

EXPLICIT INTERTEXTUALITY IN SCIENCE POPULARIZATION NEWS

Anelise Scotti Scherer¹

Universidade Federal de Santa Maria

Abstract: This paper aims at identifying traces of explicit intertextuality in 30 science popularization (SP) news articles from *BBC News* and *Scientific American* online publications. The textual analysis involves: a) identification and analysis of linguistic traces of explicit intertextuality; and b) interpretation of data in relation to the SP process (Motta-Roth, 2009). The results suggest that intertextual strategies in SP news: 1) emphasize the role of the journalist to inform the reader about new studies; and 2) make it possible to explain scientific principles and concepts, evaluate the research and promote discussion on its relevance for society while encouraging readers to participate in the process, supporting the scientific endeavor.

Resumo: O objetivo deste trabalho é identificar traços de intertextualidade explícita em 30 notícias de popularização da ciência (PC), coletadas das publicações online *BBC News* e *Scientific American*. A análise textual envolve: a) identificação e análise dos traços linguísticos da intertextualidade explícita; e b) interpretação dos dados em relação ao processo de PC (Motta-Roth, 2009). Os resultados sugerem que as estratégias intertextuais nas notícias: 1) enfatizam o papel do jornalista de informar o leitor sobre novas descobertas; e 2) possibilitam explicar princípios e conceitos científicos, avaliar o estudo e promover a discussão

¹ English major (seventh semester) at the Federal University of Santa Maria (annesscherer@yahoo.com.br). CNPq scientific initiation grant, process n. 111379/2007-3. This paper is part of the research project *Análise crítica de gêneros com foco em artigos de popularização da ciência* (Motta-Roth, 2007), developed at *Laboratório de Pesquisa e Ensino de Leitura e Redação* (LABLER). The study was developed in the course *LTE1002 Análise do Discurso e do Texto em Língua Inglesa*, taught by the project coordinator and adviser of this study Désirée Motta-Roth (CNPq PQ grant, process n. 301962/2007-3). The writing of this paper was co-advised by Fábio Santiago Nascimento, Master's student at *Programa de Pós-Graduação em Letras - UFSM* (CAPES grant).

sobre sua relevância para a sociedade ao mesmo tempo em que encorajam o público leitor a participar do processo, financiando a empreitada científica.

Introduction

In general terms, Science Popularization (SP) can be defined as a process of recontextualization of knowledge from scientific contexts (such as laboratories and research institutes) to the mass media (Motta-Roth, 2009, based on Bernstein, 1974). In this process, lay versions of scientific knowledge are disseminated in newspapers, magazines, TV shows in order to enable non-specialized readers to incorporate such knowledge into their existing knowledge in order to actively participate in political decisions concerning scientific issues (Calsamiglia; van Dijk, 2004:370).

For constructing these non-specialized versions of scientific knowledge, journalists make use of various linguistic and discursive strategies such as definitions, examples, metaphors (Calsamiglia; van Dijk 2004:370.). In addition, intertextuality is used to incorporate other voices besides the author's into the debate about the reported study by adopting quoting and/or reporting strategies (Beacco et al., 2002; Oliveira; Pagano, 2006; Motta-Roth et al., 2008). These intertextual strategies of quoting and reporting may be considered a characteristic feature of SP news, because they allow journalists to draw on previous texts produced within the scientific realm such as academic articles and conference communications. In addition, such strategies highlight the importance of scientific knowledge and promote the debate on the implications of scientific discoveries for society. In light of the above, the objective of this study is to identify traces of intertextuality in the SP news genre as a characteristic feature of the process.

This paper is structured in four main sections. The review of the literature (section 1) focuses on the concepts of SP and intertextuality. Section 2 presents corpus selection and analytical procedures for the study.

Data analysis and results (section 3) are organized in three subsections: the first one explores the contexts of publication contrastively; the second one provides data on types and frequency of intertexts; and the third subsection presents a brief discussion on explicit intertextuality in relation to the process of SP. The last section presents an attempt of relating the findings of this study to some characteristics of the SP process.

I. Review of the literature

1.1 The SP process

A traditional view of SP considers two separate discourses: the scientific discourse, produced within scientific institutions and the popularization discourse, through which science is popularized for non-specialists (Myers, 2003:266). This view of SP assumes that scientific knowledge is translated into simple terms for a lay or 'ignorant' audience and that information is "distorted, hyped up, and dumbed down" (Myers, 2003:266). As argued by Myers (2003:267), this traditional perspective attributes a higher and authoritative position to scientists in relation to the general public, considered a 'blank slate of public ignorance'.

On the other hand, a more contemporary view of the process implies that 'science circulates within many ordinary discourses' (Beacco et al., 2002:279), providing explanation for recurrent events in society. In this view, SP news is part of a cycle of activities that interrelates science and society (Motta-Roth, 2009:8). In this cycle (Figure 1), the production of SP news, for example, is instigated by people's interest in a theme. The publication of such texts in the media draws the scientists' attention to the topic, which triggers the intensification of research in a given field. Once the research is developed and the theme is incorporated to scientific discourse, it contributes to the establishment of a new agenda of public interests.

