribution of *all* evidentials seems necessary across the *Introduction*, *Methods*, *Results*, and *Discussion* (IMRD). IMRD sections of the posters under investigation:

1	of both diseases - The CDC	recommends	that all IDUs be tested for HC
2	; Objectives - To	describe	rates of HCV testing and infec
3	at the high end of the range	reported	for MSM in the United States (
4	Background : Current evidence	suggests	that HIV-1 and HIV-2 have orig
5	Current evidence	suggests	that HIV-1 and HIV-2 have orig
6	; cell associated . Here , we	report	data from a CDC linked study i
7	by ELISA and WB as previously	described	by Lerche et al . SFV antibodi
8	imers were used as previously	described	(Heneine et al, Lerche et al
9	NHPs (14 yrs with chimps) ;	reported	bites , scratches but does not
10	were consistently negative ,	suggesting	low-level viremia . Persistent
11	ity was observed for Case 1 ,	suggesting	a persistent infection . Case
12	erforms invasive procedures ;	reports	bite-scratch injuries to macaq
13	bility All SFV-infected cases	report	being in good health with the
14	V , or STLV and may likely be	explained	by the higher frequency of exp
15	mented exposure of 14.5 years	suggest	that secondary transmission by
16	rkers will be needed to fully	define	the pathogenic potential and h
17	two SRV-D seropositive cases	suggests	that cross-species infection w
18	/oxytoca : 743 isolates-15.2%	reported	as ESBL positive , 8% multires
19	w , but high compared to what	reported	in other European countries .

Table 4
Hearsay Semantic domains.

4.2. Evidentials distribution across IMRD poster sections

Previous research has revealed that medical posters have a highly codified pattern which, while transcending national constraints (Dahl, 2004, p. 1822), follows the constraints described in the *Recommendations for the Conduct, Reporting, Editing, and Publication of Scholarly Work in Medical Journals*,[11] originally known as Vancouver style, drafted in 1978 by the *International Committee of Medical Journal Editors* (ICMJE) and published in 1991 (last update, December 2017) in the *British Journal of Medicine* (BJM). Such a codified pattern adopted by poster authors is identical to that of other scientific writing, and has an *Introduction* (and *Objectives*), *Methods*, *Results*, and *Discussion*/*Conclusions*.

A close examination of evidentials across the poster IMRD pattern revealed an interesting outline, of which Chart (1) gives the major features. We

[11] Further information at http://www.icmje.org/recommendations/ (01.10.2018).

can see here that evidentials are predominantly used in the *Results* section, and yet, if we look at single evidential categories, their distribution varies according to the section they occur in. For instance, induction evidentials are more frequent in the *Results* and *Discussion* section than in the *Introduction* section, while hearsay evidentials have roughly the same frequency in the *Introduction* and *Results* sections, which is much higher than the *Methods* and *Discussion* ones.

