Metadiscourse in Research and Popular Science Articles or how to please the audience: *a cross-generic and intra-generic analysis in search of a common metadiscursive core.*

I. INTRODUCTION

1.1 *Research and Popular Science: two varieties of scientific discourse.*

Scientific discourse has been linguistically described by a vast number of authors, among whom I would like to cite Widdowson's classification (1979: ch. 4), who claims three major ways to focus science, thus resulting in three discourse types:

	FOCUS	DISCOURSE TYPE
a.	science as subject	scientific instruction
b.	science as discipline	scientific exposition
c.	science as topic	scientific journalism

It is easy to deduce that Research Science is what Widdowson calls *science as discipline* and its corresponding discourse type "scientific exposition" and Popular Science is seen as *science as topic* thus corresponding to "scientific journalism". These are the two discourse types which are the object of the research I am reporting to you, since *science as subject* and its reflection in textbooks would be of interest to researchers in education, something out of my scope at the moment.

Both varieties of scientific discourse, *Research Science and Popular Science* are ways in which scientific knowledge is communicated. We must assume, then, that both discourse varieties have in common the fact of

having an audience (interpersonal macrofunction - the social world) who wants to be informed about certain facts (ideational macrofunction - the mental world) but also to be convinced and persuaded and, in the case of Popular Science, also to be entertained by means of language (textual macrofunction - the physical world), if we follow systemic functional linguistics postulates (Halliday, 1978, 1994).

From the viewpoint of genre analysis (Swales, 1990), these two varieties of scientific discourse give way to a number of genres, among which I have chosen Research Articles (RA's) and Popular Science Articles (PSA's) as the most representative ones within the world of science.

Also, recent approaches to discourse analysis have revisited the concept of genre and have introduced that of *social construct* (Fairclough, 1992, 1995, 2003), suggesting that texts are part of social events or the linguistic way in which people act and interact socially. Authors and audience of texts are seen as social agents whose actions are not free since they are socially constrained:

> Social agents *texture* texts, they set up relations
> between elements of text. There are structural
> constraints on this process –for instance, the
> grammar of a language makes some combin-
> ations and orderings of grammatical forms
> possible but not others (Fairclough, 2003: 22).

This perspective regards both varieties of scientific discourse in the form of texts as action and interaction, defined by their social practices and the ways in which these are connected. Traditionally in applied linguistics

RA's have been the main object of research from a discourse analysis perspective. *Social constructionism* views them as social action between two parties, author/s and audience, in this case scientific communities and researchers. However, and this is my point in the current research, PSA's can also be regarded as social constructs between mass media groups and the general public, sharing some of the metadiscursive resources with RA's.

RA's can be described as "rhetorically competent products" through which scientific knowledge is negotiated and ratified (Hyland, 1998). They require writers to take into account the audience and anticipate their background knowledge, processing problems and reactions to the text (Widdowson, 1984: 220). For authors like Salager-Meyer and Alcaraz Ariza (2001) among others, language in RA's must serve both a communicative and an interactional purpose: a writer not only wants his/her words to be understood (an illocutionary effect), but also to be accepted (a perlocutionary effect).

Following this premise, the accomplishment of social acts in scientific writing therefore concerns epistemic change: the intention of the writer is to alter the reader's knowledge on a specific field or matter. In other words, the reader not only has to identify semantic acts of meaning and reference, but also to be involved in pragmatic interpretation. A scientific assertion, then, has, as part of its essential force to persuade an audience, that of changing "a context in which the speaker is not committed…into a context in which s/he is so committed" (Gazdar, 1981: 69).

As for PSA's, it is essential to see them as instances of scientific journalism and, thus, as mass media products and news. Following de Semir (2000),

Mass media is a commercial product, and as such, it must play to its audience in such a way that it captures attention and sells. This necessity converts the reporter into a kind of showman, and the news must spark debate and emotion in its audience to maintain interest (de Semir, 2000: 125).

Then, PSA's can be described as social constructs, since the world of news establishes its own rules, language and truths. News can be tailored to serve different purposes, such as to provoke debate or to support a particular public position. In this sense, the media does not simply communicate a reality: it creates one. PSA's can also be, then, texts seen as action.

1.2 *Metadiscourse as a means of social action: hooking the audience.*

The concept of metadiscourse has many times been defined as "discourse about discourse" and it is based on a view of writing as a social and communicative action between writer and reader. It deals with the study of textual resources at above-sentence levels and can be defined as the linguistic resources used to organize a discourse or the writer's stance towards either its content or the reader (Hyland, 2000: 109) and includes a heterogeneous series of cohesive and interpersonal features which help readers to connect, organize, and interpret material in a way preferred by the writer and with regard to the understandings and values of a particular discourse community. It was first studied by Vande Kopple (1985) and later on, Crismore et al. (1993) divided metadiscourse into textual metadiscourse (text markers and interpretative markers) and interpersonal metadiscourse (hedges, certainty markers, attributors, attitude markers and

commentary). Researches based on metadiscourse have served to demonstrate which authors, genres or cultural discursive communities show more interest in guiding and orienting readers in the process of interpretation and make their presence felt in the text more explicitly, thus reflecting a more reader-oriented attitude, a more positive notion of politeness, and a generally more explicit textual rhetoric (Moreno, 1998: 549).