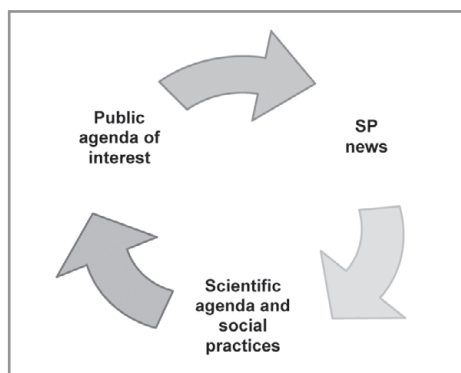


Figure 1 Cycle of activities that interrelates science and society, adapted from Motta-Roth (2009:8)

This cycle of activities is motivated by three axes through which the SP process is realized: 1) the role of the media to inform society about new research outcomes; 2) the responsibility of the mediator (author of the SP text) to explain principles and concepts which allow society to participate in the transformation of knowledge; and 3) the need society has to understand the relevance of the research in order to support scientific endeavors (Motta-Roth, 2009:4). These axes permeate the journalist's lexicogrammatical choices and the linguistic strategies used in SP News. Thus, SP in a contemporary perspective consists of a recontextualization process of scientific knowledge from the academic context to the mass media (Motta-Roth, 2009:6).

According to Bazerman (2004b:90), any process of recontextualization involves a 'translation across contexts', that is, words of a given text – produced within a given context – used in another text and given new meaning according to the new context. Therefore, considering the SP process as a recontextualization of scientific knowledge implies investigating SP news in its relation to previous (or future) texts about science – it requires a discussion on intertextuality.

1.2 The concept of intertextuality

In accordance with the work of Julia Kristeva, Bazerman (2004b:84) defines intertextuality as the “relation each text has to the texts surrounding it”. He explains that “Intertextuality, for Kristeva, is a mechanism whereby we write ourselves into the social text, and thereby the social text writes us” (Bazerman, 2004a:2). In this sense, absolute originality cannot exist in texts. We do not create original texts *ex nihilo*; texts are conceived in the sharing and interrelation with previous and future texts.

The notion of intertextuality underlying this discussion is that of a capacity of a text to evoke other texts available in the culture (Motta-Roth, 2008:354). A text may evoke other texts at different levels of intertextuality, and through different techniques of intertextual representation (Bazerman, 2004b:86-9). Such levels and techniques characterize intertextuality as explicit or implicit. Explicit intertextuality is the reference to previous or further texts overtly made in a given text, such as the texts referred to in the review of the literature section and the list of references of an academic article (Koch, 2009:146). Texts that are alluded to by other texts and are part of the readers’ social and discursive memory are referred to as intertexts (Koch, 2009:145). On the other hand, implicit intertextuality is the reference to texts without indicating its source, such as jokes in which previous discourses are ironically referred to or criticized, relying only on the interlocutor’s familiarity with them (Koch, 2009:145). Discourses – rather than their materiality (texts) – that are implicitly alluded to in texts and are familiar to the reader are referred to as interdiscourses (Fiorin, 2006:183). This study focuses only on the analysis of explicit intertextuality. The analysis of the interdiscourses involved in the production of SP news configures a subject for future studies.

1.3 Intertextuality in SP news

Intertexts, in SP news, usually refer to academic texts in which the research is shared with a specialized audience as well as to different voices evoked by the journalist in order to describe, interpret, explain, and/or evaluate the research (Motta-Roth et al., 2008). Thus, such intertexts may be part of the scientific domain or part of a non-scientific domain. The intertexts within the scientific domain are academic articles and communications, and the scientists' comments about the research; while the intertexts within a non-scientific domain usually recall official documents and the public's opinion about the research (Motta-Roth et al., 2008:4).

As Beacco et al. suggest, "the reshuffling of the articulation of scientific discourses (and their interdiscourses) with discourses of a very different nature has become one of the characteristics of the contemporary knowledge society" (2002:280). In other words, the SP process exists in the intersection between different discourses typically attributed to different contexts (science and media) (Motta-Roth, 2009). In this recontextualization of scientific knowledge, the scientist/journalist refers to different discourses by using intertextual strategies (such as quoting and reporting) and interdiscursive strategies (such as metaphors for explaining scientific principles) that incorporate a "diffuse intertextual form" (Beacco et al., 2008:280) into the process. In SP news, the diffuse intertextual form of the SP process is evidenced, for example, through the multiple voices that are incorporated in the text in order to promote a debate concerning the research outcomes and its implications for science and society. This reorganization of scientific discourse is systematized in recent analyses of the rhetorical organization of SP news, as shown in Figure 2.

Moves and steps	Recursive moves and steps
Headline	
Move 1 – LEAD/Popularized research conclusions (_{preview})	A – Elaborating comments and narratives (Debate/Polyphony): positive or negative comments and opinions from different enunciative standpoints: <ol style="list-style-type: none"> 1. Scientist/researcher (or metaphorically study); 2. Colleague/Technician/ Institution; 3. Government; 4. Public; 5. Journalist (Interpellation) B – Explaining principles and concepts (credentials) (apposition [expansion], gloss [reduction], metaphor). C – <u>STRESSING SOCIAL/LOCAL PERSPECTIVE</u>
Move 2 – Presenting the research (_{detail}) by: <ol style="list-style-type: none"> a) identifying researchers (or) b) exposing conclusions (and) c) referring to the research objective (or) d) alluding to published scientific article (or PhD/ Masters dissertation) 	
Move 3 – Referring to previous knowledge (contextualizing) by: <ol style="list-style-type: none"> a) referring to established knowledge B) <u>STRESSING SOCIAL PERSPECTIVE</u> c) alluding to previous research d) indicating limitations in established knowledge 	
Move 4 – Describing the methodology used in the popularized research by: <ol style="list-style-type: none"> a) identifying experimental procedure b) referring to aspects of data (source, size, date, place, category) 	
Move 5 – Explaining the popularized research outcomes by: <ol style="list-style-type: none"> a) exposing findings/accomplishments (_{specific}) b) explaining significance of results (_{general}) c) comparing previous and present research in terms of: <ol style="list-style-type: none"> (1) established knowledge (2) methodology (3) results 	
Move 6 – Indicating popularized research conclusions by: <ol style="list-style-type: none"> a) mentioning implications in present research b) suggesting future research C) <u>STRESSING LOCAL PERSPECTIVE</u> d) indicating limitations in present research 	

