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Focus on medical communication

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Popularizing Medical Discourse:
The Role of Captions

1. Introduction

In the last decades, several studies have been concerned with the analysis of the discourse of popularization (see for example Shinn/ Whitley 1985; Gregory/Miller 1998; Myers 1997, 2003; Ciapuscio 2003; Calsamiglia/Van Dijk 2004). Many scholars have been interested in the language adopted by journalists and media professionals when dealing with scientific research articles and have focused in particular on the linguistic features of popularizing texts. This line of research has often analysed journalists' products in comparison with the original research articles in scientific journals, pointing out several differences at various levels, such as textual, syntactic and rhetorical levels (Myers 1990, 1991, 1994; Calsamiglia 2003). Furthermore, particular interest has been placed on those linguistic strategies enacted in order to enhance lay readers' comprehension such as the use of metaphors (Gülich 2003) and other expressive functions (e.g. definition, denomination, description, exemplification, generalization, paraphrase or reformulation; cf. Calsamiglia/Van Dijk 2004; Garzone 2006).

As far as the definition of popularization is concerned, this process has often been identified as a 'social operation' aimed at communicating lay versions of scientific knowledge among the public at large (Jacobi 1999; Calsamiglia/Van Dijk 2004). The discourse of popularization is a pluricode discourse in which text, images, stylesheets and colours semantically interact (Lemke 1998; Miller 1998) through a multimodal approach (Gotti 2013). As Bontems (2013: 103) argues, images are fundamental to the construction of scientific knowledge for a lay audience since they influence the reader's sensitivity, thus

enhancing comprehension. The journalist is the mediator between science and its popularization and he/she chooses the right images and, in the case of complex technical ones, he/she adapts them to the supposed background knowledge of their public (Jacobi 1999; Bontems 2013).

Even though in the last years many studies have claimed the importance of images in the field of science popularization (see among others Jacobi 1999; Bontems 2013; Dondero 2013; Lathene-Da Cunha 2013), little attention has been paid to the role of captions in the process of conveying specialist knowledge for a wider audience of non-specialists (Myers 1997). In order to fill this gap in the literature, the present work aims at providing an introductory description of captions in the discourse of medicine through the media, focusing in particular on three comparable corpora of news collected from the medicine sections of French, English and Italian online magazines of science popularization. To be more specific, the study deals with the popularizing strategies used in the captions and their relation with the news and the image they refer to. Moreover, the use of captions is compared in the three languages to highlight similarities or differences in their use in order to see what strategies are typical of popularization discourse in different cultures

As for the organization of the chapter, the first part will focus on the materials and methods used for the analysis, the second will deal with the findings deriving from an in-depth observation of corpus data and, in the final section, results will be discussed and conclusions will be drawn in the light of the previous analysis.

2. Materials and Methods

The present study has focused on scientific popularization discourse (Calsamiglia/Van Dijk 2004; Desmet 2005) aimed at transferring general medical information to a target public of educated laymen interested in the latest science news. The articles chosen are texts adapted

to the editorial board policies by journalists, in which the presence of graphs, images and illustrations is pervasive. More specifically, the analysis was carried out on three comparable corpora of science news articles collected from the medicine sections of six online magazines of science popularization, namely *Futura-Sciences* and *Science et avenir* for the French corpus, *Le Scienze* and *Focus* for the Italian corpus, and *Scientific American* and *Science Daily* for the English corpus. To have a representative sample for the analysis, the three corpora were gathered in a time span of one month, i.e. October 2013. As for the number of articles published, data show a sharp difference among the various online magazines and, in particular, between the Italian ones and the others. In fact, both *Le Scienze* and *Focus* publish less than one third of the articles printed in English and French magazines. Moreover, it is worth noting a difference in the number of images used: English magazines tend to use one image per article while in French and Italian magazines we find an average of two images. Table 1 gives an overview of these first quantitative differences:

	Scientific American	*Science Daily*	*Futura-Science*	*Science et avenir*	*Le Scienze*	*Focus*	TOTAL
No. of texts	29	143	81	49	21	5	**328**
No. of images	29	143	173	70	26	7	**448**
No. of captions	17	143	173	62	21	4	**420**
Average no. of tokens (per text)	1,000	700	700	400	550	300	
Average no. of images (per text)	1	1	2.13	1.41	1.2	1.4	

Table 1. The corpus.

