

Popularizing biomedical information on an online health forum

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Abstract

Given the increasing importance assumed by online health forums as a form of doctor-patient communication, this study describes the types of dialogic and polylogic interactions that develop in this type of communicative event, focusing on a corpus of threads drawn from an “Ask a Doctor” forum in the area of cardiology. Adopting a discourse analytical approach, the investigation illustrates how these forums may popularize biomedical knowledge. After describing the shifting conceptualization of popularization, we present a new conceptualization of Web 2.0 popularization which we call “oblique popularization”, as it is indirect, user-generated, dialogic and polylogic, and targeted. In particular, this study characterizes the online health forum as a Web 2.0-style popularization tool. It does so not only because biomedical information communicated to a single inquirer is also available to the whole population, but also because the function of the online forum as a medium of popularization is discursively acknowledged by the participants. The study also explores what explanatory tools (such as definitions, analogies, exemplifications, and generalizations) are used by the experts to present complex or technical information. The analysis shows that biomedical information is circulated on a health forum by a complex network of participants, and that e-patients’ posts may also serve as prompters of popularization.

Keywords: online health forum, health communication, doctor-patient interaction, discourse analysis, popularization strategies.

Resumen

La popularización de la información biomédica en un foro de salud online

Dada la creciente importancia que han adquirido los foros de salud online como una forma de comunicación entre doctor y paciente, este estudio busca describir

los tipos de interacciones dialógicas y polilógicas que se desarrollan en este tipo de acto comunicativo. Para ello, el estudio se centra en un corpus de secuencias comunicativas de un foro “Pregunte a un doctor” en el área de cardiología. El estudio adopta el marco del análisis del discurso para ilustrar cómo se populariza o divulga el conocimiento biomédico. Tras describir la cambiante conceptualización de la noción de popularización, proponemos una nueva conceptualización de la popularización de la Web 2.0 que denominamos “popularización oblicua”, en tanto que es indirecta, generada por el usuario, dialógica y polilógica, así como con un objetivo o propósito concreto. En particular, el presente estudio caracteriza el foro de salud online como una herramienta de popularización de perfil Web 2.0 en tanto que la información biomédica se comunica no solo al individuo que pregunta sino también a toda la población. Además, la función del foro online como medio de popularización es igualmente reconocida a nivel discursivo por los participantes. El presente estudio también explora qué estrategias aclaratorias (definiciones, analogías, ejemplos, generalizaciones) utilizan los expertos para presentar información compleja o información especializada. El análisis muestra que la información biomédica se distribuye en un foro de salud mediante un complejo entramado de participantes y que son los correos electrónicos de estos participantes los que sirven para construir la popularización.

Palabras clave: foro de salud online, comunicación sobre salud, interacción doctor-paciente, análisis del discurso, estrategias de popularización.

Introduction

The Internet revolution has had important implications for the ways in which patients gather information. It has led to the evolution of a new communication paradigm in health communication known as Health 2.0 or Medicine 2.0 (Van de Belt et al., 2010) due to the use of Web 2.0 communication technologies where content is user-generated. The new dynamics generated by the Health 2.0 paradigm have made patients more knowledgeable and active in the care process, hence modifying patient-physician interactions. In particular, e-patients that characterize the paradigm of e-medicine are increasingly proactive (Ferguson, 2008) and do not represent merely passive recipients of information. For instance, both on patient-patient and doctor-patient forums, patients not only initiate threads, but also contribute to disseminating biomedical information by offering comments that have informative and educational functions in that their posts may help other participants co-construct knowledge about a certain

topic. What emerges is a shifting paradigm where the patient is not only provided with information, but also arguably plays an active role in the popularization of biomedical knowledge.

The Internet clearly has great potential in terms of the dissemination of health knowledge: for instance, a survey conducted in the US reveals that 72% of Internet users in the America seek health information online (Fox & Duggan, 2013). Even though there is broad agreement that online interactions should complement (but not substitute) traditional face-to-face encounters, for some people health forums represent the primary way of accessing medical information for convenience or financial reasons. It is therefore imperative to investigate the interactions developing there, also from a discursive perspective, in order to observe how language used in authentic texts may reflect specific interactional and communicative practices. Indeed, the spread of online health communication brings with it an increasing range of research questions which need to be addressed in that they potentially affect the approach to medical information both from an organizational and individual perspective. Knowledge asymmetries are at the core of doctor-patient interactions and the roles are to some extent clear and pre-determined even on an online forum. However, the knowledge asymmetries that underpin the interactions on online forums are particularly complex. On the one hand, certain traits of the doctor-patient consultation are clearly present, but the nature of the online exchanges gives them particular aspects.

