Recent Linguistic Research into Author Abstracts: Its Value for Information Science‡

Michela Montesi* and Blanca Gil Urdiciain**

*University of Amersterdam, Media Studies, Turfdraagsterpad, 9, 1012 XT Amsterdam, The Netherlands, m.montesi@uva.nl

** Complutense University of Madrid, Department of Library and Information Science, Escuela Universitaria de Biblioteconomía y Documentación, C/ Santísima Trinidad, 37, 28010 Madrid, Spain, blanca@caelo.eubd.ucm.es

Michela Montesi is a post-doctoral researcher at the University of Amsterdam. She has a PhD from the Complutense University of Madrid on quality and evaluation of abstracts, and is also author of a few publications on that subject.

Blanca Gil Urdiciain holds a PhD and is a Professor of Information Science at the Complutense University of Madrid, Department of Library and Information Science. She is the author of publications on her major areas of research: thesaurus construction, indexing and abstracting.

Montesi, Michela, and Blanca Gil Urdiciain. **Recent Linguistic Research into Author Abstracts: Its Value for Information Science.** *Knowledge Organization, 32(2).* 64-78. 66 refs.

‡This research was funded by a grant from the Spanish Ministry of Education and Science.

ABSTRACT: This paper is a review of genre analysis of author abstracts carried out in the area of English for Special Purposes (ESP) since 1990. Given the descriptive character of such analysis, it can be valuable for Information Science (IS), as it provides a picture of the variation in author abstracts, depending on the discipline, culture and language of the author, and the envisaged context. The authors claim that such knowledge can be useful for information professionals who need to revise author abstracts, or use them for other activities in the organization of knowledge, such as subject analysis and control of vocabulary. With this purpose in mind, we summarize various findings of ESP research. We describe how abstracts vary in structure, content and discourse, and how linguists explain such variations. Other factors taken into account are the stylistic and discoursal features of the abstract, lexical choices, and the possible sources of bias. In conclusion, we show how such findings can have practical and theoretical implications for IS.

1. Introduction

This article is a review of recent linguistics research into abstracts, and specifically research in the branch of linguistics that studies English for Special Purposes (ESP). Such research may be useful for Information Science (IS) and information professionals, since it can assist with a specific type of abstract, i.e. the author abstract. Author abstracts are written by the author of the original paper, as opposed to abstracts written by information professionals, and are intended to serve specific functions in information retrieval (IR) and selection. Due to the ever growing volume of publications, and limitations in the resources available for indexing and especially for abstracting, the author abstract is of pivotal importance for information services. It guarantees timeliness and economical convenience, since it can be

published simultaneously with the article and needs no extra work from the information professional, except possibly some editing and revision. Another advantage of the author abstract is that, in principle, nobody has more command of the substance of the article than the author, and there is rarely anyone more familiar with the relevant literature and terminology (Pinto Molina 2001, 185).

Among the drawbacks of the author abstract, ignoring possible copyright constraints (Rowley 1988, 18), the literature cites a tendency to bias – especially when authors seek to promote their work among the members of their own scientific community – as well as insufficient experience in writing abstracts (Cleveland & Cleveland 2001, 58-59). Despite these disadvantages, however, author abstracts remain extremely interesting for information services, mainly on grounds of their low cost and immediate availability. We believe that ESP research into abstracts may provide information science professionals with the means to adapt such abstracts to the quality standards required for IR and other functions they can serve in the organisation of knowledge.

With few exceptions, IS and ESP research into abstracts have so far remained unconnected. Chan & Foo (2001) explained this by the fact that the two disciplines have different focuses. Broadly speaking, IS professionals and researchers focus largely on user needs, while ESP researchers think mainly in terms of structure and style, their main concern being "teaching novice writers to produce linguistically and structurally acceptable abstracts." Abstracts written by expert or native English speaking members of each scientific community are models for all the other members: once published, the abstracts provide an example to be followed by those who want to be published in turn. As a consequence, ESP research tends to be "descriptive," never questioning the appropriateness of the abstracts it studies. By contrast, IS literature addresses mainly information students and professionals and tends to be "prescriptive," prompting its audience to abide by rules and standards with clear information purposes.

It is the descriptive character of the ESP approach to author abstracts that makes it interesting for IS. Using a methodology unfamiliar to the information scientist, ESP research demonstrates how author abstracts vary across several disciplines. Knowledge of these variations can represent new areas of meaning and application for the information scientist. In this paper we suggest that this knowledge can be useful in revising abstracts, as well as for other activities in knowledge organization, such as subject analysis and vocabulary control.

The idea that abstracts can be revised has been reinvigorated by research into automatic abstracting (Mani 2001, 37-38). The high cost of such research has triggered the need to implement the results already obtained, and since automatically produced abstracts still leave much to be desired, they need revision before being utilized. Through revision, automatically produced abstracts can at least be made readable, the chief difficulty being redundant elements and a lack of relationship between sentences, as well as the inclusion of uninteresting information (Hovy 2003, 589). Revision can also be applied to "human-written" abstracts, though this necessitates entering a more complex environment: an area in which ESP literature on author abstracts could be extremely useful.

A better understanding of author abstracts could provide grounds for reconsidering Borko and Bernier's idea (1975, 5) that abstracts form a basis for indexing and reviewing scientific literature. Such an idea has often been questioned because author abstracts are not objective (Lancaster 2003, 104), nor do they cover the contents of the original document exhaustively (Montesi, in press). However, carrying out abstracting and reviewing tasks on the basis of the author abstract is common practice in many information services. This is specifically the case when the article is written in an unfamiliar language and only the abstract is available in English, or when time constraints prevent the indexer/abstractor from analysing the original document in depth.

As explained at length below, authors regard abstracts as academic genres and attribute to them pragmatic functions that are not necessarily related to information retrieval. Even terminology can contribute to bringing such functions into being, and needs to be seen in a general academic environment. Understanding how authors use abstracts can therefore also assist with vocabulary control, and have positive reverberations within IR.

In the remainder of the article, we summarize the major findings of ESP research since 1990, the publication year of "Genre Analysis: English in academic and research settings" by Swales, which marked the beginning of a decided interest in abstracts among linguists. Data were extracted from the database "Linguistics and Language Behavior Abstracts;" through regular browsing of the journals "English for Specific Purposes" and "English for Academic

Purposes;" through cross references, and through personal contacts with researchers.