Figure 2 Schematic representation of the rhetorical organization of SP news (Motta-Roth, 2009)

According to previous analyses (Motta-Roth et al., 2008; Motta-Roth; Lovato, 2009; Motta-Roth, 2009), the rhetorical structure of SP news is organized mainly in terms of: a) the presentation of general and detailed information about the research (moves 1-4); and b) the promotion of a debate and conclusions on the significance of the results to society (moves 5 and 6). However, these studies also reveal that comments and narratives as well as the explanation of principles and concepts and the stressing of the social perspective are recursive (recursive moves A, B and C), appearing in all sections of the texts. As far as explicit intertextuality in SP news is concerned, traces of other texts seem to be recurrent throughout the texts; but, for the purpose of this study, the analysis will focus only on the following moves: 'Presenting the research by: alluding to published scientific article (or PhD/Masters dissertation)' (move 2d) and 'Elaborating comments and narratives' (recursive move A).

2. Methodology²

2.1 Corpus selection

Four online publications in English compose the universe of analysis of the main project (Motta-Roth, 2007): *BBC News International* (<http://www.bbc.co.uk/>), *Scientific American* (<http://www.scientificamerican.com/>), *ABC Science* (<http://www.abc.net.au/>), and *Nature* (<http://www.nature.com/>). These publications were selected according to an analysis of the context of each publication (Motta-Roth; Lovato, 2009:242-243) in terms of:

- a. Commitment to SP and/or education about science (Mission Statement);

2. We thank Graciela Rabuske Hendges and Luciane Kirchhof Ticks for their suggestions on how to organize this section.

- b. Presence of sections devoted to news on science and technology;
- c. Upload dynamics (daily or weekly);
- d. Free access to SP news; and
- e. Average text length (up to 1046 words).

The publications selected to be part of the present study are *BBC News International* and *Scientific American* due to the fact that these subcorpora have already been analyzed in terms of the rhetorical structure of SP news. The other two subcorpora will be considered in a future analysis related to the final undergraduate paper.

The corpus comprises 30 texts retrieved from the sections entitled News of each website. The selection included SP news that is: a) available online; b) written in English; c) published between 2004 and 2008; and d) concerned with health, environment and technology themes, as suggested in *Parâmetros Curriculares Nacionais* (Brasil, 1997)³. The references of the texts that are part of the corpus are listed in the Appendix.

2.2 Analytical procedures and categories

The present analysis of SP news focuses on the identification of explicit intertextuality within the corpus, according to the theoretical perspective of Critical Genre Analysis (Meurer, 2002; Bhatia, 2004; Motta-Roth, 2005). In this perspective, discursive genres – understood as typified social activities that are culturally pertinent and mediated through language within a given

3. *Parâmetros Curriculares Nacionais* (PCN) are official documents that establish guidelines for basic education across disciplines in Brazil. We have included PCN in the criteria for corpus selection because we understand that a systematization of intertextuality in SP news in the light of Critical Genre Analysis can be at service to EFL teachers and undergraduate students in their first year in higher education. We believe that studies on SP news genre can subsidize pedagogical practices and design of teaching materials that explore linguistic features of SP news in relation to the SP process, promoting a transition between literacy practices in school and in the university.

context of situation in which different orders of discourse coexist – are described in terms of their linguistic features and interpreted in relation to the context in which they occur (Motta-Roth, 2005:147). The analysis is based on the schematic representation of the rhetorical organization of SP news (Figure 2) and includes two sets of analytical procedures: 1) contextual analysis; and 2) textual analysis.

The contextual analysis involves: a) investigating the SP process; and b) exploring the publication context (purposes, authorship, readership, etc.) as proposed by Hendges (2009). The textual analysis involves: a) identifying linguistic traces of explicit intertextuality within the rhetorical organization of the texts; b) analyzing the discursive manifestation of intertextuality; and c) relating textual analysis to the context of SP. The analytical categories concerning the textual analysis are provided in Figure 3.

Category	Realization	Example in the corpus
Reference to scientific publication	Allusion to the academic text in which the research was reported to a specialized audience.	BBC#10 The study features in <i>Proceedings of the National Academy of Sciences</i> . SCIAM#7 Now researchers of Nebraska have successfully modified crops (...), researchers report in <i>Science</i> .
Quoting	Allusion to quoted words 'usually identified by quotation marks, block indentation, italics, or other typographic setting apart from other words of the text' (Bazerman, 2004b:88).	BBC#1 "You are not comparing like with like," says Mary Newburn, head of policy at the charity. BBC#12 Belinda Phipps, of the National Childbirth Trust, said: "This shows for the majority of parents they can have a positive effect on their babies IQ by breastfeeding"
Reporting	Allusion to reported words, usually specifying a source and attempting to 'reproduce the meaning of the original but in words that reflect the author's understanding, interpretation, or spin on the original' (Bazerman, 2004b:88).	BBC#6 He said the finding offered clues not only to these massive changes, but to the ongoing evolution of humans. SCIAM#4 Researchers report today that they grew prostate glands (...) in mice using a single stem cell transplanted from the prostates of donor mice.