Two main research questions are explored in this study: (1) how “Ask a doctor” forums such as that investigated in the present paper can be defined as having popularizing functions, and (2) in light of previous work on popularization strategies by Calsamiglia and van Dijk (2004), what explanatory structures are used to communicate specialized information to patients. This paper correspondingly has two main focal points: (1) it contributes to supporting the view of what we define as “oblique popularization” which is reflected in the threads of patients and medical professionals, and which we identify as a particular type of popularization, and (2) it examines the popularization strategies which are employed to explain biomedical concepts in online health communication. Thus, the paper initially explores the theoretical concept of popularization with particular reference to the popularization of biomedical information and the co-construction of knowledge in an online health setting, focusing on the interaction between medical professionals and patients in order to set the

framework for the empirical analysis. Subsequently, after a presentation of the methodological approach, the analytical section focuses on the discursive realization of popularization processes, with particular attention being devoted to the use of explanatory tools.

More specifically, we examine the approaches used to communicate biomedical information across knowledge asymmetries on the “Ask a Doctor” forum of the DoctorsLounge site (DoctorsLounge, 2012). We compare the strategies used on this forum with those identified in previous studies of popularization in offline newspaper articles (e.g. Calsamiglia & van Dijk, 2004) with the aim of observing whether similar approaches to communicating biomedical concepts are evident in online communication too. Here, the dialogic form of the data examined in this paper is particularly valuable as it helps to indicate patients’ satisfaction or otherwise with the answers provided. Thus, the main contribution of the paper is that of improving current understandings of popularization as a discursive accomplishment in online media.

Popularization

Given that this article contributes to existing popularization theory with the notion of “oblique popularization”, it is important to situate this new concept against the backdrop of existing theory. As will be seen below, popularization theories have evolved over time, acquiring new meanings, whilst others have fallen out of fashion. Many of the more recent understandings of popularization reflect a constructionist approach, in line with the constructionist trend within social science research (e.g. Burr, 2003: 1; Alvesson & Sköldberg, 2009: 15).

Shifting conceptualizations of popularization

In the canonical form of popularization, the sender is assumed to possess authoritative, expert scientific knowledge (Myers, 2003: 266), whilst the public is “typically viewed as large, diffuse, undifferentiated and passive” (Whitley, 1985: 4), a “blank slate of ignorance on which scientists write knowledge” (Myers, 2003: 266). A common metaphor for the popularization process is “translation” (e.g. Bucchi, 1998: 4), where expert, esoteric knowledge is “translated into ordinary language for public dissemination” (Whitley, 1985: 6). In the canonical approach, simplification (Bucchi, 1996:

376) is crucial. The complexity of knowledge is deemed to shrink in the process of popularization, as reflected in the model which represents popularization as a funnel with the broad end reflecting experts' knowledge and the narrow end reflecting receivers' knowledge (Bucchi, 1996: 381; 1998: 13). The canonical understanding of popularization is characterized by a one-way transmission or dissemination model of communication (Whitley, 1985; Bucchi, 1996: 376; Myers, 2003), and it is assumed that the public's acquisition of knowledge has "few social consequences" (Whitley, 1985: 5).

Other definitions of popularization have also emerged. Whilst still appealing to the transmission model, Whitley (1985: 12) points out that recontextualization is an important element of popularization. McElheny (1985: 277) also questions the assumption that the public is passive and indifferent to expert knowledge, stating that popularization often "arises from a strong demand from the public for such information". Similar to Myers (2003: 269) who cites health and risk as areas of specific interest for the general public, McElheny (1985: 281) identifies health and environmental issues as being of general concern to publics who are "eager for such information". He pushes the argument further, making the Foucauldian point (cf. Foucault, 1991) that popularizers of science have a governmental function as they determine the horizons for discussion about scientific matters amongst the public (McElheny, 1985: 277). On that basis, he also argues that humanistic and social science scholars should critically investigate the contours of the topics of popularization. In viewing experts as defining what the public needs to know, this perspective on popularization assumes a one-way directionality in information flow from expert to lay.

Over the years, the canonical view of popularization (described *inter alia* by Hilgartner, 1990; Bucchi, 1998; Grundmann & Cavallé, 2000) has been subjected to further review and critique. Hilgartner (1990: 528), for example, points out that "popularization is a matter of degree", suggesting that the sharp dividing line between expert and lay should be replaced with the notion of a spectrum. Gülich (2003), in his examination of spoken interactions, also questions the boundary between expert and lay participants (see also Sarangi, 2001, on the concept of "lay expertise" and "expert laity" and Myers, 2003: 267, who problematizes the categories of "expert" and "lay"). A co-constructive approach emerges from the conceptualization of popularization as recontextualization (Calsamiglia & van Dijk, 2004). Moreover, the concept of context models (cf. van Dijk, 2009) seems to confirm the nature of popularization as a co-constructive process in that

these models are “construed and dynamically updated by the participants” (van Dijk, 2009: VII). In this regard, Gotti (2014: 23) notes that “popularization is thus not just seen as a category of texts, but as a recontextualization process that implies relevant changes in the roles taken on by the actors and institutions involved, and their degree of authoritativeness”.