Our exclusive focus on linguistic research does not mean that IS has not contributed significant findings to the topic. In fact, IS has taken a different perspective and focused on other aspects such as, most recently, readability (Hartley & Sydes 1997), quality (Tenopir & Jacsó 1993), users' preferences and problems (Hartley & Sydes 1996; Montesi & Gil Urdiciain, in press), the structured format (Hartley 2000, 2000a, 2002, 2004), abstracts and abstracting in the humanities (Tibbo 1992, 1993), electronic abstracts (Armstrong & Wheatley 1998), and the cognitive processes implied in abstracting (Liddy 1991, Endres-Niggemeyer 1998). What we suggest here is that research trends in IS may be enriched by the linguistic perspective.

2. Genre analysis of abstracts

Linguists address the topic of abstracts mainly within the framework of "genre analysis." From this point of view, genre is understood as a text "purposed" to the accomplishment of certain functions, constrained by the conventions of each scientific community, and possibly also presenting variations reflecting other factors of a social, cultural or linguistic nature. In genre analysis, abstracts customarily undergo a rhetorical analysis, and are studied in terms of "moves," i.e. the sections constituting their rhetorical structure, and in terms of the linguistic signals characterizing such moves. Each move serves a minor communicative purpose, which in turn serves the general communicative purpose of the whole text. Moves can be further divided into "steps" or "sub-moves." In this paper, the term "move" and "section" are used interchangeably, as are "sub-move" and "step."

The structure of an abstract is defined intuitively, on the basis of the structure of the underlying research article, and is summarized in four moves: Introduction (or Purpose), Methodology, Results, and Discussion (or Conclusion), which constitute the IMRAD pattern (Swales 1990). Table 1 below gives a summary of studies conducted on the basis of genre analysis, the scientific fields they took into account, the type of abstracts, and the dimensions of the corpora studied.

Author and year of publication	*Scientific field(s) studied*	*Corpus*
Salager-Meyer (1990 and 1991)	Medicine (Clinical, and Epidemiological Research, and Review Articles	77 abstracts accompanying research articles in medical journals
Kaplan et al. (1994)	Applied Linguistics	294 abstracts submitted in application for a conference
Melander et al. (1994)	Biology (Plant Pathology); Medicine (Obstetrics); Linguistics (Applied Linguistics)	90 abstracts, 30 from each of the 3 fields mentioned: for each group: 10 abstracts in Swedish, 10 in English written by Swedes; 10 in English written by Americans
Berkenkotter & Huckin (1995)	Rhetoric and Composition	441 abstracts submitted in application for the Conference on College Composition and Communication
Busch-Lauer (1995)	Medicine (Experimental and Operative Research)	60 abstracts including the Instructions for authors, and the research articles. 30 abstracts in German; 30 in English 15+15: experimental research 13+13: review articles 2+2: case study
Andersson & Gunnarsson (1995)	Applied Linguistics	40 abstracts published in the abstract volume of the AILA world congress held in Amsterdam in 1993

Author and year of publication	*Scientific field(s) studied*	*Corpus*
Bittencourt dos Santos (1996)	Applied Linguistics	97 abstracts accompanying research articles in linguistics journals
Anderson & MacLean (1997)	Medicine (Clinical Medicine, Surgery, Epidemiology, Basic Sciences)	80 abstracts, equally divided according to the 4 types of medicine research, and to the country of production (North American journals and British journals)
Valero Garcés & Calle Martínez (1997)	Medicine	8 abstracts, 4 in English and 4 in Spanish
Bolívar (1999)	Linguistics	207 abstracts from two international South American conferences on linguistics (90 + 117), one attended mostly by Spanish speakers, and the other mostly by English speakers.
García-Calvo (1999)	Linguistics and Biosciences (Agronomy, Genetics, Neuroscience, and Zoology)	185 abstracts of reports of investigation for different conferences
Espinoza Muñoz (2000)	Horticultural science	317 conference abstracts.
Hyland (2000)	Molecular Biology, Magnetic Physics, Mechanical Engineering, Electronic Engineering, Philosophy, Sociology, Marketing, Applied Linguistics	1,040 research article abstracts.
López-Arroyo (2001)	Medicine (Cardiology)	180 database abstracts: 50 by English writers, 50 by Spanish writers, 40 translations from Spanish into English, and 40 translations from English into Spanish
Pérez Ruiz (2001)	Linguistics and Medicine	80 journal abstracts, 20+20 in English, 20+20 in Spanish
Huckin (2002)	Medicine (Basic Science, Clinical Medicine, Health Care Delivery)	90 database abstracts from MEDLINE
Samraj (2002)	Wildlife Behaviour and Conservation Biology	40 (20+20) abstracts of the two disciplines
Martín Martín (2003)	Experimental Phonetics and Psychology	160 research article abstracts, 80 in Spanish (40 for each field), and 80 in English (40 for each discipline).
Méndez-Cendón & López-Arroyo (2003)	Radiology	234 research article abstracts, and their corresponding research articles.
Stotesbury (2003)	Humanities (General and Applied Linguistics, Literature, Anthropology, Cultural Studies, History) Social Sciences (Education, Psychology, Sociology, Human Geography, Economics, Business Administration) Natural Sciences (Ecology, Soil Science, Botany, Animal Biology, Limnology, Oceanography, Terramechanics, Forestry, Physics, Chemistry, Mathematics, Mathematical Statistics)	300 journal abstracts, 100 form the humanities, 100 from the social sciences, and 100 from the natural sciences

Author and year of publication	*Scientific field(s) studied*	*Corpus*
Samraj (2004)	Conservation Biology and Wildlife Behaviour	24 article abstracts (12+12) and their 24 corresponding introductions.
Lorés (2004)	Applied Linguistics	26 abstracts from 4 journals of Linguistics published in English
Martín Martín & Burgess (2004)	Psychology and Phonetics	160 abstracts, in Spanish (40+40) and English (40+40).

Table 1. *Scientific fields and corpora of abstracts studied on the basis of genre analysis*

Most work centres on abstracts written in varying branches of Linguistics and Medicine. Journal abstracts as well as conference abstracts are studied, with most research focusing on the former type. When different languages and cultures come into play, abstracts written in English are usually compared with abstracts written in Spanish, either "castellano" [i.e., Castilian] or South American Spanish (Bolívar 1999; García-Calvo 1999), followed by German or Swedish. Genre analysis has also been combined with different methodologies, such as thematic analysis (Kaplan et al. 1994; Lorés 2004), and interviews (Ventola 1994; Hyland 2000). In comparative approaches, abstracts are compared with research articles and instructions provided to authors (Busch-Lauer 1995; Méndez-Cendón & López-Arroyo 2003, Webber 2004), or with the introduction of the corresponding article (Samraj 2004). The terminological studies focus on the use of metaphors (Webber 1996), on "lexical density" and "lexical variation" (Gibson, 1993; Martín Martín 2001, 2003a), on evaluative language (Stotesbury 2003), on phraseological devices (Méndez-Cendón & López-Arroyo 2003), and on the terminology used in abstracts versus the indexing keywords (Huckin 2002). When conference abstracts are studied, the abstracts of accepted papers are often compared to the abstracts of those rejected (Kaplan et al. 1994; Berkenkotter & Huckin 1995; Faber 1996).