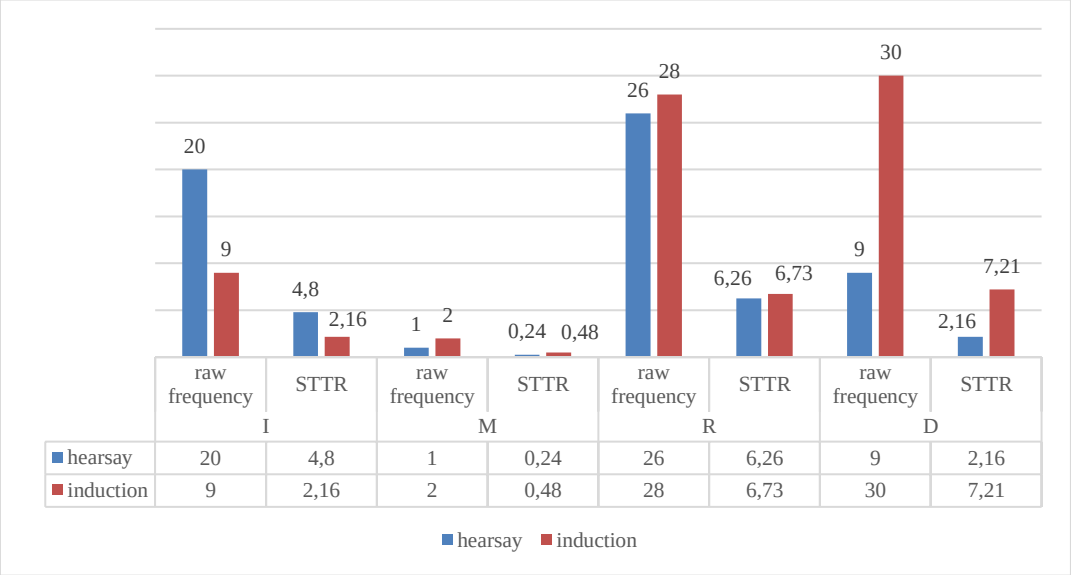

Chart 1
Distribution of evidentials across poster IMRD pattern.

Furthermore, within each category, we notice that evidentials are not randomly used but rather they follow a precise pattern. In other words, there is a preference for using certain evidentials in particular sections. For instance, the evidential *show*, which is an evidential marking an inductive (through perception) source of information, is more likely to be found in the *Discussion* section than in other sections.

In the following paragraphs, we will see in detail how the various evidentials markers are distributed in the IMRD sections of posters.

4.2.1. The Introduction *section*

In poster genre, the *Introduction* section is normally very short. It introduces background information, to which a problem or an issue is related and, finally, the explicit aim of the poster itself. All this is realized in very concise and elliptical language. Here, evidentials (30 occurrences, STTR 7.21) emphasize these points featuring the *Introduction*.

Hearsay evidentials (20 hits, STT 4.80), are normally realized in three different ways. They can focus on published literature reporting previous

research or current evidence (my emphasis, in bold) and which can be expressed by an adverbial expression, as in (14):

> (14) According to previous studies, antimicrobial resistance of S. aureus and S. pneumoniae seems to be stable. (P052)

Hearsay evidential markers can make reference to quotation to scholarly literature, as in (15), or footnotes, as in (16). Indeed, differently from Aikhenvald (2004, p. 64), Chafe (1986, pp. 268-269) underlines that "in academic writing knowledge obtained through language is indicated with the formal devices of citing a reference or personal communication", which is exactly what happens in medical posters.

> (15) Training activities on environmental and occupational health issues and work safety (**Quito, Guayaquil 2008**). (P337)

They can also be realized as verbal expressions, as the expression "indicating that" in (16), below:

> (16) [GSTPl was consistently down regulated or not expressed in prostate cancer, which coincides with previous research **indicating that** [GSTPl is methylated in prostate cancer tissue **[16,95,99-109,111-118,130,136]** (P476)

Induction evidentials (9 hits, STTR 2.16) found in the *Introduction* section are defined as knowledge deriving from evidence and these coincide with lexical items which are mainly referred to as *data*, *diagnoses*, *evidence*, *investigation*, *research* and *results*, that is, with all those elements which in medicine are at the basis of inductive scientific methods: observation, experiments, data test and analysis, as excerpts (17) and (18) below seem to indicate:

> (17) We previously **demonstrated** that some, though not all GBV-C NS5A proteins inhibit PKR-mediated eIF-2a phosphorylation, and this may help the virus avoid clearance by cellular antiviral response mechanisms (4). (P165)

> (18) Observational, clinical, and laboratory evidence **indicate** [sic] that sex steroid hormones are important to the development and progression of prostate cancer [2-14] (P476)

4.2.2. The Methods *section*

The *Methods* section of posters explains the features characterizing the scientific experimental protocol (subjects, procedures, statistics analysis, ethical approbation). It is a compulsory section and the most important one, because it is on the basis of the methodological approach of the research or experiment that the whole study is scientifically evaluated. In other words, the description of the methodology does not need any source of information in

evidential terms.[12] This explains why only three evidentials (STTR 0.48) are used in the *Methods* section: one hearsay evidential, and two inductive evidentials.