In keeping with this constructionist approach to popularization, recent popularization studies reflect the general “discursive turn” in the humanities and social sciences more generally (Weatherall, 2002: 146). Moirand (2003: 191) notes the non-linear, cyclical quality of popularization, where information that has been subject to popularization enters an “interdiscursive memory bank”, thereby also rejecting the “atomistic” (Whitley, 1985: 4) understanding of the public as consisting of isolated individuals in traditional popularization theory. An intertextual approach is adopted in Calsamiglia and López Ferrero (2003), who examine the use of reported speech and expert knowledge in texts, also reflecting a view of popularization as discursive and constructive.

Oblique popularization?

The basic thesis of this paper is that “Ask a Doctor” online forums constitute complex examples of popularization processes. “Ask a Doctor” forums are very different to the live patient-doctor encounter in the clinic as the main function of the forum is to provide information rather than diagnose and treat individual patients, and online forums are public, whereas the clinical encounter is private. Both of these features – information-provision and the public nature of online forums – contribute to the popularizing qualities of “Ask a Doctor” forums. We examine first more specifically the evidence for “Ask a Doctor” forums having a popularizing function, and then explain what we mean by “oblique”.

Online health forums as popularization

Following Bucchi (1998), popularization processes imply the presence of a recognized expert, a recognized non-expert, and a type of information which is specialized but presented in a way that is assumed to be understood by a lay public, in that it is meant for the *populus*. Consequently, “Ask a Doctor” forums may be seen as particular forms of popularization for several reasons.

First, these sites serve ostensibly as a means of imparting complex biomedical information on the part of the experts in an accessible way. Second, the interactions, while initiated as one-to-one exchanges, gradually become a repository of clinically relevant health information on a vast array of medical subjects that reflect the real concerns of individual patients and are available for the (Internet-accessing) public's perusal. In the forum we examine, threads can receive hundreds, even thousands of views revealing the extent of their popularity, in line with the view of popularization as (ideally) involving the public at large (Calsamiglia & van Dijk, 2004: 371; Luey, 2010: 26). The posts are visible to those who have not registered on the website and who may just be "passing by". There is often the exhortation to "lurk", and it is highlighted that browsing does not require any registration (DoctorsLounge, 2012). Thus, while popularization is traditionally intended for a mass audience, forums such as the "Ask a Doctor" forum explored here have a more restricted, but potentially large, number of readers. Third, popularization is generally understood as "mass popularization", involving a mass audience, and often relying on mass media. The widespread use of the Internet as a medium allows us to include it among the mass media which may have popularizing objectives/effects.

The online health forum as "oblique" popularization

Popularization has been aptly defined as:

a social process consisting of a large class of *discursive-semiotic practices*, involving many types of mass media, books, the Internet, exhibitions and other genres of communicative events, *aiming to communicate lay versions of scientific knowledge*, as well as opinions and ideologies of scholars, *among the public at large* [original emphasis] (Calsamiglia & van Dijk, 2004: 371).

Popularization is thus generally intended to communicate scientific knowledge to the general public. The kind of popularization that takes place on an online forum is significantly different, and we define it as "oblique". In this case the interaction is user-generated and initially concerns a specific group of participants, but indirectly may involve a considerably larger number of other potential users. More precisely, typical interactions on the online forum analyzed here may be represented as concentric circles. The inner circle includes those immediately involved in the question and answer communication (e.g. Patient 1 and Professional 1). The next level includes others who contribute to that discussion (Patient *n* and Professional *n*),

although this may be an empty level if the only contributors are Patient 1 and Professional 1. The outer circle involves the lurkers – any other potential users.

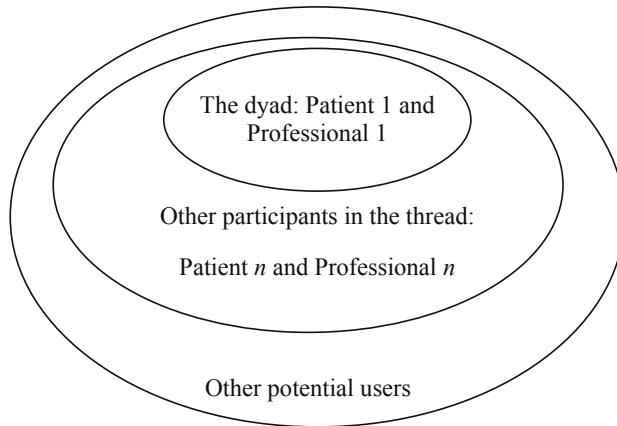


Figure 1. Participants on an online forum.