Figure 3 Analytical categories: realization and example

In the recontextualization of scientific knowledge, not only 'written conventional sources' are referred to, but also 'oral interviews between journalists and specialists and between specialists and the subjects who eventually take part in their research' (Oliveira; Pagano, 2006:628). In the corpus of this study, both written conventional sources (such as academic articles) and oral interviews are referred to by the journalist. Written texts concerning the research being popularized are usually mentioned in relation to the first category in Figure 3 (Reference to scientific publication), although this category can also be concerned with oral texts in which the research author reports the study to a specialized audience (such as an academic presentation).

On the other hand, the last two categories (Quoting and Reporting) are mostly concerned with the mentioning of oral texts that are incorporated into the news in order to promote the debate. Data from previous analysis (Motta-Roth et al., 2008; Motta-Roth; Marcuzzo, in press) of the *BBC News International* subcorpus has indicated that the debate in SP News is manifested by the occurrences of four other voices besides the journalist's: the author of the research being popularized, the researcher colleague not involved in the research, the technician, the government, and the public (see recursive move A in Chart 1). In SP news, the journalist makes choices in terms of who participates in the debate and how these voices are introduced in the text: either by quoting their exact words directly or reporting them by representing their meaning in the journalist's own words (Halliday; Matthiessen, 2004:445).

3. Results and Discussion

The analysis points to at least two aspects of SP news: 1) the publication's target public varies from specialized to non specialized readers, which has an impact on the journalist's choices of which intertexts to evoke;

and 2) explicit intertextuality seems to be an important feature in the SP process since a significant portion of the texts is based on other texts either by reference, quoting or reporting. In the following subsections, data is presented in order to explain such aspects of SP news: section 3.1 explores the contexts of publication contrastively in order to offer evidence on the differences concerning the publications' target public; section 3.2 provides data on types and frequency of intertexts found in the corpus; and section 3.3 presents a brief discussion on explicit intertextuality in relation to the process of SP.

3.1 *The publications and their target public*

Textual and contextual data from the corpus indicate that *BBC News International* appears to be devoted to a less specialized public than *Scientific American*, which seems to confirm the assertion that the recontextualization of scientific knowledge in the media occurs according to "degrees of popularization" (Hilgartner, 1990:528). Following Hilgartner's continuum of science popularization, science can be more or less popularized in the media. However, there is no guarantee that there will be a fixed point in which a text is no longer a scientific one, but is a popularization.

In this study, we considered the publication's target public as an evidence of the different degrees of SP involved in news by contrasting the publication's mission statements. In *BBC News International*'s mission statement – section *About the BBC* of the website (<http://www.bbc.co.uk/aboutthebbc/>) – the publication defines the British Broadcasting Corporation (BBC) as 'the largest broadcasting corporation in the world', which aims at enriching people's lives 'with programmes and services that inform, educate and entertain' the general public. Although the BBC website provides a specific section in which news about science are published, there is the predominance of other sections that circulate news about politics,

economy, entertainment and curiosities about the world and the United Kingdom specifically which do not emphasize scientific knowledge and research outcomes.

In the section *About us* (<http://www.scientificamerican.com/page.cfm?section=aboutus>) of *Scientific American* – self-entitled “the oldest continuously published magazine in the U.S.” – its mission statement reveal that the publication’s target audience includes readers with particular interest in the ‘developments in science and technology’. The publication’s target audience is also revealed by the magazine sections, which only convey texts about scientific knowledge and research outcomes. By comparing the description of both publications, one can say that the readership of *BBC News International* is more general (or less specialized) than the audience of *Scientific American*. This publication only publishes texts about scientific knowledge and research outcomes, while *BBC News* publishes news concerning a wide range of topics from science to politics and entertainment.

Such a difference in the publications’ target public can also be observed through data from the corpus: the frequency of reference to the scientific publication ranges from 100% in *Scientific American* texts to 80% in *BBC News* texts. The type and frequency of the intertexts in the texts also provide evidence on the differences between the publications’ degree of popularization. The more scientific the intertexts referred to by the journalist are, the more specialized the publication’s target public is and, consequently, the more scientifically oriented the news is.

3.2 Type and frequency of intertexts in SP news

The analysis also points to occurrences of explicit intertextuality concerning both oral and written texts within the scientific and social domain. However, the intertexts found in the *Scientific American* corpus (in

contrast with the ones in the *BBC News International* corpus) mostly alluded to texts within the scientific domain, such as academic articles, journals, event proceedings, etc. This feature may be explained by the fact that *Scientific American* is devoted to a more specialized audience than *BBC News International* (as evidenced in the mission statement of each publication).

Texts produced within the scientific realm include the scientific publication of the research, works by other scientists on topics related to the research as well as their comments about the significance of the results or the relevance of the research; while texts produced outside the scientific context include government documents and the public's opinion about the research. Thus, the intertexts referred to by the journalist were classified by mode (oral or written texts) and by domain (scientific or non-scientific) – Examples 1 and 2⁴.

Example 1 – oral text

BBC#3 A *UK government spokesman* said of the Bright findings: “It’s valuable research, and complements the Farm-Scale Evaluations. (...)”

Example 2 – written text

SCIAM#10 The researchers report in *Science* that they sussed out the bug’s travel plans (...).

In Example 1, the journalist alludes to an oral text (indicated by the Verbal Process *said* and quotation marks) within a non-scientific domain (indicated by the reference to the author of the utterance *A UK government spokesperson*); whereas, in Example 2, the journalist alludes to a written text (indicated by the title of the academic journal *Science*) within the scientific domain (indicated by the lexical items *researchers*).