2.1 Variations in the rhetorical structure of abstracts

A general conclusion drawn by ESP researchers is that the rhetorical structure of abstracts presents variations with respect to the IMRAD pattern, which can be identified as follows:

1. Variations concerning single moves;
2. Variations concerning ascribed weight;
3. Variations concerning sequence;
4. Variations relating to the scientific field and/or cultural and linguistic differences.

Such variations are interdependent in that they presuppose and often explain each other. We elaborate below.

2.1.1. Single moves

Single moves can occur other than the reader expects on the grounds of his or her previous experience, or assumptions based on the guidelines for writing abstracts, instructions to authors, or the conventions of each discipline, etc. The introduction is expected to be the initial section, for instance, but may on the contrary be preceded by a background (Bittencourt dos Santos 1996; Anderson & MacLean 1997; Samraj 2002). Different explanations are given for the presence of a background section. In linguistics, Bittencourt dos Santos observed that in the background the author "situated" the research, while in the Introduction proper the author "presented" it. In medicine, Anderson & MacLean (1997) made the background section dependent on the implicitness of the purpose, because it did not appear earlier when the purpose was stated explicitly. Then again, Hyland found that the introduction in soft sciences abstracts provided some kind of context to the research, while in hard sciences it tended to consist of a statement of purpose (2000, p. 72). We can, therefore, not rule out the possibility that this halving of the initial move has, in fact, a disciplinary motive.

The introduction section as a whole is often found to be the longest, and at times the only, section of the abstract (Martín Martín 2003). In some cases researchers can even recognize the structure of the research article introduction in the structure of the abstract (Anderssson & Gunnarsson 1995; López-Arroyo 2001, 345-346). In others, the structure of the abstract coincides with that of the intro-

duction (Lorés 2004). At the other extreme, a couple of studies on medical abstracts underlined that the statement of purpose, which is often viewed as an alternative for the introduction proper, can sometimes (Salager-Meyer 1990) or even often (Huckin 2002) be omitted.

The methodology section is usually found to be short, often embedded in another move, or missing. It appeared in only half of the items studied by Hyland (2000) and Samraj (2002), and hardly ever in the abstracts of philosophy papers that were studied by Hyland. In applied linguistics, this move is specifically described as difficult to spot (Lorés 2004). The move can vary widely in length, ranging from a few sentences to a mere adjunct.

Conclusions are often omitted (Anderson & MacLean, 1997; Hyland 2000; López-Arroyo 2001), and in some cases cannot be distinguished from the results (Martín Martín 2003). Anderson & MacLean calculated that 12 out of their 80 medical abstracts had no conclusion, without apparently diminishing the informativeness of the abstracts. However, they regarded a summary of results as a conclusion, especially when it was a non-numerical summary of results. López-Arroyo (2001, 389-392) noticed that in her set of Spanish medical abstracts the final moves (conclusion and/or results) were often omitted, and that such omissions tended to occur also in abstracts translated from Spanish into English.

2.1.2 Ascribed weight

If we look at moves in terms of length and frequency across a corpus, some seem more important than others, in particular the results, which occupy more text and appear more frequently than other moves (Busch-Lauer 1995; Samraj 2002). Pérez Ruiz found that the purpose, the introduction and the results sections were the most popular in a corpus of medical and linguistic abstracts, the results section being more important in medicine than in linguistics (2001, 443).

Due to their length and wealth of detail, some moves of abstracts allow an analysis in terms of sub-moves or steps – i.e. it is possible to identify in them the microstructures of the moves contained in the original article. This gives them a prominent position by comparison with other sections. Significantly, as we anticipated, the introduction is the move which has most frequently been found to be articulated in sub-moves (Bittencourt dos Santos 1996; Martín Martín 2003; Samraj 2004). Studying the fields of conservation biology and wildlife behaviour, Samraj (2004) showed how differences in the articles' introductions were echoed back in the abstracts' introductions.

On the other hand, some moves can be underrepresented – at least relative to the researcher's expectations – especially when two are concentrated in a single sentence, without any typographical separation. This phenomenon is referred to as "embedding of moves" in the literature. The methodology move is the section most often embedded in other moves, contained in either the introduction or the results sections, across different disciplines including: applied linguistics (Binttencourt dos Santos 1996), medicine (Anderson & MacLean 1997), experimental phonetics and psychology (Martín Martín 2003), wildlife behaviour and conservation biology (Samraj 2002), and others (Hyland 2000). In Anderson & MacLean's study, the methodology was rarely presented in an independent sentence, rather it was embedded either in the introduction, (usually following the pattern "to determine… we did…"), or in the results section. Results and discussion moves can also be embedded (Bittencourt dos Santos, 1996).

2.1.3 Sequence

Some linguists argue that, if one wants to enhance readability and simplify the readers' comprehension process, the IMRAD pattern should be followed in its logical sequence, and each section should be visualized as a single paragraph (Salager-Meyer 1990, 1991). However, research shows that authors, in many cases, don't live up to readers' expectations of sequence. ESP researchers observe several cases in which the desired sequence is not followed. They describe these aberrations, which may occur in conjunction, as "reversal of moves" and "recycling of moves."

Reversal of moves occurs when some moves precede those the reader expects. The abstract might not open with an introduction or a statement of purpose, as one would expect, but instead, opens by explaining the methodology (Bittencourt dos Santos 1996; Martín Martín 2003), or with a statement of results (Espinoza Muñoz 2000). Salager-Meyer (1990) found that the sequence of moves in medical abstracts could vary according to the type of research: in research papers the conclusion tended to precede the results, while in review papers the results tended to precede the purpose.

Move-recycling occurs when the same move is divided over other sections. In Salager-Meyer's corpus (1990) results moves were sometimes split into two parts, separated by the conclusions. Anderson & MacLean (1997) noticed that move-recycling occurred with a high frequency in their sub-corpus of biochemistry abstracts (in 14 abstracts out of 20), in which experimental procedures and findings alternated in the sequence MRMR. They hypothesized that this structure was a peculiarity of the field.