The hearsay evidential clearly indicates in detail the procedure/experiment followed/conducted, questionnaires and records, and reports sources of information:

> (19) Cell surface receptor density: CXCR4 and CD4 expression on Jurkat cell surfaces were characterized by flow cytometry as previously **described** (3) (P156)

The two induction evidentials underline how things will be identified; who amongst the diagnosed people have been selected for the experimental protocols; and with what tests, as we can see from excerpt (20) below:

> (20) The Durham Fidelity Criteria specifies [sic] that EI teams should: […] 7. Monitor DUP and collect data to **demonstrate** its effectiveness in relation to key outcomes including engagement rates, relapse rates, hospital readmission, suicide and Para suicide, education and employment functioning. (P398)

4.2.3. The Results *section*

In the poster genre, the *Results* section is the place where data collected from the scientific protocol are generally presented in figures, tables and graphs. In this section, the textual element of posters is strictly integrated with the visual one, the latter normally occupying 30-50% of the available space, as shown by Maci (2016), which means that the verbal and visual components of posters are strictly integrated. Here the use of visuals seems to be preferred because images help readers better understand key points (Mitrany 2005, p. 115). The text used in this section has, therefore, an explanatory function and is mainly realized as captions and, at the same time, conveys key scientific information. The main aim of the *Results* section is objectivity and effectively *seeing* the results expressed in graphs, tables and figures persuasively, which assures readers that the scientific procedure has been correctly followed and that the protocol can be tried and tested in any laboratory under the same conditions, as described on the poster. In addition, the presence of tables and figures demonstrates that the evidential truth represented here is unambiguous (Skelton, Edwards 2000, p. 1268). This explains why belief and deduction evidentials are absent. There is, on the contrary, a high frequency of hearsay evidentials (26 hits, STTR

[12] There might be sources in the methodological section, but this does not mean that they are evidentials. An evidential validates a factual claim by possibly indicating a source of knowledge. For instance, the sentence "The questionnaire was based on the NIMHE National EI audit of February 2005 (Pinfold, V., Smith, J. & Shiers, D., 2007)." has a source of information but no evidentiality, as there is no factual claim to validate.

6.65), when compared to the other sections. Interestingly, the most frequently used hearsay evidentials found here are verbs that report findings in a process of knowledge construction with reference to previous research as we can see in (21), below:

> (21) RESULTS […] We **have recently reported** that it is possible to label individual particles of HIV using a Vpr:IN-GFP fusion protein (Alberto Albanese, Daniele Arosio, Mariaelena Terreni, and Anna Cereseto, HIV-1 Pre-Integration Complexes Selectively Target Decondensed Chromatin in the Nuclear Periphery. PLoS ONE. 2008; 3(6): e2413. Published online 2008 June 11.) (P340)

The excerpt in (21) above clearly indicates a hearsay evidential as the verb *report* has as a source of evidence *we* and validates the factual claims introduced by *that*. Furthermore, the evidential *reported* is supported by the reference in literature within brackets, which Chafe (1986, pp. 268-269) classifies as hearsay.

There are also, but less frequently, verbs in which data are given the author's voice and explain the meaning of the finding, as in (22):

> (22) RESULTS. […] Figure 2. The initial linear relationship with square root of time **suggests** a diffusion controlled process. (P054)

A similar occurrence of inductive evidentials (28 hits, STTR 6.73) is found here: in our corpus, this type of evidentials is normally verbs whose subjects are not the authors of the poster but rather data and findings. In the poster *Results* section, in particular, the poster authors never seem to have any active involvement in data analysis (see also Gross et al. 2002; Vihla 1999). Graphs, figures and tables *show* or *represent* results. It is the poster that presents the medical research, rather than the poster author. The author's voice does not need to support facts which can speak for themselves and visual components that can stand alone. This is clearly an attempt to avoid both negative face threats (in order to receive consensus from the scientific community) and future research attacks proving the present research wrong:

> (23) Figure 2. This graph **shows** fluoride release from the GIC and RMGIC are comparable. The initial linear relationship with square root of time **suggests** a diffusion controlled process. (P054)

> (24) Panel C and D **illustrate** that NS5A has two immunoreactive bands representing different phosphorylation forms, and that NS5A expression is shut down when cells are grown in a tetracycline (doxy) (P156)

4.2.4. The Discussion *section*

The *Discussion* section of posters outlines a summary of the main results and, at the same time, offers an interpretation of the main findings. Of course, data interpretation is based on the findings resulting from the experiments explained in the *Methods* and stemming from the *Results* section – which, as our data suggest, is based on no belief evidentials but rather on hearsay and induction evidentiality (cf. Table 3, above).