4. All examples in this paper were retrieved from the corpus *verbatim*. Emphasis were added in *italics*.

In terms of linguistic realization, the scientific publication is mentioned in the corpus:

a) as Sayer or Senser (Example 3);

Example 3

BBC#9 *Neurology* says that post-mortem tests on 24 patients found a 70% fall of a protein linked to dementia in those who had taken cholinesterase inhibitors.

BBC#6 *The Nature Neuroscience study* found clear differences between brain junctions in mammals, insects and single cell creatures.

b) within a non-defining relative clause – a dependant clause that ‘functions as a kind of descriptive gloss to the primary clause’ (Halliday; Matthiessen, 2004:399) (Example 4); and

Example 4

SCIAM#8 The new findings, *published this week in Proceedings of the National Academy of Sciences USA*, casts (sic) doubt on the second migration out of Africa.

c) within prepositional phrase indicating circumstances of place and angle (Example 5).

Example 5

SCIAM#9 *Researchers report in Proceedings of the National Academy of Sciences USA* that music triggers changes in the brain stem (...).

SCIAM#3 Turning the food crop into ethanol would not be the best use of the energy embedded in the kernels’ carbohydrates, *according to a new study in Science*.

A significant portion of the texts is constituted through explicit intertextuality strategies: a) quoting, through which the journalist exposes the actual words of the Sayer; b) reporting, through which the journalist interprets the discourse being referred to; and c) a hybrid form between quoting and reporting, in which the journalist mixes his own words with the Sayer's actual words (Example 6).

Example 6

BBC#15 (...) the staff said the technology did not link in properly with other IT systems, and that many had given up using it "until it works better".

Table 1 illustrates the amount of quoting, reporting and the hybrid forms in relation to the total extension of the texts in the corpus.

Table 1 Average amount of quoting, reporting and hybrid form in each text

	Quoting	Reporting	Hybrid
BBC News International	30%	25,4%	3,2%
Scientific American	33,2%	35,7%	8,2%

The sum of quoting and reporting occurrences constitute more than 50% of each text, indicating that the mentioning of other texts is a characteristic feature of SP news, which confirms the diffuse intertextual form of the SP process (Beacco et al., 2002). Although quoting, reporting and the hybrid form occur throughout the entire text in all exemplars of the corpus, quoting prevails in most of the texts as pointed out in Table 2.

Table 2 Occurrences of quoting, reporting and their hybrid form in the corpus

<i>BBC News International</i>	Occurrences in the corpus			<i>Scientific American</i>	Occurrences in the corpus		
	Quoting*	Reporting	Hybrid		Quoting*	Reporting	Hybrid
BBC#1	6	6	1	SCIAM#1*	7	2	0
BBC#2	6	8	0	SCIAM#2	3	2	3
BBC#3*	11	6	0	SCIAM#3*	12	2	0
BBC#4*	12	10	0	SCIAM#4	1	5	2
BBC#5*	5	1	0	SCIAM#5*	5	4	1
BBC#6*	8	7	1	SCIAM#6	3	14	1
BBC#7	5	5	0	SCIAM#7*	9	1	1
BBC#8*	4	1	1	SCIAM#8*	5	2	1
BBC#9*	8	6	0	SCIAM#9*	9	9	0
BBC#10	5	7	0	SCIAM#10	8	7	2
BBC#11	4	7	0	SCIAM#11*	6	3	1
BBC#12*	6	7	0	SCIAM#12*	6	3	0
BBC#13	4	6	0	SCIAM#13	3	6	0
BBC#14*	10	3	1	SCIAM#14	4	4	0
BBC#15*	9	7	6	SCIAM#15	6	10	1
TOTAL	103	87	9	TOTAL	82	74	13
*Exemplars in the corpus in which quoting prevails.							

The journalist's choices of quoting or reporting other voices are strongly related to the role these voices play in society. In other words, the intertextual strategies in SP news help the journalist promote a debate on the research that can stay within the scientific domain or can spread throughout other sectors of society. For example, if the journalist chooses to quote or report only scientists' voices, the degree of SP is likely to be low

in comparison to other texts in which representatives of the government and the public are invited to participate in the debate.

3.3 Explicit intertextuality in SP discourse

Quoting in media discourse allows the journalist to attribute authenticity, distance, and objectivity towards the content of the utterances because, by quoting the author's literal words, he no longer has to assume total responsibility for the content of what is said (Maingueneau, 2008: 142). In SP news, quoting seems to be used for the same reasons: the journalist establishes a certain distance towards what is said about the research and, by providing the author's credentials, he attributes authority and reliability to what is said.

But, as Caldas-Coulthard argues with regard to discourse in the news:

The treatment of any topic will always depend on who is chosen to comment and whose opinions and definitions are sought. Choice and selection, therefore, will determine how a certain event will be reported and the implications derived from this choice will have ideological consequences (1997:37).

Hence, it is a matter of choice and ideology. Not only the choices of either quoting or reporting somebody else's voices are important, but also who is chosen to be part of the debate. For example, the social actors chosen to be part of the debate promoted by the journalists of *Scientific American* are typically representatives of a scientific community; differently than the debate promoted by the BBC journalists, whose choices embrace a range of social actors (from the scientist to the general public) (Motta-Roth et al., 2008). These results align with Caldas-Coulthard's observations on the hierarchical order of reliability in news:

Sources are 'accepted' in a hierarchical order. People linked to power relations or institutions tend to be more 'reliable' than others, so a lot of what is reported is associated with power structures. (...) Direct and indirect reporting in hard news have, thus, the function of legitimising what is reported. It is one of the rhetorical strategies used by the media discourse to implicate reliability (1997:59).