Variations in the composition of moves are also found in conference abstracts. The omission of moves seems to be a more acute phenomenon in this type of abstract. Bolívar (1999) observed that, in her corpus of 207 linguistic items, the complete structure IMRC (an alternative for IMRAD, where C stands for "conclusions") was never followed in its entirety. On the other hand, García-Calvo (1999) noted a difference between linguistics abstracts and bioscience abstracts: between 52% and 60% of the former had a three-section pattern (introduction, methodology, and discussion), while between 54% and 60% of the latter had all 4 sections. However, each group of abstracts showed different patterns of preference, the results usually being given greater emphasis in biosciences than in linguistics, and the introduction invariably having an important place in the abstracts of all knowledge fields.

Kaplan at al. (1994) studied a corpus of 294 conference abstracts in applied linguistics, including accepted abstracts, rejected abstracts, and abstracts termed "alternate." The macro-structural analysis revealed that the introduction was the most common move, followed by the methodology. The accepted abstracts revealed a slight tendency to include the methodology and the result sections.

2.1.4 Scientific field and/or cultural and linguistic differences

The differences in move structure referred to above may be explained by the type of research, the scientific community targeted, and the author's culture and language. The structure and content of abstracts presented for admission to conferences can also depend on the stage reached in the underlying research, on its type (theoretical or experimental, for example), and on the type of discourse implied by the congress in question (workshops, plenary conferences, or poster presentations) (Bolívar 1999). According to Bolívar, the implication of the underlying research would also explain the high incidence of omissions of moves in this type of abstract, assuming that when the abstract is written the research may not yet have been completed. On the other hand, editorial prescriptions for writing abstracts seem to have no influence on writers' choices (Hyland 2000, 75; López-Arroyo 2001, 517-518).

The review article has proved to be difficult to adjust to the IMRAD pattern (Busch-Lauer 1995, Salager-Meyer 1990, 1991). In addition, abstracts of review articles and case studies distinguish moves in a different way from experimental abstracts (Huckin 2002).

Depending on the targeted scientific community, the rhetorical structure of the abstract may diverge from the standard pattern. Stotesbury (2003) noted that 100 abstracts from different humanity disciplines, notably literary disciplines, manifested the structural pattern Topic – Argument – Conclusion, and not the IMRAD pattern found in the natural and social sciences. In Hyland's corpus, humanities and social science writers preferred the sequence Introduction-Purpose-Product, while physicists and engineers showed a preference for the pattern Purpose-Method-Product (2000, 68-70). Samraj (2002) noted subtle variations in the rhetorical structure used in conservation biology and wildlife behaviour abstracts, notably in the opening and ending sections. Introductions tended to be longer in conservation biology. Conclusions, on the contrary, took the form of recommendations for management actions in conservation biology, and of implications of the results in wildlife behaviour. Differences were also identified in the weight of each move: results in wildlife behaviour occupied from 33% to 86% of the text, while in conservation biology all moves tended to be represented in a more balanced fashion.

The degree of divergence from the IMRAD pattern, in terms of variations affecting single moves and their weight and sequence, is probably directly proportional to the maturity of the field (Melander et al. 1994; Samraj 2002, 2004). Melander et al. compared abstracts of three disciplines (biology, linguistics, and medicine) written by Swedish and American authors, finding a great homogeneity only in biology abstracts. These biology abstracts, whether in English (written by Americans or Swedes), or in Swedish, presented common features. Remarkably, they took the form of the experimental-method schema, and contained a striking absence of persuasive devices. In the authors' interpretation, this trait of biology abstracts (in comparison to the abstracts of linguistics and medicine), hinges upon the maturity

of the field. In mature fields such as biology, scientists see novelty and interest by themselves, without needing to be persuaded. Consequently, these abstracts may be characterized by the absence, on a rhetorical level, of persuasive elements in terms of "tacitness" or "taciturnity" (novelty is not stated explicitly). The same conclusion was reached by Samraj (2002, 2004), when she compared conservation biology, a relatively new area of research, to wildlife behaviour, a more mature field.

The claim that variations of moves may depend on cultural differences has been voiced by Busch-Lauer (1995), Melander et al. (1994), Von Staa (1999), López-Arroyo (2001), and Martín Martín (2003). In a comparative study of 60 English and German medical abstracts, for instance, Busch-Lauer (1995) noted that in the abstracts written in German a statement of the problem area was often substituted for the purpose move. Almost half of the German abstracts omitted the conclusion, but when it was included, it tended to be more lengthy (occupying 18.0% of the text) than in the English abstracts (11.6%). Martín Martín (2003), comparing Spanish and English abstracts, noted that the Spanish abstracts more frequently omitted the results section, did not always include the four required sections and, in some instances, did not follow the expected sequence of moves. In the medical sub-field of cardiology, López-Arroyo observed that weight given to moves was related to the language (2001, 520-525): American abstracts tended to focus on the application of the research, thus stressing the results, while the Spanish authors emphasised the premises and the justification for the study being undertaken, thus stressing the introduction. Such differences were noticeable even in the abstracts translated from one language to the other: authors translating into Spanish or into English made an effort to adapt to the target culture, but still retained some of their idiosyncrasies. Spanish and American writers also differed in their terminology. In the American abstracts the disorder in question was always referred to by the same term, where it was referred to in varying terms in the Spanish abstracts.

Melander et al. (1994) interpreted the use of deictic elements, such as *the*, *these* or *this*, as revealing significant differences between Swedish and American authors. Referring to the underlying research, Swedish authors tended to use *the*, thus seeing it as standing alone, while American authors used *this* or *these*, thus implying that both the article and the abstract were part of the same publishing effort. According to Melander et al., producing an abstract is an indispensable task in a competitive academic environment like the American, whereas it is optional in the Swedish university community. Fewer authors compete for publication in Sweden, and the mere name of an author is enough to draw attention.

In conference abstracts, too, there are differences relating to culture and discipline (Andersson & Gunnarsson 1995; García-Calvo 1999). In García-Calvo's study, English abstracts devoted more words to the discussion sections than those written in Spanish. Biosciences abstracts devoted more space than linguistics abstracts to the results section and less to the discussion or conclusion section. His explanation was that the difference might be due to the fact that the major incidence of quantitative studies in the biosciences makes a discussion or a conclusion unnecessary, because the mere presence of numerical data can be persuasive enough.