The images found in the corpus are mainly of two types:
1)   direct representations of the object described in the article, in which the similarity between the *representamen* and the object relies on simple qualities or properties (Lathene-Da Cunha 2013);

2)   diagrams and graphs, i.e. images in which the similarity bet-
      ween the *representamen* and the object is based on an analogy
      of their contents, which becomes accessible only through an in-
      terpretation of the relationship among the terms implied (Lath-
      ene-Da Cunha 2013).

The methodology adopted for this study proposes an integration of
corpus and discourse perspectives. According to Myers (1997: 98) in
scientific popularization articles "the text directs us to the picture,
which leads us back to the caption, which leads to the picture, which
leads back to the text". So, first of all, we decided to consider the rela-
tionship between the captions, the image and the article and we identi-
fied what part of the article the caption anchors to. Secondly, we tried
to make a functional classification of all the captions in our corpus
adapting Myers' typology to suit the needs of our data. By analysing
the linguistic elements in the captions, we distinguished six main cate-
gories of captions in our corpus:
1)   *descriptive captions*, i.e. captions describing the picture in its
      simple qualities or properties;
2)   *summarizing captions*, i.e. captions summing up the content of
      the article;
3)   *summarizing + descriptive captions*, i.e. captions both involved
      in giving a brief summary of what is written in the news, as
      well as in describing the images they refer to;
4)   *captions using a paragraph*, i.e. captions directly taking one or
      more sentences from the article;
5)   *captions using a title*, i.e. captions adopting the same title of the
      news in which we find it;
6)   *captions using quotations*, i.e. captions in which we find a
      citation reported in the article.

Thirdly, we analysed the most frequent popularizing strategies
employed in the captions in order to enhance readers' comprehension
of the scientific knowledge reported following the framework pro-
posed by Garzone (2006). Finally, a contrastive analysis of the use of
captions in the three languages selected is provided and differences
and similarities are outlined and discussed.

3. Results

The results section is sub-divided into three main parts. In the first section, the classification of the captions of the three corpora is presented and examples in the different languages are provided. The second section considers the issue of the popularizing strategies involved. In the third section, emphasis is laid on differences in the use of captions in the three corpora, i.e. French, Italian and English.

3.1. A classification of captions in comparable corpora of science popularization news

Considering the quantitative presence of captions in comparable corpora, a first interesting observation that can be made concerns the fact that only 28 images out of 448 do not present captions. Thus, captions are devices pervasively used in science popularization magazines. As regards the typology outlined in Section 2, data show that the most frequent category of captions found in the three corpora is the *summarizing* one (197 out of 448). Examples (1-3) provide an instance of this type of captions in the three languages.

(1)

Le prion **est une protéine** infectieuse de la maladie de Creutzfeldt-Jakol **Certains spécialistes pensent** que l'impact des prions va au-delà de cett pathologie**. Des études suggèrent** par exemple qu'ils auraient un rôle dans développement d'autres maladies neurologiques, comme Alzheimer.
(© student.biology.arizona.edu, *Futura -Sciences*)

(2)

Polyphenols are naturally occurring compounds found largely in fruits, vegetables, coffee, tea, nuts, legumes and cereals. **More than 8,000 different phenolic compounds have been identified** in plants, and have antioxidant, antiinflammatory, and anticarcinogenic effects. (© neillockhart/Fotolia, *Science Daily*)

(3)

Allattamento, il latte materno venduto online negli Usa **è pericoloso** (© Lisa B./Corbis) (*Focus*)

As is possible to observe in the examples above, both images and captions give an overview of the topic reported in the news. The three captions provide a definition of the element discussed in the article (*Le prion **est une protéine** infectieuse* […]; ***Polyphenols are naturally occurring compounds** found largely in fruits* […]) and present a brief summary of its content (***Certains spécialistes pensent** que l'impact des prions va au-delà de cette pathologie**. Des études suggèrent** par exemple* […]; *More than 8,000 different **phenolic compounds have been***

identified […]). The Italian caption of *Focus* is the most summarized one, since it begins with a nominalization (*allattamento*) to introduce the main topic and then gives only the main gist of what the text is about (*il latte materno* […] *è pericoloso*)