Oblique popularization on an online forum differs from traditional forms of popularization in the following aspects. Firstly, the e-patient starting the thread usually has a specific objective (e.g. to obtain an expert's opinion on a diagnosis or treatment). They may not wish to learn about a particular medical area more generally (e.g. to learn about how the heart works), which is expected by someone reading popularization texts which have a clearly informational and educational agenda (Shinn & Whitley, 1985: vii). Secondly, traditional popularization texts are often written and delivered by people who are technically non-specialists or act as a bridge between experts and laypeople (Ciapuscio, 2003). However, in the case of online forums, the experts themselves, as well as other participants with different types and degrees of knowledge, are responsible for posting the comments. Thirdly, unlike canonical forms of popularization which have to do with direct communication to a mass audience, the process taking place in an online forum addresses one (or a few) specific readers directly, and indirectly the public at large. Popularization is generally meant as a one-to-many interaction, but online forums involve interactions that are both one-to-one and indirectly one-to-many. In other words, the information provided is meant for the one user who specifically asked about it, but it is made public and indirectly has a popularizing function. Thus, popularization may not be

the primary purpose of the exchange, but it assumes an important function within the communicative process. Moreover, an online forum describes a public space which constitutes a virtual area for discussion on a specific topic (Antelmi, 2011). Consequently, an online health forum also differs from other types of online arenas in that it selects from the wider public an audience which is specifically targeted because it shares similar condition-related concerns (Antelmi, 2011: 287; see also Anesa, forthcoming).

Table 1 summarizes the main differences between traditional forms of popularization and the characteristics of oblique popularization on an online health forum.

	Popularization	Oblique popularization
Popularizing purpose	Primary	Secondary
User-initiated	No	Yes
Addressees	Directly a mass audience	Directly a specific audience and indirectly a broader audience
Interaction	Primarily monologic One-to-many	Dialogic and polylogic One-to-one and one-to-many
Targeted	Less specifically targeted	More specifically targeted

Table 1. Features of oblique popularization.

To sum up, popularization is not intended here in its more general sense, but rather as an indirect form of popularization, which can be called oblique and interpreted as a “secondary effect” on the totality of readers, not only the one who initiates a thread. Indeed, the information provided is aimed at one person, but the data also reveal that there is awareness amongst all users of a wider group of (potential) users.

Methodological approach

This analysis is based on a corpus which consists of 129 threads available on the public forum of the DoctorsLounge website (DoctorsLounge, 2012); the total number of tokens is approximately 236,000. Selection criteria for the corpus were thematic consistency (cardiology); recency (from 2009 onwards); interactivity (at least five posts in a thread); and collaboration (at least two different users). In particular, the selection of threads that consisted of at least five posts was intended to capture the interactivity of the medium. In fact, even though interactivity is an intrinsic potential of online forums, many of the threads on DoctorsLounge have a reactive

(consisting simply of one reply) and not interactive aspect. Moreover, given the study's particular focus on popularization strategies, the selection of threads with at least five posts allows us to delve into the participants' reactions to specific biomedical explanations as subsequent posts provide a valuable form of feedback on previous ones. It may certainly be argued that threads with only one response still potentially represent a form of popularization. However, for the purpose of this study, focusing on longer threads allows us to gain deeper insights into the interactional dynamics taking place.

The site we chose represents a Web 2.0-style medium where longer threads often explain, in quite elaborate terms, likely biomedical scenarios as well as medical histories and symptoms. Thus, this medium allows for insights into the dissemination of biomedical information and the circular sharing of such information among participants (as well as information from individuals *in absentia* such as friends, doctors, acquaintances, whose views are cited on the forum). Among the different sites available for analysis, DoctorsLounge was chosen because it offers many advantages. First, it provides an ongoing tally of how many views each thread receives, which illustrates the popularity of the individual threads, a function that was not shared by the other sites we had considered. Second, the site also provides specific information on the professionals who post the answers (such as their job, qualifications, and country) which is important in relation to their role as experts. Third, the approach to the public was interesting from a popularization standpoint as DoctorsLounge also has an educational function, in that typically patients can learn more about a specific topic thanks to the information posted by other participants. The service is completely free, and patients are encouraged to read other patients' posts and are occasionally directed to other relevant articles on specific conditions and treatments, written by professionals and available elsewhere on the website. Fourth, the forum on DoctorsLounge has a particularly clear layout. It is organized into different disciplinary fields, which are then further subdivided into specific sections. Each section deals with a specific medical area, thus enhancing thematic consistency. Fifth, the public nature of the posts is made evident on DoctorsLounge, limiting the room for ethical issues on the use of data. In this regard, it is up to individual users to make sure they remove any identifying information, and they are expressly told that they need to be responsible for concealing information that could lead to their identity being revealed.