2.2 Stylistic and discoursal features of abstracts

2.2.1 Move signalling

In genre analysis, researchers also highlight the linguistic features (words, phrases, verb tenses and moods, etc.) that characterise each move and the transition from one move to another. In this sense, abstract writers' choices are apparently limited, tending to include a restricted number of verbs and nouns, and might be influenced by the topic of the research rather than by the constraints of the structure (Kaplan et al. 1994).

All of the moves, especially the purpose or introduction, and the results and the conclusions, typically have a core of high-frequency verbs and nouns; strong preferences in terms of verb tense, mood, and voice; and sometimes syntactical structures, such as the "to + INFINITIVE" structure followed by a description of the method (Anderson & MacLean 1997). Verb tense and mood can depend on the adopted approach. In the introductions included in the Bittencourt dos Santos' corpus, the present tense was employed when the genre was indicated (paper, article – for instance), the past tense when the type of inquiry was mentioned (study, investigation, examination, experiment, analysis, or survey), while the past tense and modals dominated when a hypothesis was raised (1996).

Methodology and results moves are signalled by a switch from the present to the past tense (Anderson & MacLean 1997), often in combination with a de-

cided prevalence of the passive voice in different disciplines (Busch-Lauer's 1995; Bittencourt dos Santos 1996; Pérez Ruiz 2001; Martín Martín 2003). Huckin (2002) observed that in the results the present tense was preferred to the past when the article reported on a case study or a review.

Finally, what seems to mark strikingly the transition from results to conclusion is the verb tense change from the past to the present, combined, in some cases, with the use of modal verbs such as "may," "might," "could," etc. (Anderson & MacLean 1997, Samraj 2002). Modals seem to be especially common in introductions, conclusions and recommendations (Pérez Ruiz 2001, 462-467).

Different preferences for verb tense, mood or voice can depend on the discipline (García-Calvo 1999; Pérez Ruiz 2001), as well as on the language (Valero Garcés & Calle Martínez 1997). In conference abstracts moves appear to be characterised in a very similar way. Kaplan et al. (1994), however, noted some distinguishing features in the introduction, like the future tense and the presence of questions.

2.2.2 Metadiscourse

Along with the stylistic signals distinctive of each move, research also takes into account specific aspects of the scientific discourse, such as "metadiscourse." According to Vande Kopple (1985), metadiscourse refers to those elements of the text that do not add anything to its propositional content, but help "readers organize, classify, interpret, evaluate, and react to such material." Common manifestations of metadiscourse are text connectives such as "first," "next," "in the first place," etc., or illocution markers, such as "I hypothesize that," "to sum up," etc. Among the expressions of metadiscourse in abstracts, ESP researchers study especially the personal pronouns "I" and "we," as well as phrases used in place of those such as "the authors" (Busch-Lauer 1995). In conference abstracts, the use of the pronoun "we" instead of "I" is related to the acceptance of abstracts (Kaplan et al. 1994). In comparative approaches, on the other hand, "I" seems to be used more frequently in English than in Spanish (García-Calvo, 1999).

One specific aspect of metadiscourse is "hedges," or all the "linguistic means used to indicate either a) a lack of complete commitment to the truth value of an accompanying proposition, or b) a desire not to express that commitment categorically" (Hyland 1998, 1). Modal verbs, for example, are common devices for "hedging" statements in scientific discourse. In abstracts, hedges are concentrated mostly in introductions or in conclusions (Busch-Lauer 1995); however, their distribution as well as their incidence can vary depending on either the scientific field or the writer's culture (Martín Martín & Burgess 2004). Stotesbury (2003) found that hedges tended to appear in the background section of humanities and natural sciences abstracts, while they tended to occur in the result or conclusion sections of social sciences abstracts. The distribution of hedges can be different in two related fields also. Samraj (2002) found that in wildlife behaviour abstracts hedges were gathered mainly in the conclusions, but tended to be spread all over the body of the text in conservation biology abstracts. Comparative studies have demonstrated that English authors use more hedges than Spanish authors (Martín Martín 2003).

2.2.3 Propositional organization

According to linguists, propositional organization of abstracts can be influential in readability. Syntactical complexity, in particular, which refers to the number and nature (paratactic or hypotactic) of the connections among clauses, seems to have a role in text comprehension, although such a role has not yet been precisely defined. In Martín Martín's comparative study of English and Spanish abstracts in the field of phonetics (2001), Spanish abstracts were more syntactically complex than their counterparts in English, since they had a larger number of clauses. Kaplan et al. confirm the idea that syntactical complexity is received positively by academic audiences. In their study, abstracts with fewer and longer main clauses were more likely to be accepted, and so were abstracts with a greater number of dependent clauses, suggesting a pattern of foregrounding/backgrounding of ideas in the effective texts. Successful abstracts also had a greater number of propositions (on the average 20 versus 17).

2.3 Evaluation

The syntactical organisation of abstracts is also studied as a means for expressing evaluation. "That-clauses" are reckoned as strategic devices that authors use to evaluate different aspects of the research (Hyland & Tse 2004). These clauses allow the writer to open the sentence with the evaluation in subject

position, and to emphasize the notional subject which is moved ("extraposed") to the end of the sentence. For example, in the sentence "We believe that more attention should be given to evaluative language," "evaluative language" is the notional subject "extraposed" to the end of the sentence. Hyland & Tse found that that-clauses occurred 5.5 times per 1,000 words, and in 1.2 cases per single text. That-clauses were used to evaluate – firstly, the author's own findings, and, then, the findings of previous studies – the statements of the research goals and the methods, and the models and theories authors had drawn on in their research.

Evaluation can also be achieved in other ways. Stotesbury (2003) recognized different instances of evaluation in a corpus of 300 abstracts from various branches of knowledge, as reported in Table 2.