The second most frequent category of captions identified in the three corpora is that of *descriptive captions* (109 out of 448). *Descriptive captions* are directly linked to the picture they refer to and they provide a description of the element depicted in the picture or of the data represented in a graph. The following extracts, taken from the three corpora, are representative examples of this type of captions in the different languages:

(4)
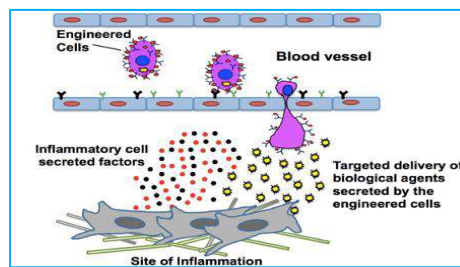
Ce schéma explique les mécanismes en jeu dans cette expérience. Les CSM génétiquement modifiées **(engineered Cells)** se fixent au niveau des récepteurs des vaisseaux sanguins, à proximité des régions en situation d'inflammation. Les CSM traversent la paroi et sécrètent l'IL-10 **(en jaune)** qui contrecarre les effets des facteurs inflammatoires sécrétés (inflammatory cell secreted factors). (© Jeffrey Karp, *Futura-Sciences*)

(5)

Miniatura tratta da un manoscritto svizzero del 1411 che **illustra** l'epidemia di peste. (© Corbis, *Le Scienze*)

(6)
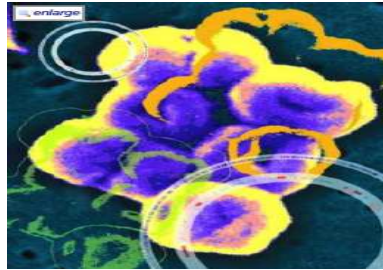
Scanning electron **microscope image** of A.baumannii, with maps of its geno-
me **(outer circle)** and alien island sequences **(inner circle - red)**. (© J.Carr/
CDC; T.Gianoulis and D.Massa/Yale, *Science Daily*)

As we can see in the examples above, the captions signal the relation
with the described picture through textual metadiscursive devices
('endophoric markers', Hyland 2005) such as *ce schema* (*Futura-
Sciences*), *miniature* (*Le Scienze*), *microscope image* (*Science Daily*).
Moreover, the descriptive function of the captions is also displayed by
the mention of colours of the picture (e.g. *en jaune* (*Futura-Sciences*);
inner circle – red (Science Daily) and by the use of descriptive verbs
as, for instance, *illustra* in the Italian example.

Moving on to the third most preferred category of captions,
what emerges from the three corpora is a hybrid type of caption mer-
ging the two previous categories, i.e. *descriptive + summarizing cap-
tions.* They are characterized by a first part that anchors the explana-
tion to the pictorial representation by means of a description and, then,
by a second part in which the content of the science popularization ar-
ticle is presented. Examples (7-9) show instances of this type of re-
sources found in the three corpora:

(7)
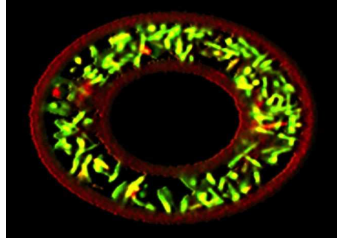
<u>On peut **apercevoir** des bactéries **(en vert)** emprisonnées dans une cage en forme de donut (en rouge).</u> Cette expérience, loin d'être farfelue, devrait permettre de mieux comprendre comment les communautés microbiennes communiquent au sein des environnements et développent des infections. (© Jodi Connell, université du Texas à Austin, *Futura-Sciences*)

(8)

<u>Un laboratorio con livello di biosicurezza 4</u>. Solo centri dotati di queste strutture sono abilitati a ospitare e studiare virus altamente letali come quello di Ebola (© Christian Charisius/dpa/Corbis, *Le Scienze*)

(9)