An initial coding was performed using QDA Miner Lite, a program that supports the qualitative coding of text by multiple coders. For this analysis, the coding focused on discursive, textual and stylistic features. First, we manually coded aspects of patients' posts that acted as prompters of popularization, such as requesting clarification, attempting to paraphrase, asking for repetition, etc. Then we focused on popularization devices with particular reference to how they are used by professionals. In this regard, special attention was devoted to the identification of "explanatory structures") which are used to connect old and new knowledge for popularization purposes (following Calsamiglia & van Dijk, 2004: 374). For example, coding was used to identify denominations, metaphors, definitions, descriptions, reformulations, paraphrases, exemplifications, and generalizations (following Calsamiglia & van Dijk, 2004) with attention being devoted to the emergence of other potential explanatory structures, such as analogies or other figures of speech which may assume an explanatory function.

Analysis

Complex network of participants

The process of information dissemination on the forum does not lie exclusively in the hands of the professionals. Rather, experts often highlight how patients' contributions could be valuable for other readers. Indeed, the process of sharing information does not only assume the form of expert-patient, but also patient-patient and even patient-expert, and displays aspects of circularity through different participants and potential future readers. The following statements from experts underline the learning benefits for a broader network of beneficiaries:

- (1) Thanks for touching base with us and for sharing a potentially very valuable bit of information!
- (2) Great to hear from you and really happy to have you drop us a positive update, which really could be useful to a lot of doctors (and patients, too).

This is not to assume that in other types of interaction the co-construction of knowledge does not involve mutuality, cooperation and reciprocity, but simply that such processes are made public on a health forum. In particular,

the communicative process taking place on the forum is not exclusively a doctor-patient dyadic interaction like that which is possible in the privacy of the clinical consultation, but rather a complex series of relationships.

Participants constantly reflect awareness that the interactions in the threads can benefit others, and this point is expressed by both professionals and patients in their exophoric references to other readers. For example, the professionals' answers often have a twofold purpose: firstly, to reply to a specific patient and to address his/her health concerns; secondly, to make those answers generally understood so that they provide a repertoire of medical information for all potential patients interested:

- (3) For the sake of possible interested readers who my [*sí*] visit this thread [...]
- (4) That exam should pretty much put your (and everyone else's) mind at ease.
- (5) I'd like to insert here, for the sake of any passing readers, that three days of indigestion, even three hours of it, is a red flag and should be investigated, especially in men over the age of 50.

These references also reflect the process of generalization as well as provide evidence of "oblique" popularization.

New information is circularly, intertextually and interdiscursively presented, in that it is not presented in a dyadic form, but all the participants contribute to the sharing of information by eliciting or offering different points of view. References to other patients by patients who are similarly aware of the enormous potential of the forum in terms of knowledge sharing are also present. The comments they receive are not only useful to the individual patient but constitute a gamut from which all passing readers may draw. A sense of community emerges, and this seems to be enhanced by a communion of purposes and intentions shared with patients who may experience similar situations:

- (6) i [*sí*] notice this has been veiwed [*sí*] by 34859 people.
- (7) I will get some answers (which I'll post on here in case others can relate to my unfortunate situation)
- (8) so if it's OK, I'll post what I find out for everyone's benefit.

A patient may also act as a messenger and a link between experts, showing a continuum between the online interaction and the face-to-face one, as the two forms of consultation are not necessarily mutually exclusive. The offline-online boundaries are often intertwined, as information gathered offline may be reframed online and vice versa:

- (9) Thank you so much! I have printed off your answer and will be taking it with me tomorrow to the naturopath and the cardiologist.

These processes also demonstrate that information is communicated not only to laypeople but also “through” laypeople.

E-patients as prompters of popularization

E-patients’ activity on a health forum is very complex and goes from asking for information to formulating their own hypotheses, from narrating their medical histories to checking understanding, indirectly contributing to the popularization of biomedical information. On a forum, explanatory strategies are based on knowledge asymmetries which are not only assumed (as they would be in a more typical popularization text) but are also expressed verbally. By initiating threads, e-patients initiate online interactions which may have indirect popularization effects. For example, they may need clarification of certain biomedical notions, and ask for definitions of technical terms:

- (10) One last thing, on my echo report it said ‘In the apical views the IVS appears mildly [*sic*] dyskinetic’ what does that mean?

Patients may also expressly state that they need help in understanding and framing test results, given their technical nature:

- (11) Mild prolapse of anterior leaflet of mitral valve with trival [*sic*] MR. >Normal LV dimension [*sic*] with normal function. what does it mean.

The inquiry is often formulated in such a way as to ask for the general meaning of a concept plus its specific significance:

- (12) The monitor said this was five beats of AIVR. What is AIVR, and is it something I should be worried about?

- (13) Also, can you explain the systolic bowing and if that is a problem?
- (14) just wondering about something that was mentioned after echo about the lung pressure slightly high! what is it and what are the implications of “slightly”.

What patients need is often a specific understanding of a concept in a given context, rather than its abstract definition, which they can find through other means.