	Humanities	*Social sciences*	*Natural sciences*
Evaluative lexis:	15	7	6
Evaluative adverbs:	3	1	1
The structure "x is y":	4	6	2
Nouns:	3	13	4
Evaluative verbs:	5	7	2

Table 2. *Instances of evaluative devices per 100 words of abstracts in Stotesbury's research*

Attributes and adverbs were twice as common in humanities and social sciences as in natural sciences, and, particularly, in the background and introductory sections of the abstracts. The "x is y" structure was usually employed, typically in social science abstracts, to indicate that a finding was positive, interesting or important. Evaluative nouns and verbs were notably common in social sciences abstracts, perhaps because such research deals with "problems." In general, evaluation in the humanities and in the social sciences took a more explicit "attitudinal" form, while natural scientists employed mainly intensifiers and comparators. Common moves for evaluation were those indicating a gap in knowledge or expressing counterclaims (background and introduction), as well as those reporting findings in relation to previous research or claims of new knowledge (conclusions). Gaps were indicated by lexical items such as little, few, not much, fail, etc. or negations in general, while claims of new knowledge were supported by attributes like new, novel, innovative, alternative, etc. The word "new" was especially common in the humanities abstracts, which also frequently showed the prefix "re-" "in the evaluative sense of re-examining, reinterpreting, reconstructing, recasting the problem." Similarly, claims of significance in Hyland's corpus were achieved through words like "benefit," "novelty," "importance," and "interest;" however, hard science writers insisted on novelty and benefit, while soft science writers drew on the notion of importance (2000, p. 76).

The introduction section is often the place in which authors stress the importance of the topic dealt with (Hyland 2000, 75). In point of fact, Martín Martín & Burgess (2004) found that most instances of academic criticism – which is understood by them as the criticism of other members of the writer's scientific community – occurred in the introduction and in the conclusion sections. In their study, criticism was realized differently in Spanish abstracts than in English abstracts. In the former, it tended to be personal and direct, e.g. indicating the name of the persons criticised and avoiding hedges, while in the latter it tended to be impersonal and indirect, i.e. it referred to general areas of research and also resorted to hedges.

2.4 Lexical choices

Martín Martín (2001, 2003a), following the work of Gibson (1993), measured lexical density and lexical variation in a corpus or 30 English and Spanish abstracts in the field of phonetics. He defined lexical density as the proportion of lexical items – such as "real," "accident," "fog," and "ice" – as opposed to grammatical items such as "the," "only," "that," "ever," etc. Lexical variation was defined as the frequency with which lexical items repeat in the text. His assumption was that a good abstract should show a high score of both lexical density and lexical variation, since it has to offer wide and diversified in-

formation. Results revealed that English abstracts had higher levels of both lexical density and variation, even though the difference in comparison to Spanish abstracts was not significant.

The high occurrence of abbreviations, jargon, and acronyms was noted by both Kaplan et al. (1994) and Hyland (2000), who interpret them in different ways. For Kaplan et al. such occurrences are counter-intuitive, given the requirements of brevity, while for Hyland those same occurrences provide proof that the author is familiar with the topic. Inasmuch as jargon, acronyms, abbreviations, and some forms of citations demonstrate the author's "insider status," showing familiarity with the research area, and enhancing the function of the abstract to promote the research to an academic audience (Faber 1996). Authors may prove their "inner status" to the other members of their scientific community through use of terminology as well as in other ways. Berkenkotter & Huckin observe that successful abstracts submitted to a conference in rhetoric and compositions had the following characteristics: the abstracts 1) reflected a topic of current interest; 2) defined a problem; 3) analyzed the problem from a new perspective; and, 4) "projected more of an insider ethos through the use of terminology, special topoi, and/or explicit or implicit references to scholarly literature" (1995, 102).

2.5 Readability

ESP researchers often comment on which stylistic and rhetorical choices are the most adequate for enhancing the readability of abstracts, often including an analysis of the linguistic and cultural perspective. López-Arroyo (2001, 412), for instance, comments that, in general terms, the Spanish medical abstracts she studied seemed easier to understand than the American abstracts, because the Spanish abstracts stressed the common knowledge existing between the writer and the potential readers and also made use of explicit semantic relations to identify the disorder studied. Pérez Ruiz (2001), on the other hand, considers English abstracts more readable than Spanish because they use explicit connectors instead of implicit ones. Busch-Lauer (1995) stresses that translation may entail a deterioration of readability. On a terminological level, Webber (1996) points out that metaphors can hinder readers' comprehension, especially younger readers, but in her corpus only a few metaphors were detected.

3. Discussion and Conclusion

Results achieved by genre analysis make it possible to define different features of abstracts depending on the scientific field, the author's cultural background, and the targeted context (conference abstracts or abstracts accompanying an article). Awareness of such features may guide the information professional wishing to revise or otherwise make use of certain types of abstracts. The research findings confirm that abstracts may be used for other documentary purposes such as subject analysis or indexing. In so doing, the information professionals must bear in mind that the rhetorical features linguists have set out so far are: 1) restricted to certain scientific domains and to limited corpora, and thus susceptible to errors by extension; and 2) based on methods that are, to some extent, subjective and intuitive.

Another important factor is that ESP researchers often use the same analytical tools for abstracts as for scientific literature in general and research articles in particular. For instance, they recognise in the abstracts they study not only the four main moves that distinguish research article structure, but also further sub-moves within these. This is probably due to the fact that authors of abstracts do not yet have a clear concept of the functions the abstract should serve, and therefore write abstracts as they would any other scientific text. Authors might simply give precedence to a sole function, i.e. that of convincing a busy audience that their particular article is worth reading. Whatever the case, this confirms the shortcomings of using one academic genre for all knowledge organization purposes. Lancaster has pointed out that "abstracts for reading" by humans and "abstracts for searching" by machines differ in terms of synonyms, length, negative references, punctuation and syntax (2003, 129-130). Linguistic research into abstracts indicates that most such shortcomings must be attributed to the pragmatic functions that author abstracts serve in the academic environment where they are produced.

It is noteworthy that some aspects of the variations described by linguists can be linked to research conducted in information science. For example, this is the case for all of the variations attributable to research type and discipline. The fact that structure and other features of abstracts can be influenced by the type of research conducted is acknowledged by Hartley (2000b) and Mulrow et al. (1988) each of whom discusses specific guidelines for abstracting review papers in medical publications. Similarly,

Tibbo has shown that the recommendations included in the international standards on abstracts (ANSI/NISO Z39.14-1997, ISO 214-1976) apply neither to historical literature nor to discourse in the humanities in general (1992, 1993). ESP literature on abstracts reinforces these conclusions and offers further arguments in their support.