<u>Minamata Bay at Dusk:</u> From 1932 to 1968, Chisso Corp. dumped methylmercury into the bay, poisoning the city's food supply. (© Hideaki Nakatani/ Flickr, *Scientific American*)

The three extracts above illustrate the regular pattern of this type of captions. First of all, we find a descriptive introduction in which the elements of the image/photograph are presented (e.g. *Minamata Bay at Dusk*; *Un laboratorio con livello di biosicurezza 4*) often by making reference to physical characteristics such as colours and forms and by using verbs of perception (e.g. *On peut **apercevoir** des bactéries **(en vert)** emprisonnées dans une cage en **forme de donut (en rouge)**)*. Secondly, an outline of the main topic is provided in the subsequent sentence (e.g. *Chisso Corp. dumped methylmercury into the bay, poisoning the city's food supply*).

Another frequent strategy employed in the realization of science popularization captions is the use of part of the original texts. In fact, in our corpora we found: 1) *captions using a paragraph* (24 out of 448), 2) *captions using the news' title* (15 out of 448), and 3) *captions using quotations from the article* (16 out of 448). The extracts in (10-12) and the subsequent figures exemplify these three categories:

(10)

(11)

(12)

"We've struggled to improve Haiti's overall public health for decades," **he added**. "Now we arrive at a critical juncture where from the depths of a terrible epidemic there is an opportunity for Haiti to rise up to a new level of protecttion against infectious diseases," **said Jon Andrus**, MD, deputy director of the Pan American Health Organization. (© iStockphoto, *Science Daily*)

A closer observation of our data shows that, as regards *captions using paragraphs,* in 80% of cases journalists/editors employ the lead to give a title to pictures. As for *captions using quotations,* on the other hand, direct quotations (as in examples 10-12) are the most used (ten out of 16) followed by indirect ones (four out of 16).

3.2. Popularizing strategies used in captions

According to the data of our corpora, captions align with the strategies of popularization typical of popularized science text, i.e. denomination, definition, description, exemplification, generalization, analogies (comparison and metaphor), use of quotations (cf. Calsamiglia/Van Dijk 2004; Garzone 2006). However, some strategies seem to be preferred in captions, namely *generalization*, *description,* and *use of quotations*. As concerns the categories of captions identified above, it is possible to say that *summarizing captions* generally involve a process of *generalization* (44% of all captions). In fact, they usually give a general overview of the topic without going into specific details. This strategy is exemplified below:

(13)   MS patients generally often have problems with fading out what is unimportant. The attention system is too highly activated and also notices – for example when watching the television or when talking to someone – completely unimportant extraneous noises. Because of this, concentrating on what is important is completely impossible or only possible to a limited extent. (*Science Daily*)

(14)   Les cellules souches mésenchymateuses sont capables de se différencier en plusieurs types de cellules associés au squelette. Très peu nombreuses, elles pourraient jouer à l'avenir un grand rôle dans la fabrication et la délivrance de molécules thérapeutiques. (© Ghanson, Wikipédia, *Futura-Sciences*)

(15)   L'analisi di un dente di paraconodonte ha permesso di mettere in evidenza le fasi di crescita della struttura, che si sono dimostrate diverse da quelle caratteristiche dei veri denti. (® DJE MurdockØNature, *Le Scienze*)

Regarding *description*, it is a typical strategy employed in *descriptive captions* (24.4%). As a matter of fact, by providing a description of the picture, captions also give an explanation of a specific process that is highlighted in the article it refers to. The following examples are instances of descriptions in the three languages:

(16)   The Bielefeld chemist Michael Schwake and his colleagues have discovered a new protein fold. At its head (the red helices), this protein can bind enzymes

and viruses. The tunnel in the protein structure is colored yellow. (© Nature, *Science Daily*)

(17)   Rappresentazione artistica del flusso sanguigno, il veicolo con cui le cellule tumorali (in bianco-azzurro) possono diffondersi nell'organismo, dando origine alle metastasi. (© Springer, *Le Scienze*)