- (15) The report from my echo last week was normal except it reported that the apex of the left ventricle is hypokinetic. I understand the meaning of the word hypokinetic, but can you explain what significance this has?

In other circumstances, patients paraphrase and reframe a concept and then ask for confirmation of their interpretation. Such reformulation is an example of their proactive role in popularizing biomedical information. Although the main objective of this type of clarification is individual, it is possible that other readers may find this clarifying too.

- (16) Does this mean that the low Iron is not the likely culprit?
- (17) Does this mean that 200 bpm isn't dangerous for me because I start high anyway?
- (18) Would you be able to briefly explain what these results mean? I'm assuming it is a normal, but fast, reading and that is why it looks abnormal. Am I right?

E-patients demonstrate both experiential knowledge, which is often acknowledged by the expert, as well as familiarity with biomedical terminology and technical information (Fage-Butler & Nisbeth Jensen, 2013). Such patients are often active in referring to other sources in order to encourage information-sharing. This is in line with Hardey's (2001) observation that medical information on the internet is provided by a vast range of participants, and that patients also assume the role of producers of medical information. For example, references to other sections of the site which are deemed useful are evident:

- (19) I also read something about that we should be careful when using Warfarin with depressed patients (here [http://www.doctorslounge.com/hematology ... rfarin.htm](http://www.doctorslounge.com/hematology...rfarin.htm)).

With a similar purpose, references are also made to other external sites:

- (20) I was surfing the web and found the Bicuspid Foundation (<http://www.bicuspidfoundation.com>) website where it mentioned the possibility of BAV patients developing aneurysms in their early 50's.

Patients' posts make it possible to observe developments in the interaction and to investigate how different "knowledges" constantly intermingle and are reciprocally influenced in the processes of discursive co-construction.

Experts' explanatory tools

Explanation plays a fundamental role in popularization processes. Drawing on the explanatory tools identified by Calsamiglia and van Dijk (2004), the analysis focuses on the ones that emerge more significantly in our corpus, namely definitions, figures of speech (with particular reference to metaphors), exemplifications and generalizations.

Definitions

Among the different explanatory tools used by experts are definitions, which aim to "explain unknown words" (Calsamiglia & van Dijk, 2004: 379). Popularization texts frequently make use of definitions which consist of hypernyms and superordinate nouns followed by a specification (often in relative clauses, see Anesa, forthcoming). Manifest definitions are often introduced by definitional verbs such as "call", "define", etc:

- (21) First, your husband is having occasional premature ventricular contractions (PVCs). When these occur as every other beat (a regular beat followed by a premature beat followed by a compensatory pause, then repeat ad nauseum) it is called "bigeminy"

Everyday words used to explain a phenomenon are often followed by a parenthetical technical definition intended to help the patient who made the initial inquiry and other potential readers to understand further technical references to that phenomenon:

- (22) this trio of defects (commonly called "tetralogy of Fallot") [...]

Quite commonly, the parenthetical definition is preceded by the disjunctive conjunction *or*:

- (23) you have high blood pressure (or prehypertension).
 (24) pulmonary hypertension (or cor pulmonale, abbreviated "CP" for future reference).

Elsewhere, the technical term is followed by the description of its meaning. Parenthetical reformulations are based on the process of linking a new concept with something the reader may be familiar with (cf. Ciapuscio, 2003). As Gotti (2011: 185) aptly states, this type of juxtaposition establishes “a semantic equivalence” which is similar to the structure of definitions in a monolingual dictionary:

- (25) orthostasis (getting lightheaded upon standing after being at rest) [...]
- (26) Is it considered idiopathic (without known cause)?

Definitions are sometimes provided in answer to a specific request on the part of the patient:

- (27) what that means is there is mild outward bowing or distortion of the forward (frontmost) of the two leaflets, which is minimal criteria for diagnosis of “prolapse” (it could be a lot more “floppy” but is very little).
- (28) Trivial regurgitation means just that, very minor and trivial, inconsequential but noted.

In other cases, specific definitions are accompanied by further explanation of terms that are assumed to be potentially complex for the patients:

- (29) What dysautonomia means, literally, is “dysfunction of the autonomic nervous system.” The autonomic nervous system is that part which controls a lot of normally unnoticed functions, such as heart rate and output regulation, moment-to-moment blood pressure regulation, and even dilation of blood vessels, especially capillaries in the skin. While this can be an essential and physical (though poorly understood) syndrome, it is also definitely a part of various anxiety syndromes.
- (30) Tell your doctor you’d like to be checked for nystagmus which is that simple “watch my finger” test for BPV. If your eyeballs bounce on the horizontal plane (sounds weird but trust me on this) then that’s what it is, and there’s over-the-counter medication that’ll almost always handle that.
- (31) In some clinics, at least here in the US, MVP syndrome without a finding of MVP is called dysautonomia, meaning a malfunction or inappropriate responses by the autonomic nervous system, which is what MVP syndrome is anyway.