Metadiscourse is an attractive concept regarded as a tool to attempt tracing patterns of interaction and cohesion across texts. Although it has received criticism as a method, for being possibly under-theorized and empirically vague (Hyland and Tse, 2004), it is an aspect of discourse which cannot be left aside. It is generally seen as the author's linguistic and rhetorical manifestation in the text in order to "bracket the discourse organization and the expressive implications of what is being said" (Schiffrin 1980: 231). Following Hyland & Tse (2004: 157), through metadiscourse, a writer is able not only to transform a dry, difficult text into coherent, reader-friendly prose, but also relate it to a given context and convey his or her personality, credibility, audience-sensitivity, and relationship to the message. Therefore, metadiscourse is a functional category which can be realized through a range of linguistic units going from hedges, boosters and passive sentences in RA's to personalizations, imperatives, humorous clauses, exclamatory punctuation and quotes in PSA's.

Finally, metadiscourse has been mostly applied to academic discourse analyses, since the need to describe and teach the textual resources that scientists and academics use in their writings has been a priority in applied linguistics till now. However, the enormous expansion that scientific journalism and its translation into many languages has had in the last

fifteen years or so, due, in part, to globalization, has showed a need to study this aspect of popular science texts. I am particularly concerned in seeing whether there is a common metadiscursive core between science as a discipline and science as a topic in their common objective of hooking their audience and, if so, what is its nature. This has been the aim of the present research.

2. METHOD AND MATERIALS

The framework I have used to analyse my corpus is Hyland and Tse's model of metadiscourse (2004) regarded as a *functional category.* Although this model has been drawn from a corpus of academic texts and designed to analyse them, I am interested in knowing how popular science texts also adapt to this framework. This means, obviously, that many of the resources that popular science displays to attract readers' attention will be left aside, since the purpose here is only to depict the resources that are common to both RA's and PSA's. A wider scope of resources belonging to popular science have been the object of other researches (Suau, 2005, ReSLA, -in press-).

A corpus of 30 articles, 15 from each genre, chosen randomly from the following fields has been analysed:

RSA's	PSA's
Tourism	Biology
Business	Photography
Genetics	Psychology
Botany	Technology
Zoology	Meteorology
Economics	Zoology
Research Strategies	Space
Information Science	Astronomy
Philosophy of Science	Epidemiology
Computer Science	Climate
Ecology	Physics
Medicine	Robotics
Nursing	Medicine

RSA's all belong to international electronic academic journals, edited by well-known publishers such as Pergamon, Blackwell or Elsevier and PSA's have all been collected electronically from the journal Scientific American. For each text, a maximum of 600 words has been analysed, as a means to homogenize RSA's and PSA's length. The variety and randomness in chosing the subjects is due to our purpose in showing the use of metadiscursive devices in a wide scope of fields cross-generic and intra-generically.

Hyland and Tse's metadiscourse model entails two sub-divisions: *Interactive Resources*, -conjunctions, frame markers, code glosses, etc.- that refer to ways of organizing discourse, and help the reader in knowing the writer's preferred interpretations and *Interactional Resources*, that involve readers in the argument by alerting them to the author's perspective towards both propositional information and readers themselves. Metadiscourse here is essentially evaluative and engaging, influencing the degree of intimacy, the expression of attitude, epistemic judgements, and commitments, and the degree of reader involvement. This aspect thus relates to the *tenor* or interpersonal macrofunction of language, concerned with controlling the level of personality in a text (Hyland & Tse, 2004: 168) and, therefore, is a first order tool in attracting the reader's attention towards the text. This is the set of metadiscursive tools I am most interested in and the framework I have applied to my analysis.

Interactional: involving the reader in the argument.