Although Caldas-Coulthard does not focus her analysis on SP news specifically, her assumptions about power relations in news discourse can also be applied to SP news. In these texts, the journalist introduces social actors and their exact words along with their credentials (Example 7). By doing so, the journalist emphasizes the social actor's institutional role (Motta-Roth et al., 2008:4) and transfers the responsibility towards what is being said to the author of the utterance. These strategies, as Caldas-Coulthard suggests, implicate truthfulness and reliability.

Example 7

BBC#13 Sally Rose, *an asthma nurse specialist at Asthma UK*, said: 'While some research does suggest that breastfeeding may help reduce the chance of babies developing allergic conditions such as asthma, there are other studies that contradict this.'

SCIAM#9 Senior study author Nina Kraus, *a professor of neurobiology and physiology at Northwestern University*, says this means music training may not only improve a person's ability to decipher different tones but also enhances reading and speech functions (...).

The enclosed clauses in Example 8 (*an asthma nurse specialist at Asthma UK* and *a professor of neurobiology and physiology at Northwestern University*) attribute an institutional role to the Sayer (Sally Rose and Nina Kraus). In such cases, the reliability of the projected clause (proposition or proposal) is increased by the credentials of their authors (Motta-Roth;

Lovato, 2009). Thus, the more a person is related to an institution and the more important this institution is, the more reliable and relevant his/her comments are concerning public decisions about science.

4. Final Considerations

The analysis of explicit intertextuality in the corpus has indicated that SP news are built on a multiplicity of references to texts related to the research being popularized for at least three reasons: 1) the role of the media to inform society about new research outcomes; 2) the responsibility of the mediator (journalist) to explain principles and concepts which allow society to participate in the transformation of knowledge; and 3) the need society has to understand the relevance of the research in order to support scientific endeavors (Motta-Roth, 2009). The mention of the scientific publication in which the research was published, for example, seems to be connected more specifically to the role of the journalist to inform the reader about new studies. By providing the academic source of the text (*Science, Nature, etc*) and when the academic text was published (*recent study, this week, today, etc*), the journalist indicates that the text reports a new discovery, new insights on science that are worth reading.

On the other hand, the mention of intertexts (e. g. interviews with the researchers, previous research, official documents), which can occur directly (quoting) or indirectly (reporting), seems to be related to the explanation of scientific principles and concepts and the evaluation of the study, as well as the promotion of a debate on the topic. Hence, the mention of oral texts is related to the responsibility of the mediator (journalist) to explain the research in order to make society understand its relevance and participate in the process, supporting scientific endeavors. The identification of the institutional role of the Sayers, in such cases, attributes reliability towards what is being said.

Because a great portion of the texts (typically more than 50%) rely on a variety of other texts, studies of SP news and of the SP process itself may benefit from a more systematic investigation of explicit intertextuality as well as from a more profound study of implicit intertextuality or interdiscursivity. The analysis of the latter (interdiscursivity) has been shown to be as important as the analysis of intertextuality for understanding how scientific knowledge is recontextualized in media settings, because SP news embraces a complex web of different discourses, such as educational, media, and scientific discourses (Beacco et al., 2002; Motta-Roth et al., 2008). Therefore, future developments of this study will involve mapping and interpreting the linguistic strategies concerned with explicit and implicit intertextuality in a corpus of 60 SP News from the main project as to achieve a more representative view of intertextuality in SP.

Bibliographical references

BHATIA, Vijay (2004). *Worlds of written discourse: a genre-based view*. London: Continuum.

BAZERMAN, Charles (2004a). Intertextualities: Volosinov, Bakhtin, Literary Theory, and Literacy Studies. In: Arnetha Ball; Sarah Warshauer Freedman (Ed.). *Bakhtinian Perspectives on Languages, literacy, and Learning*. Cambridge University Press, pp. 53-65. Available at: <http://education.ucsb.edu/bazerman/chapters/35.intertextualities.doc>. Accessed 02 May 2010.

BAZERMAN, Charles (2004b). Intertextuality: how texts rely on other texts. In: Charles Bazerman; Paul Prior (Eds.). *What writing does and how it does it: an introduction to analyzing texts and textual practices*. Mahwah, NJ: Lawrence Erlbaum Associates, pp. 83-96.

BEACCO, Jean-Claude; CLAUDEL, Chantal; DOURY, Marianne; PETIT, Gérard; REBOUL-TOURE, Sandrine (2002). Science in media and social discourse: new channels of communication, new linguistic forms. *Discourse Studies*, 4(3): 227-300.

BRASIL (1997). SECRETARIA DA EDUCAÇÃO FUNDAMENTAL. *Parâmetros Curriculares Nacionais: Introdução aos Parâmetros Curriculares Nacionais*. Brasília: MEC/Secretaria de Educação Fundamental. Available at: <http://portal.mec.gov.br/seb/arquivos/pdf/livro01.pdf>. Accessed 03 Nov 2009.

CALDAS-COUTHARD, Carmen Rosa (1997). *News as social practice: a study in critical discourse analysis*. Florianópolis: Pós-Graduação em Inglês/UFSC.

CALSAMIGLIA, Helena; van DIJK, Teun A. (2004). Popularization discourse and knowledge about the genome. *Discourse Studies*, 15(4): 369-389.

FIORIN, José Luiz (2006). Interdiscursividade e intertextualidade. In: Beth Brait (Org.). *Bakhtin: outros conceitos-chave*. São Paulo: Contexto, pp. 161-191.

HALLIDAY, Michael Alexander Kirkwood; MATTHIESSEN, Christian M. I. M. (2004). *An introduction to functional grammar*. London: Arnold.