Sometimes the origin of a term is also explained. Even though it may not have been requested, it is deemed important in order to understand a particular phenomenon.

- (32) The problem rarely happens out of the blue, but it can show up fairly abruptly, which is how the word “attack” came into use.
- (33) The term “neurasthenia” is an antique word no longer used in medical circles, primarily because it was generally applied to people who were thought to be weak or tired because of emotional disorder — in the “all in your head” sense. It was once also a catch-all term for what was probably chronic fatigue syndrome and other not-yet-recognized disorders for which there was no diagnostic criteria.

In an asynchronous forum such as DoctorsLounge, e-patients do not generally ask for aseptic definitions, which can be easily obtained through research. Rather, requests often refer to the specific significance of a phenomenon in relation to a particular case. In this regard, experts may metadiscursively stress the ability and the willingness of the readers to understand specific terminology, thus highlighting a reduction of assumed knowledge asymmetries:

- (34) in the critical care setting post MI (I’m going to assume you’ve done enough research to understand these terms) [...]

These processes are in line with the evidence that some patients display substantial technical knowledge about a particular phenomenon.

Tropes

Tropes often allow us to reframe complex notions through familiar concepts or experiences. In particular, the use of metaphors in clarifying scientific concepts in science education is well-recognized (e.g. Niebert, Marsch & Treagust, 2012). Explanations based on this process are particularly useful in online interaction in that other tools immediately available in face-to-face encounters (such as gestures or other extra-verbal tools) are generally not used in a forum.

More specifically, our data show a considerable presence of metaphorical expressions. A metaphor has been defined as a cross-domain mapping

where meanings are projected from the source domain to the target domain (Lakoff & Johnson, 1980; Kertész, 2004). In keeping with the role of metaphor in popularizing discourse (Calsamiglia & van Dijk, 2004) and science education more generally (e.g. Bucchi, 1998; Kertész, 2004), metaphors are also used in this “Ask a Doctor” forum. The online expert exploits metaphors as an explanatory tool to convey biomedical information to the patients:

- (35) The “normal LV dimension with normal function” means your left ventricle, which is the real *workhorse part* of the heart, is working perfectly [italics added]
- (36) I think your best bet right now may well be to see the general practitioner/family physician, as he can (and often should) act as “*quarterback*” for the specialists and help to prioritize the care your mom needs [italics added]
- (37) it’s all very technical and involves both *electrical and plumbing issues* [italics added]

Similes are also employed to describe particular phenomena or to depict particular feelings or sensations:

- (38) They can feel like a *little flick of flutter* sometimes, while at other times they can feel almost like a *kick in the chest* [italics added]

Personification is also occasionally used:

- (39) I think this is probably the *anxiety “talking” in a new symptomatic dialect* [italics added]

Expressions that employ technological references are quite common and are used to explain specialized biomedical concepts. Metaphors drawing on this domain include the following:

- (40) Otherwise I think it’s just going to take a little while for things to “*reset*” *themselves*, but that is fairly normal, given all the circumstances [italics added]
- (41) Here’s what seems to be going on: you are probably “*wired*” for panic disorder, but are only on the fence with it (so far, so good) [italics added]

Similarly, idiomatic expressions based on the technological domain are also present:

- (42) There is some controversy about why this is, with some arguing it is the result of subconscious concerns playing out “*under the radar*”, while others suggest, rightfully so, that panic attacks are a seizure-like event, originating in the temporal lobe of the brain, and so can come on without any intellectual content being involved [*italics added*]

Exemplification

Hyland (2007: 270) describes exemplification as “a communication process through which meaning is clarified or supported by a second unit which illustrates the first by citing an example”. Exemplification allows the reader to focus on a more familiar experiential concept, which otherwise may remain expressed in abstract terms, and to link that concept to concrete and specific situations:

- (43) Electrolyte [*sic*] solutions are OK used in regular dietary supplements for most of us...for example Gatorade and Powerade are both over the counter electrolyte preparations. However, having a cardiac dysrhythmia can be caused from many reasons other than and electrolyte imbalance.
- (44) the suspicion would fall to the most insidious probable cause which, in your aunt’s case would be an undiscovered malignancy or connective tissue/autoimmune disease (lupus, for example).

Generalization

An important aspect of popularization is generalization, which exploits processes that are the reverse of those used by exemplification (Calsamiglia & van Dijk, 2004: 383). Starting from a specific case involving a specific patient, the expert may draw more general conclusions which are applicable to a vast number of potential readers, thus fulfilling informative as well as educational purposes:

- (45) You raised a very important question early on: can this dysfunction go away? For the sake of possible interested readers who my visit this thread, it is unlikely (as I’m sure you now know) that any degree of valve dysfunction will go away on its own, especially aortic valve dysfunction.

- (46) bear in mind that young, otherwise healthy women quite often have serious heart problems overlooked by doctors because women tend to develop heart disease later in life (statistically).