Category	*Function*	*Examples*
Hedges	withhold writer's full commitment to proposition	might/perhaps/about
Boosters	emphasize force or writer's certainty in proposition	in fact/definitely/it is clear that
Attitude markers	express writer's attitude to proposition	unfortunately/I agree/ surprisingly
Engagement markers	explicitly refer to or build relationship with reader	consider/note that/ you can see that
Self-mentions	explicit reference to author	I/we/my/our

3. RESULTS

Table 1. Interactional Features in RSA's (intra-generic)

Hedges	Boosters	Attitude Markers	Engagement Markers	Self-Mention	TOTAL FEATURES
86	12	137	2	87	326
26.38%	3.68%	42.02%	0.06%	26.69%	Percentages

Table 2. Interactional Features in PSA's (intra-generic)

Hedges	Boosters	Attitude Markers	Engagement Markers	Self-Mention	TOTAL FEATURES
105	1	84	19	43	252
41.67%	0.40%	33.33%	7.54%	17.06%	Percentages

The above figures show that, on the one hand, RA's present, intra-generically, a clear preference for *Attitude Markers*, followed by *Self-mention* and *Hedges*, these two practically at the same level, as the main

interactional features. Curiously enough and always subjected to the analysis of the present corpus, *Hedges* show a slightly higher percentage in PSA's, contrarily to the conventions for both genres, which are more demanding on the use of hedges in RA's than in PSA's, since RA's need not to impose new knowledge to the scientific community but to hedge it according to the scientific community's conventions. The other two most representative features, *Attitude Markers* and *Self-mention* also show higher figures in RA's than in PSA's. This fact contrasts powerfully with the conventions for both genres, since these two features are much more typical of popular science texts as a means to hook the reader's attention with subjective items such as personalizations and emotional or evaluative determiners in the form of adverbials or adjectives.

Table 3. Interactional Features in both genres (cross-generic)

Hedges		*Boosters*		*Attitude Mk.*		*Engagement*		*Self-mention*	
RA's	PSA's	RA's	PSA's	RA's	PSA's	RA's	PSA's	RA's	PSA's
86	105	12	1	137	84	2	19	87	43
26.38%	**41.67%**	**3.68%**	**0.40%**	**42.02%**	**33.33%**	**0.06%**	**7.54%**	**26.69%**	**17.06%**

The cross-generic comparison suggests that it is in the area of *Hedges, Attitude Markers* and *Self-mention* that both genres coincide in their common metadiscursive core.

However, a deepest analysis into each category of feature proves necessary, in order to measure to what extent is this common core reliable and also to trace differences in the embodiment of each feature in both genres.

HEDGES

Hedges present a common identity in both genres, mainly in the form of *impersonal* sentences and *reifications*, the author thus hiding his/her self as conventions for scientific discourse in general demand. In both cases, the result is **depersonalization**:

Common core:

RA's

- *Clover cultivars are <u>likely to be</u>…*
- *This <u>could lead</u> to a wider understanding of…*
- *<u>Perhaps</u> the degree to which variation arrives..*
- *It <u>might</u> also provide a useful framework.….*
- *These insights <u>would be</u> difficult to gain…*
-

PSA's

- *Recent findings <u>may finally</u> put the hippo in its place..*
- *The explanation of the universe <u>may be</u> the most important fact..*
- *Some of these issues <u>may not have been</u> as central…*
- *Titan <u>might have</u> clouds of methane..*
- *Gender <u>could not</u> affect scores…*
- *The camcorders can observe those that can sense the long-wavelength..*

Differences of embodiment:

Other examples only appear in **PSA's,** using hedges in an indirect way, the subject of their sentences deriving to third persons, thus deviating the author's responsibility of propositions and attributing it to other subjects alien to the author. The result is also **depersonalization**:

PSA's

- *A skeptic might yawn…*

Another category of hedges appears in first-person sentences in PSA's, the author's self thus being emphasized, something typical in this genre. The result is **personalization**, one of the ways to draw the reader's attention:

- *I never <u>would have</u> dreamed that..*
- *I <u>would've certainly</u> mailed..*
- *Now that <u>I can finally get a glimpse</u>..*
- *Self-doubt <u>could be</u> eliminated..*

ATTITUDE MARKERS

Under *Attitude Markers* I have considered not only adverbs, as Hyland and Tse (2004) suggest, but also adverbial phrases, adjectives and adjectival phrases, thus taking into consideration all kinds of **emotional determiners** that convey a subjective attitude from the author. This is another common core area for metadiscursive resources in both genres:

Common core:

RA's

- *Confers <u>remarkable</u> resistance to DNAses..*
- *Technology is developing <u>rapidly</u>..*
- *..has offered an <u>interesting</u> alternative approach..*
- *..constitutes an <u>attractive</u> new class of probes..*
- *The <u>unique</u> properties of these molecules..*
- *There is a <u>useful</u> interpretation of the coefficient of x.*

PSA's
- *<u>Essentially</u> the ribo-regulator enables scientists to..*
- *..but <u>exactly</u> where hippos sit.*
- *I would've <u>certainly</u> mailed in $1.98..*
- *The alarmist stories <u>greatly</u> exaggerated..*
- *His colleagues achieved <u>special</u> prominence..*
- *Mann is <u>most famously</u> known for…*

Differences of embodiment:

Here possibly the only difference of embodiment between both genres is the figurative, almost metaphorical sense of some **determiners** in PSA's, in order to burden their meanings with extreme qualities. This constitutes a powerful attraction of reader's attention:

- *The artiodactyls family tree has proved <u>devilishly</u> difficult..*
- *The capability of quantum computers perform <u>monstrously</u>..*

SELF-MENTION

Under this feature we can also observe some differences between both genres. In particular, the fact that examples from RA's always correspond to the author/s voice and, therefore, author's authority over the research, whereas those from PSA's are divided into several sub-categories: examples belonging to the author's voice and examples belonging to quotations or direct speech sequences, typical of popular science:

Common core:

RA's

- *<u>We</u> hypothesized that the observed data…*
- *<u>We</u> studied the effects..*
- *<u>We</u> obtained laboratory mice..*
- *<u>We</u> counted nucleated cells…*
- *<u>I</u> analyze another argument..*
- *<u>Our</u> purpose to review the indications…*

PSA's

- *<u>We</u> have constructed rigorous, systematic methods..*
- *…<u>we</u> have ever discovered about our origins…*
- *If, like <u>me,</u> you were an avid reader of comic books…*
- *The basic idea is to liberate <u>ourselves</u> from..*

Differences of embodiment:

Personalizations belonging to direct speech quotations are used as a way to present the voice of the true researcher or scientist, since the voice of the author is here that of the reporter, and, thus, cannot coincide with that of the researcher.

PSA's

- *"I never would have dreamed.." he said.*
- *"I'm not sure if…" he said.*

This wide scope of personalizations in PSA's seems in line with the discourse of popular science, since the author here does not coincide with the researcher's self. S/he is only the journalist narrating scientific facts, contrarily to RA's personalizations.

4. DISCUSSION

After seeing the intra-generic and cross-generic results we could suggest that Hyland and Tse's framework has proved useful to analyse those interactional metadiscursive resources typical of RA's which also appear in PSA's. It has been possible to identify and isolate resources that form a common core and also to set the differences of embodiment in each of the genres. Three RA's resources have been proved to be shared by PSA's, thus forming a common core of metadiscourse: *hedges, attitude markers* and *self-mention* items, although numerical results suggest very different overall conclusions to those expected from genre conventions in scientific discourse. *Hedges* are used in *impersonal sentences* and *reifications* in both genres, thus creating the desired depersonalization of scientific discourse which directly addresses the reader suggesting a non-imposed way towards new knowledge. They guarantee the requisites of scientific research which demands a certain doubt in the findings, so as to leave open the way for

further discussion and additional research. This depersonalization through hedges is also embodied in PSA's by means of third person utterances, which in this way derive responsibility about the new knowledge to other people alien to the text author. The number of hedges is, however, larger in PSA's than in RA's, this being an unexpected result, since PSA's do not need as wide usage of hedges as RA's do. As for *Attitude Markers*, it is, surprinsingly, the area where there is a more solid and balanced sharing of metadiscursive elements, in terms of embodiment, not in number, which, as mentioned above, is far more relevant in RA's. This finding could, however, be subjected to the analysis of the present corpus and has to be contrasted with further corpora analyses. Both genres here present rather similar types of attitude markers, the only difference being in some more extreme qualities shown in PSA's examples. Finally, *Self-mention* presents important differences of embodiment: in RA's, *self-mention* always corresponds to the researcher's voice, being responsible for the new findings and also being the author of the text, whereas in PSA's, *self-mention* is shared by two voices: that of the reporter and that of the direct speech quotations which refer to the scientist behind the new knowledge reported. Here too, the numerical result is larger for RA's.

Our conclusion to these data would be that this research has revealed insightful in unveiling the common metadiscursive resources that both genres display in a varied scope of disciplines. It has also revealed the different ways in which these resources are embodied in both genres. These results seem to us reliable, since the three types of resources: *hedges, attitude markers* and *self-mention* have shown a consistent use in RA's and PSA's through all disciplines. However, the frequency of some resources seems contrary to what each generic convention asks for. Results indicate that the relational pressure with the tenor in PSA's presents a rich and

powerful metadiscourse mainly achieved through politeness strategies in the form of *hedges*, that cater for self-concealment and objectivity. RA's metadiscourse analysis evidences, on the other hand, a quantitatively lower number of hedges and relies mainly on pronominal forms of *self-reference* and *emotional determiners* which provide a strong discourse subjectivity, meeting in this way the tenor's requirement for persuasiveness in a different way than that generically demanded. The use of *hedges* is surprinsingly greater in PSA's, and *attitude markers*, charged with emotional meaning are rather numerous in RA's, contrarily to what conventions for writing scientific discourse claim. I would say, to sum up, that these results are a first step in the comparison between the metadiscursive resources of both genres but should be contrasted with further researches in larger corpora.

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