On a broader level, the several factors of variation described by ESP researchers confirm that epistemology, pragmatism, language and culture have differential impacts on the way authors write and structure their abstracts. If the composition of documents mirrors unconscious epistemological norms within each research community (Hjørland 1998), then it may also have repercussions in IR. Hjørland has insisted on various occasions (2001, 2002, 2003) on the necessity for IS to take into account the epistemological peculiarities of scientific domains and the social dimension of research and knowledge, which also imply culture, language and the sense of purpose of the different scientific communities. To give an example, we can say that through author abstracts it is possible to get an idea of what each scientific community considers interesting and important, and, thus, to infer elements that contribute to the definition of the subject or the aboutness of documents. In fact, issues of import and interest to a scientific community as transmitted through published or accepted abstracts are not exclusively author-related, since published or accepted articles imply a degree of inter-subjective agreement within a scientific community. Another example can be found in the terminological choices of the American and the Spanish medical authors studied by López-Arroyo (2001). The preference expressed by the American authors for a single term for the same disorder may require a different documentary treatment than the multi-terminological preference of the Spanish authors. Such differences may have consequences in IR when these same authors, acting as users of information services, search the literature. In short, ESP literature on author abstracts offers several hints that help identify what different scientific communities consider important, interesting and necessary, and how those communities express these orientations.

ESP literature may provide an answer to the main problem posed to IS by author abstracts, i.e. their tendency towards bias. ESP research has confirmed that: "abstracts are actually heavily rhetorical," because "writers have to clearly demonstrate that they have something worthwhile to say to gain the interest of the reader" (Hyland and Tse 2004, 126). What is new in the ESP studies is that they show clearly what devices authors use to promote their articles, and how they achieve such bias linguistically. The studies by Stotesbury and by Hyland and Tse about evaluation in abstracts referred to above demonstrate that authors nearly always have recourse to evaluative devices for assessing their own research. Hyland and Tse demonstrated how evaluation can be achieved syntactically, disguised in a common syntactical structure such as a "that-"clause. Even jargon, abbreviations, references to previous literature, and terminology may serve the heavily pragmatic function of promoting the author's work when gatekeeping decisions have to be made, such as when access to a conference can be granted or denied. Therefore, all of these elements potentially contribute to bias in abstracts. Thanks to this research, abstractors wishing to remove bias from an author abstract have more precise clues available on what to look for and where.

In these final paragraphs we have discussed why and how ESP research into abstracts can be useful in IS. This discussion proves the need for IS students and professionals to be aware of the main features of author abstracts, in order to handle them proficiently for revision, subject analysis, control of vocabulary, and for the other uses that abstracts might have in the organization of knowledge.

References

Anderson, K. and J. MacLean. 1997. A genre analysis study of 80 medical abstracts. *Edinburgh Working Papers in Applied Linguistics* 8: 1-23.

Andersson, B. and B. L. Gunnarsson. 1995. A contrastive study of text patterns in conference abstracts. *Anglicana Turkuensia* 14: 139-148.

Armstrong, C.J. and A. Wheatley. 1998. Writing abstracts for online databases: Results of an investigation of database producers' guidelines. *Program,* 32 (4): 359-371.

Berkenkotter, C. and T. N. Huckin. 1995. *Genre knowledge in disciplinary communication: Cognition, culture, power*. Hillsdale, NJ: Lawrence Erlbaum Associates.

Bittencourt dos Santos, M. 1996. The textual organization of research paper abstracts in applied linguistics. *Text* 16 (4): 481-499.

Bolívar, A. 1999. Homogeneidad versus variedad en la estructura de los resúmenes de investigación para congresos. *Akademos* 2: 121-138.

Borko, H. and C. L. Bernier. 1975. *Abstracting concepts and methods*. New York: Academic Press.

Busch-Lauer, I.A. 1995. Textual organization in English and German abstracts. *Anglicana Turkuensia* 14: 175-186.

Chan, S.K. and S. Foo. 2001. Bridging the interdisciplinary gap in abstract writing for scholarly communication, *Genre and Discourse in Education, Work and Cultural Life: Encounters of Academic Disciplines on Theories and Practices (GENRE 2001)*, Oslo University College, May 13-16. Available at: http://islab.sas.ntu.edu.sg:8000/user/schubert/publications/2001/conf_oslo_fmt.pdf

Cleveland, D.B. and A. D. Cleveland. 2001. *Introduction to indexing and abstracting*. Englewood, NJ: Libraries Unlimited, Inc.

Endres-Niggemeyer 1998. *Summarizing information*. Berlin: Springer.

Espinoza Muñoz, A. M. 2000. Tendencias en el contenido de la oración inicial en Horticultural abstracts. *The ESPecialist* 21 (1): 29-41.

Faber, B. 1996. Rhetoric in competition: The formation of organizational discourse in Conference on College Composition and Communication Abstracts. *Written Communication* 13 (3): 355-384.

García-Calvo, J. 1999. Un estudio comparativo de *abstracts* para eventos científicos en inglés y en español. *D.E.L.T.A.*15 (2): 269-288.

Gibson, T. 1993. *Towards a discourse theory of abstracts and abstracting. Volume 1*. Monographs in Systemic Linguistics. No. 5. Nottingham: University of Nottingham.

Hartley, J. and M. Sydes. 1996. Which layout do you prefer? An analysis of readers' preferences for different typographic layouts of structured abstracts. *Journal of Information Science* 22 (1): 27-37.

Hartley, J. and M. Sydes. 1997. Are structured abstracts easier to read than traditional ones? *Journal of Research in Reading* 20 (2): 122-136.

Hartley, J. 2000. Are structured abstracts more or less accurate than traditional ones? A study in the psychological literature. *Journal of Information Science* 26 (4): 273-277.

Hartley, J. 2000a. Typographic settings for structured abstracts. *Journal of Technical Writing and Communication* 30 (4): 355-365.

Hartley, J. 2000b. Clarifying the abstracts of systematic literature reviews. *Bulletin of the Medical Library Association* 88 (4): 332-337.

Hartley, J. 2002. Do structured abstracts take more space? And does it matter? *Journal of Information Science* 28 (5): 417-422.

Hartley, J. 2004. Current findings from research on structured abstracts. *Journal of the Medical Library Association* 92 (3): 368-371.

Hjørland, B. 1998. Information retrieval, text composition, and semantics. *Knowledge Organization* 25 (1/2): 16-30.

Hjørland, B. 2001. Towards a theory of aboutness, subject, topicality, theme, domain, field, content... and relevance. *Journal of the American Society for Information Science and Technology* 52 (9): 774-778.

Hjørland, B. 2002. Domain analysis in information science. Eleven approaches – traditional as well as innovative. *Journal of Documentation* 22 (4): 422-462.

Hjørland, B. 2003. Fundamentals of knowledge organization. *Knowledge Organization* 30 (2): 87-111.

Hovy, E. 2003. Text summarization. *The Oxford handbook of computational linguistics*. Oxford: Oxford University Press.