Generalization is very useful on an online forum where interaction not only involves the actual users posting in a specific thread but also external readers through the use of exophoric references.

Concluding remarks

Given the increase in the use of the Internet amongst patients and the implications of readily available biomedical information for the evolution of the e-patient, health communication research is increasingly focusing on online exchanges (e.g. Fage-Butler & Nisbeth Jensen, 2013; Hu et al., 2012; Nimrod, 2013). The aim of this study was not to present generalizable conclusions, but rather to offer some insights into the popularizing role that online health forums may assume.

We took as our point of departure the idea that the Internet has great potential in terms of popularizing medical knowledge. In particular, we investigated an asynchronous online forum, where participants displaying different types of knowledge are virtually connected. In this paper, we identify this genre as a vehicle of popularization, which emerges first of all from the large number of views that some of the posts receive. An online forum is not only an arena for gathering, verifying or commenting on information but is also a locus where the co-construction of knowledge takes place and where the popularization of biomedical information assumes new contours, being determined not by dyadic communication but rather by a multi-source network of exchanges. Adopting a discourse analytical approach with a particular explicative agenda, we aimed at unveiling the structures of discourse which allow an online health forum to become a popularization tool, through the interaction of different identities and perspectival knowledges (Fage-Butler, 2013).

The study identifies how a forum may support a form of popularization which we have as defined as “oblique”. The concept of oblique popularization differs substantially from the core assumptions of traditional popularization (see Myers, 2003), which was considered to mean the transfer of (simplified) knowledge to passive audiences (e.g. Shinn & Whitley, 1985; Myers, 2003). The active participation of patients in online exchanges has

radically transformed their role (Hardey, 2001). Thus, the traditional doctor-patient relationship of biomedicine makes way for dynamics which enhance patients' competence and incentive to learn and share information (Antelmi, 2011) with an online community which consists of experts, semi-experts, non-experts, patients experiencing an illness, as well as their relatives and friends: in fact, anyone who happens to be interested.

Besides identifying and characterizing online health forums as having an oblique popularizing function, the other major contribution of this article relates to its investigation of how such popularization takes place on a forum. It is generally accepted that science is made accessible to non-experts through a process of translation. Indeed, popularization has traditionally been seen as an intra-linguistic, inter-generic and inter-stylistic translation. However, if we want to use the concept of translation to define popularization, it has to be intended in its most creative and productive sense (Anesa, forthcoming) where popularization implies recontextualization, reconceptualization and co-construction (Calsamiglia & van Dijk, 2004). In particular, the popularization of biomedical information on online health forums also has particular features. It is generated by multiple contributors, whose polyphonic voices contribute to providing information not only for the registered users involved in the thread but for a variety of potential readers. In this regard, threads often succeed in bringing together various pieces of information and sources of medical knowledge, which are no longer the exclusive property of one group of participants, but develop along a continuum that involves intra-, inter- and extra- specialist categories (Anesa, forthcoming). Thus, the knowledge expressed in online forums should not be considered a vulgarization of science (Luey, 2010: 25) but a recontextualized form of knowledge which is constructed through expository tools which are different from those used in intra-specialist contexts. More specifically, among the explanatory tools present on the online forum we examined, the ones emerging most evidently are definitions, analogies, exemplifications and generalizations.

Medical discourse, like other specialized discourse types, has traditionally been considered inaccessible for laypeople (McGregor, 2006: 8), and it is expected that biomedical experts may need to use accommodation and simplification strategies to respond to their patients' questions. However, some e-patients' use of highly technical terminology in online patient-patient communication suggests that they are acquiring complex biomedical knowledge (Fage-Butler & Nisbeth Jensen, 2013), and are able to participate

actively in popularizing knowledge. As the present paper illustrates, expertise and laity assume particular contours on an online health forum. E-patients may be first time users and be searching for some preliminary advice or opinion; they may describe their symptoms or their conditions in very simple terms, circumventing any technical vocabulary. However, they may also have read extensively about certain conditions, in which case their posts display a high level of technicality. The varying and heterogeneous nature of e-patients' epistemic status is one that merits further inquiry, particularly as this complexity has implications for medical practitioners.

To conclude, new media such as online forums bring with them new communicative dynamics which affect medical discourse at large (Antelmi, 2011). Telemedicine systems, for instance, also represent an interesting empirical site to explore a specific type of patient-health care provider interaction (Robinson et al., 2011). Future research in this area could include a comparison between asynchronous forums such as the present and synchronous chats to evaluate how popularization is performed in contexts in which e-patients interact with online experts in real time in situations which are more akin to face-to-face clinical interaction. Moreover, other popularization tools such as thematic blogs or specific popularization sites could be used for contrastive analyses, and could also help to indicate the possible level of genre hybridization (Bhatia, 2004) taking place.

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