(18)   La célèbre bactérie Escherichia coli, modèle si souvent utilisé par la recherche, a fait progresser la génétique d'un cran supplémentaire en devenant le premier organisme entier génétiquement recodé. Après les OGM, voici peut-être venue l'heure des OGR. (© Mattosaurus, Wikipédia, DP, *Futura-Sciences*)

One last frequent popularizing strategy employed in captions is the use of quotations, namely in the category *captions using quotations* (10%). By means of this linguistic device, the journalist 'attributes' statements to researchers, scholars, scientist, experts, etc. (Garzone 2006: 98). Recourse to quotations in captions help contribute to emphasizing authoritativeness of the sources of the article, and at the same time, it serves as a form of hedging, limiting the journalist's responsibility since he/she simply reports something stated by someone else. This strategy is shown in the subsequent example from the English corpus:

(19)   "Our research confirms past claims that coffee is good for your health, and particularly the liver," said Carlo La Vecchia, MD. (© volff/Fotolia, *Science Daily*)

3.3. Contrastive remarks on the use of captions

Our data show interesting differences per language as far as captions are concerned. Table 2 gives an overview of the quantitative disparities in the presence of captions per typology in the three corpora.

	ENGLISH CORPUS		FRENCH CORPUS		ITALIAN CORPUS		
	Scientific American	*Science Daily*	*Futura-Science*	*Science et avenir*	*Le Scienze*	*Focus*	**TOTAL**
Descriptive	\	46	22	27	12	2	**109**
Summarizing	15	31	122	25	3	11	**207**
Descriptive + Summarizing	1	31	15	\	2	1	**50**
Using Title	\	2	8	5	\	\	**15**
Using Paragraph	\	20	4	\	\	\	**24**
Using Quotations	1 *indirect*	13 *7 direct 4 indirect 2 inserted*	3	\	\	\	**17**
No captions	12	\	\	8	5	3	**28**

Table 2. Presence of captions in the corpora.

As is possible to observe in the table, French magazines tend to use more *summarizing captions* (147 instances), whereas English magazines show an equal preference for *descriptive* and *summarizing captions* (46 occurrences for both categories). Italian magazines, on the other hand, have *descriptive captions* as a preferred pattern (14 instances). Moreover, Italian magazines employ only *summarizing* and *descriptive captions* or the third category in which they are merged, i.e. *descriptive + summarizing captions*. French magazines, conversely, are almost the only ones (apart from two instances in *Science Daily*) in which it is possible to find the category *captions using title* (13 occurrences). Similarly, the classes *captions using paragraphs* and *using quotations* are nearly exclusively adopted in English science popularization magazines (20 and 13 instances respectively).

4. Conclusions

The results of our analysis show that even though there are differences between corpora which might be due to culture-based (in terms of nationality) ways of dealing with science and of using popularizing resources, there are also some striking similarities in terms of function, which seem to be distinctive of the popularization of medical-scientific discourse. In fact, captions of science popularization magazines generally have a thematic function. Indeed, the analysis suggests that they are mainly used to summarize what the article deals with (*summarizing captions*). They introduce the reader to the topic by making some generalizations or by giving some preliminary definitions. In this way, captions serve to anticipate the content of the text and they allow the potential audience to have a better understanding of the phenomena described in the articles.

A second important function of captions that our evidence indicates is the descriptive one (*descriptive captions)* since they explain the main physical characteristics of the elements depicted in the image they are linked to. *Descriptive captions* are typical of diagrams, graphs or photographs of subjects potentially unknown to a lay audience. Hence, they enhance the reader's comprehension by means of simple references to the image, explaining what cannot be drawn from an intuitive mental process.

Moreover, a third function of captions identified in our data is anchoring the image to a specific part of the article (*captions using title, paragraphs* or *quotations*). Results show that captions act as "pointers in the text that tells us what kind of statement the text is making" (Myers 1997: 98). This type of caption assists the reader in finding the most important information in the text they make reference to. At the same time, they provide a means for journalists to present legitimation of their work.

To conclude, it is possible to confirm our initial hypothesis that images and captions offer invaluable help in the construction of strategies of science popularization even though they have been scarcely considered by the literature. In fact, they provide important cognitive

guidelines, interpretive framework as to how to correctly and effect-ively process the information contained in the whole article.

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