Huckin, T. 2001. Abstracting from abstracts. In *Academic writing in context*: *Implications and Applications*, eds. Martin Hewings and Tony Dudley-Evans, 93-103. Birmingham: University of Birmingham.

Hyland, K. 1998. *Hedging in scientific research articles*. Amsterdam and Philadelphia: John Benjamin Publishing Company.

Hyland, K. 2000. *Disciplinary discourses: Social interaction in academic writing*. Harlow, England and New York: Longman.

Hyland, K. and P. Tse. 2004. Hooking the reader: A corpus study of evaluative *that* in abstracts. *English for Specific Purposes* 24 (2): 123-139.

Kaplan, R. B., S. Cantor, C. Hagstrom, L. D. Kamhi-Stein, Y. Shiotani, and C. B. Zimmerman. 1994. On abstract writing. *Text* 14 (3): 401-426.

International Standard Organization 1976. ISO 214-1976. *Documentation – Abstracts for publications and documentation*. Geneva: ISO.

Lancaster, F.W. 2003. *Indexing and abstracting in theory and practice*. 3rd ed. London: Facet Publishing.

Liddy, E. D. 1991. The discourse-level structure of empirical abstracts: An exploratory study. *Information Processing & Management* 27 (1): 55-81.

López-Arroyo, B. 2001. *Estudio descriptivo comparado inglés/español de la representación del conocimiento en los "abstracts" de las Ciencias de la Salud.* PhD thesis. Universidad de Valladolid. Available at: http://www.cervantesvirtual.com/FichaObra.html?Ref=8034.

Lorés, R. 2004. On RA abstracts: From rhetorical structure to thematic organisation. *English for Specific Purposes* 23 (3): 280-302.

Mani, I. 2001. *Automatic summarization*. Amsterdam and Philadelphia: John Benjamin Publishing Company.

Martín Martín, P. 2001. La textura léxico-sintáctica de los resúmenes de los artículos científicos en inglés y español. *Revista de Lingüística Teórica y Aplicada* 39: 101-116.

Martín Martín, P. 2003. A genre analysis of English and Spanish research paper abstracts in experimental social sciences. *English for Specific Purposes* 22 (1): 25-43.

Martín Martín, P. 2003a. Análisis contrastivo de los componentes estructurales y gramaticales de los resúmenes de los artículos científicos. *Revista Española de Lingüística* 33 (1): 153-183.

Martín Martín, P. and S. Burgess. 2004. The rhetorical management of academic criticism in research article abstracts. *Text* 24 (2): 171-195.

Melander, B., J. M. Swales, and M. Fredrickson. 1994. Journal abstracts from three academic fields in the United States and Sweden: National or disciplinary proclivities? In *Culture and style of academic discourse*, ed. A. Duszak. New York and Berlin: Mouton de Gruyter.

Méndez-Cendón B. and B. López-Arroyo. 2003. Intralinguistic analysis of medical research papers and abstracts: Rhetorical and phraseological devices in scientific information. *Terminology* 9 (2): 247-268.

Montesi, M. In press. *Métodos de evaluación y calidad de resúmenes documentales*. Gijón: Trea.

Montesi M. and B. Gil Urdiciain. In press. Abstracts: classifying problems from the user perspective. *Journal of Information Science*.

Mulrow, C.D., S. B. Thacker, and J. A. Pugh. 1988. A proposal for more informative abstracts of review articles. *Annals of Internal Medicine* 108: 613-615.

National Information Standards Organization 1997. ANSI/NISO Z39.14-1997. *Guidelines for abstracts*. Bethesda, Maryland: NISO Press.

Pérez Ruiz, L. 2001. *Análisis retórico contrastivo: el resumen lingüístico y médico en inglés y en español.* PhD thesis. Universidad de Valladolid. Available at: http://www.cervantesvirtual.com/FichaObra.html?Ref=7782.

Pinto Molina, M. 2001. *El resumen documental. Paradigmas, modelos y métodos*. Madrid: Fundación Germán Sánchez Ruipérez.

Rowley, J 1988. *Abstracting and indexing*. London: Clive Bingley.

Salager-Meyer, F. 1990. Discoursal flaws in medical English abstracts: A genre analysis per research- and text-type. *Text* 10 (4): 365-384.

Salager-Meyer, F. 1991. Medical English abstracts: How well are they structured? *Journal of the American Society for Information Science*: 42 (7): 528-531.

Samraj, B. 2002. Disciplinary variation in abstracts: The case of wildlife behaviour and conservation biology. In *Academic discourse*, ed. J. Flowerdew 40-56. London: Longman.

Samraj, B. 2004. An exploration of a genre set: Research article abstracts and introductions in two disciplines. *English for Specific Purposes* 23 (2): 141-156.

Staa, B. von 1999. A construçao de auto-imagem a partir de justificativas en resumos cientificos. *The ESPecialist* 20 (1): 1-16.

Stotesbury, H. 2003. Evaluation in research article abstracts in the narrative and hard sciences. *Journal of English for Academic Purposes* 2 (4): 327-341.

Swales, J.M. 1990. *Genre analysi:. English in academic and research settings*. Cambridge: Cambridge University Press.

Tenopir, C. and P. Jacsó. 1993. Quality of abstracts. *Online* 17 (3): 44-55.

Tibbo, H. R. 1992. Abstracting across the disciplines: A content analysis of abstracts from the natural sciences, the social sciences, and the humanities with implications for abstracting standards and online information retrieval. *Library and Information Science Research* 14: 31-56.

Tibbo. H.R. 1993. *Abstracting, information retrieval and the humanities: Providing access to historical literature*. Chicago and London: American Library Association.

Valero Garcés, C. and Ma. C. Calle Martínez. 1997. Contrastive rhetoric in ESP: A cross-linguistic analysis of finite verb profiles in English and Spanish medical abstracts. *UNESCO ALSED-LSP Newsletter* 20.2 (44): 22-36.

Vande Kopple, W. 1985. Some Exploratory Discourse on Metadiscourse. *College Composition and Communication* 36 (1): 82-93.

Ventola, E. 1994. From syntax to text: Problems in producing scientific abstracts in L2. In *The syntax of sentence and text*, eds. S. Čmejrková and F. Štícha. Amsterdam and Philadelphia: John Benjamin Publishing Company.

Webber, P. 1996. Metaphor in medical English abstracts. *UNESCO ALSED-LSP Newsletter* 19.1 (41): 35-52.

Webber, P. 2004. From spoken science to published research article: a comparative case study. In *Text and texture: Systemic functional viewpoints on the nature and structure of text*, ed. D. Banks. Paris: Harmattan.