In this section of the posters, the type of language is seldom argumentative and is mainly realized through bulleted sentences, due to space constraints. Conclusions are normally expressed in the present tense, describing a reality which is less likely to be counter-claimed since it is offered as a form of truth belonging to commonly shared knowledge. There is a going back and forth between what has been described in the *Results* section and the interpretation leading to possible theorization of a new scientific protocol. In this context, hearsay evidentials (9 hits, STTR 2.16) are used by the researchers to show their active involvement as a team:

> (25) Resistance to amicoglicosides and cephalosporines in E. coli is still low, but high compared to what **reported** in other European countries. (P052)

> (26) Comparison with independent sources, such as the Medical Monitoring Project, **confirms** that HEFSP captures 90-99% of confirmed HIV+ individuals. (P400)

On the other hand, induction evidentials (30 hits, STTR 7.21) are used as if there is no active involvement of the poster researchers, exactly as in the *Results* section: what has been seen, observed, identified and tested in the *Results* section, may or may not confirm what has been previously reported, following an inductive reasoning path. What is underlined is that the findings, which have been seen, observed, identified and tested in the *Results* section, offer an answer to the RQs previously indicated:

> (27) CONCLUSION […] This **reveals** that the nuclear transport of HIV in the nucleus is an active process similar to transport in the cytoplasm. (P340)

> (28) CONCLUSIONS […] From this study, FTIR **showed** practically 100% polymerisation of this monomer. The fluoride release level from the RMGIC was found to be comparable to that of GIC. This **suggests** the anti-bacterial properties of RMGIC and GIC should be equally effective. (P054)

5. Conclusion

This paper focused on those linguistic forms regarded as evidential markers in order to determine if, and to what extent, knowledge is expressed in terms of belief, induction, hearsay and deduction, following Chafe's (1986) framework, which replies to the first research question posed in this paper, that is:

- What are the evidential markers whose mode is defined in terms of hearsay, belief, induction and deduction and used to show various degrees of knowing?

More specifically, the aim was that of detecting whether the use of evidentiality has a pragmatic function in the genre of medical posters – which provided an answer to the second research question here presented, that is:

- What evaluative/pragmatic functions do they have, if any?

From the analysis, the following points emerged:

i) what evidentials are used in the genre of medical posters;
ii) the distribution of evidentials in poster genre indicates that there is variation;
iii) induction evidentials are used more frequently than other evidentials;
iv) induction evidentials are used more frequently in the Results and Discussion sections of medical posters;
v) hearsay evidentials are more frequent in the Introduction section;
vi) belief and deduction evidentials are rarely used in the poster genre.

Apparently, the distribution of evidential markers responds to the pragmatic function of posters.[13]

In the *Introduction*, posters commonly start with the indication of a research niche, which is only possible if literature on the topic is displayed (hearsay evidentials).

The *Methods* section describes protocols, processes, subjects, ethical probation, in detail, as reported by the poster author who by using hearsay evidentiality, makes references to the medical literature necessary to demonstrate the experiment (induction evidentials).

[13] Although posters have IMRD sections exactly as the genres of RAs and abstract (cf. Swales 2004; Nwogu 1997), and even though bot RAs and abstracts are organized in such a way as to realize IMRD pragmatic functions, it is not possible: 1) to compare posters and abstracts given that no analysis of evidentiality has ever been carried out on evidentiality in the genre of abstract; 2) to compare posters and RAs because the only study carried out on medical RAs and evidentiality (Mocini 2015) focusses on the relation existing among attribution, the source of information, the types of information this source provides, and how the evidence is validated by adopting a Systemic Functional Linguistics approach and the Appraisal Theory and without taking into consideration the IMRD structure of RAs.

The *Results* section, featuring lots of visuals, which in most cases do not need any support from text, exploits evidentials to illustrate (by means of induction evidentials) results in a process of knowledge construction and to link them discursively to the background medical literature (expressed by using hearsay evidentials) cited by the poster author.

The *Conclusion* section presents the people metonymically (hearsay evidentials) responsible for the main results of the investigation (induction evidentials): this is expressed in evidential terms via hearsay and induction evidentiality, the former used to introduce scholarly quotation, the latter to bestow results.

As we are aware of the fact that this investigation is based on 28 posters only, and that posters are extremely short in their content, we will carry out future research with a larger corpus, to test what we have found in this study. This will help us to see whether there are certain lexical and syntactical regular patterns of evidentiality in specialised contextual use (collocation and clusters); furthermore, a follow-up on such a topic will offer better insights into how these different evidential modes rhetorically merge in scientific discourse.

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