HENDGES, Graciela Rabuske (2009). Procedimentos e categorias analíticas para o estudo de notícias de popularização da ciência. In: ENCONTRO DO NÚCLEO DE ESTUDOS LINGUAGEM, CULTURA E SOCIEDADE: GT LABLER (MÓDULO II), 2. *Proceedings...* Santa Maria, RS: LABLER/PPGL/UFMS.

HILGARTNER, Stephen (1990). The dominant view of popularization: conceptual problems, political uses. *Social Studies of Science*, 20(3): 519-539.

KOCH, Ingedore Grunfeld Villaça (2009). A intertextualidade. In: Koch, I. G. V. *Introdução à lingüística textual*. 2nd ed. São Paulo: Editora WMF Martins Fontes, pp. 145-157.

MAINGUENEAU, Dominique (2008). *Análise de textos de comunicação*. São Paulo: Cortez.

MEURER, José Luiz (2002). Uma dimensão crítica do estudo de gêneros textuais. In: José Luiz Meurer; Désirée Motta-Roth (Eds.). *Gêneros textuais e práticas discursivas: subsídios para o ensino da linguagem*. Bauru: EDUSC, pp. 17-29.

MOTTA-ROTH, Désirée (2005). Questões de metodologia em análise de gêneros. In: Acir Mário Karwoski; Beatriz Gaydeczka; Karim Siebeneicher Brito (Eds.) (2006). *Gêneros textuais: reflexões e ensino*. 2nd ed. Rio de Janeiro: Editora Lucerna, pp. 145-163.

MOTTA-ROTH, Désirée (2007). *Análise Crítica de Gêneros com foco em artigos de popularização da ciência*. Research Project PQ/CNPq (n. 301962/2007-3).

MOTTA-ROTH, Désirée (2008). Análise crítica de gêneros: contribuições para o ensino e a pesquisa de linguagem. *D.E.L.T.A.*, 24(2): 341-383.

MOTTA-ROTH, Désirée (2009). A popularização da ciência como processo social: um balanço dos resultados obtidos pelo GT LABLER dentro do projeto PQ/CNPq, n. 301962/2007-3. In: ENCONTRO DO NÚCLEO DE ESTUDOS LINGUAGEM, CULTURA E SOCIEDADE: GT LABLER (MÓDULO IV), 5. *Proceedings...* Santa Maria, RS: LABLER/PPGL/UFSM.

MOTTA-ROTH, Désirée; LOVATO, Cristina dos Santos (2009). Organização retórica do gênero notícia de popularização da ciência: um estudo comparativo entre português e inglês. *Linguagem em (Dis)Curso*, 9(2): 233-271.

MOTTA-ROTH, Désirée; MARCUZZO, Patrícia; NASCIMENTO, Fábio Santiago; SCHERER, Anelise Scotti (2008). Polifonia em notícias de popularização da ciência sob a ótica sistêmico-funcional. In: CONGRESSO DA ASSOCIAÇÃO DE LINGÜÍSTICA SISTÊMICO-FUNCIONAL DA AMÉRICA LATINA (ALSFAL), 4. *Proceedings...* Florianópolis: ALSFAL-UFSC, pp. 1-10.

MOTTA-ROTH, Désirée; MARCUZZO, Patrícia. (in press). Ciência na mídia: análise crítica de gênero de notícia de popularização científica. *Revista Brasileira de Linguística Aplicada*.

MYERS, Greg (2003). Discourse studies of scientific popularization: questioning the boundaries. *Discourse Studies*, 5(2): 265-279.

OLIVEIRA, Janaina Minelli de; PAGANO, Adriana Silvina (2006). The research article and the science popularization article: a probabilistic functional grammar perspective on direct discourse representation. *Discourse Studies*, 8(5): 627-646.

APPENDIX

Texts retrieved from <i>BBC News International</i> and <i>Scientific American</i>	
BBC#1	BBC News International. Home birth to ward increases risk. UK, Apr. 2008. Health section. Available at: http://news.bbc.co.uk/2/hi/health/7324555.stm . Accessed 02 Apr. 2008.
BBC#2	BBC News International. HIV 'hides from drugs for years'. UK, Mar. 2008. Health section. Available at: http://news.bbc.co.uk/2/hi/health/7287792.stm . Accessed 02 Apr. 2008.
BBC#3	BBC News International. GM seeds can 'last for 10 years'. UK, Apr. 2008. Science/Nature section. Available at: http://news.bbc.co.uk/2/hi/science/nature/7324654.stm . Accessed 02 Apr. 2008.
BBC#4	BLACK, R. Study finds benefits in GM crops. <i>BBC News International</i> , UK, Jan. 2004. Health section. Available at: http://news.bbc.co.uk/2/hi/science/nature/4046427.stm . Accessed 02 Apr. 2008.
BBC#5	BBC News International. Racial clues in bowel cancer find. UK, Mar. 2008. Health section. Available at: http://news.bbc.co.uk/2/hi/health/7319251.stm . Accessed 02 Apr. 2008.
BBC#6	BBC New International. Brain size 'not key to intellect'. UK, Jun. 2008. Health section. Available at: http://news.bbc.co.uk/2/hi/health/7443534.stm . Accessed 02 Apr. 2008.
BBC#7	BBC News International. Gene 'controls' body fat levels. UK, Sep. 2007. Health section. Available at: http://news.bbc.co.uk/2/hi/health/6977423.stm . Accessed 02 Apr. 2008.
BBC#8	BBC News International. Fat scan shows up 'true' obesity. UK, Mar. 2007. Health section. Available at: http://news.bbc.co.uk/2/hi/health/6483403.stm . Accessed 02 Apr. 2008.
BBC#9	BBC News International. Alzheimer's drugs impact hailed. UK, May 2007. Health section. Available at: http://news.bbc.co.uk/2/hi/health/6655221.stm . Accessed 02 Apr. 2008.
BBC#10	BBC News International. Berries 'help prevent dementia'. UK, Jan. 2006. Health section. Available at: http://news.bbc.co.uk/2/hi/health/4632886.stm . Accessed 02 Apr. 2008.
BBC#11	BBC News International. Light therapy 'can slow dementia'. UK, Jun. 2008. Health section. Available at: http://news.bbc.co.uk/2/hi/health/7445606.stm . Accessed 02 Apr. 2008.
BBC#12	BBC News International. Gene 'links breastfeeding to IQ'. UK, Nov. 2007. Health section. Available at: http://news.bbc.co.uk/2/hi/health/7075511.stm . Accessed 02 Apr. 2008.
BBC#13	BBC News International. Breast milk 'may be allergy key'. UK, Jan. 2008. Health section. Available at: http://news.bbc.co.uk/2/hi/health/7208941.stm . Accessed 02 Apr. 2008.
BBC#14	BBC News International. Toll of teenage drinking revealed. UK, Mar. 2008. UK News section. Available at: http://news.bbc.co.uk/2/hi/uk_news/england/7317745.stm . Accessed 02 Apr. 2008.
BBC#15	BBC News International. NHS staff dub e-records 'clunky'. UK, May 2008. Health section. Available at: http://news.bbc.co.uk/2/hi/health/7380567.stm . Accessed 02 Apr. 2008.

SCIAM#1	BIELLO, D. When it comes to photosynthesis, plants perform quantum computation. US, Apr. 2007. News section. Available at: http://www.sciam.com/article.cfm?id=when-it-comes-to-photosynthesis-plants-perform-quantum-computation . Accessed 09 Oct. 2009.
SCIAM#2	MINKEL, J. R. Whole lotta shakin' on asteroid Itokawa. US, Apr. 2007. News section. Available at: http://www.sciam.com/article.cfm?id=whole-lotta-shakin-on-ast . Accessed 09 Oct. 2009.
SCIAM#3	BIELLO, D. What is the best way to turn plants into energy? US, May 2009. News section. Available at: http://www.scientificamerican.com/article.cfm?id=bioelectricity-versus-biofuel . Accessed 14 Oct. 2009.
SCIAM#4	JUNCOSA, B. Growing prostate from adult stem cells – but who would want one? US, Oct. 2008. News section. Available at: http://www.scientificamerican.com/article.cfm?id=growing-prostate-glands-from-stem-cells . Accessed 14 Oct. 2009.
SCIAM#5	MINKEL, J. R. Mathematics points the way to a perfect head of beer. US, Apr. 2007. News section. Available at: http://www.sciam.com/article.cfm?id=mathematics-point-the-w . Accessed 14 Oct. 2007.
SCIAM#6	MINKEL, J. R. A tale of two exoplanets: One incredibly hot, the other extremely windy. US, May 2007. News section. Available at: http://www.sciam.com/article.cfm?id=a-tale-of-two-exoplanets-one-incredibly-hot-the-other-extremely-windy . Accessed 09 Oct. 2009.
SCIAM#7	BIELLO, D. Genetically modified crops survive weed-whacking herbicide. US, May 2007. News section. Available at: http://www.sciam.com/article.cfm?id=genetically-modified-crops-survive-weed-whacking-herbicide . Accessed 09 Oct. 2009.
SCIAM#8	SWAMINATHAN, N. Is the out of África theory out? US, Aug. 2007. News section. Available at: http://www.sciam.com/article.cfm?id=genetically-modified-crops-survive-weed-whacking-herbicide . Accessed 09 Oct. 2009.
SCIAM#9	SWAMINATHAN, N. Did sesame street have it right? US, Sep. 2007. News section. Available at: http://www.sciam.com/article.cfm?id=did-sesame-street-have-it-right . Accessed 09 Oct. 2009.
SCIAM#10	SWAMINATHAN, N. That flu you caught? It came from east and southeast Asia. US, Apr. 2008. News section. Available at: http://www.scientificamerican.com/article.cfm?id=that-flu-you-caught-it-ca . Accessed 14 Oct. 2009.
SCIAM#11	GREENEMEIER, L. Monkey think, robot do. US, Jan. 2008. News section. Available at: http://www.sciam.com/article.cfm?id=monkey-think-robot-do . Accessed 03 Abr. 2008.
SCIAM#12	STEIN, L. Work it out: more activity = slower aging. US, Jan. 2008. News section. Available at: http://www.scientificamerican.com/article.cfm?id=new-study-links-exercise-to-longevity . Accessed 14 Oct. 2009.
SCIAM#13	MINKEL, J. R. Wireless energy lights bulb from seven feet away. US, Jun. 2007. News section. Available at: http://www.sciam.com/article.cfm?id=wireless-energy-lights-bulb-from-seven-feet-away . Accessed 03 Apr. 2008.
SCIAM#14	SWAMINATHAN, N. Cave speak: did neandertals talk? US, Oct. 2007. News section. Available at: http://www.sciam.com/article.cfm?id=cave-speak-did-neandertal . Accessed 03 Apr. 2008.
SCIAM#15	STEIN, L. Is human growth hormone the key to eternal youth? US, Jan. 2007. News section. Available at: http://www.sciam.com/article.cfm?id=is-human-growth-hormone-t . Accessed 03 Apr. 2008.

