



Research and discussion note

## Writing titles in science: An exploratory study

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### Abstract

To prevent a paper from being discarded and ensure that it addresses the right audience, it must have a proper title that satisfies certain requirements. Writing the titles to scientific articles is therefore a challenging exercise that demands the use of various skills. Still, although the research paper is one of the most thoroughly studied scientific genres, the study of research paper titles does not share the same privilege, nor does the study of review paper titles.

The purpose of this research and discussion note (RD) is to examine the most recurrent structural constructions of titles in two different genres, namely, review papers (RVP) and research papers (RP) in two fields: biological sciences and social sciences. More specifically, the questions raised are, on the one hand, whether the structural construction of titles is a key distinctive feature between RP titles and RVP titles, and, on the other, whether the inherent peculiarities of scientific disciplines imprint differences on the structural constructions of RP and RVP titles. Our RD was based on a *corpus* of 570 titles, of which 480 were RP titles and the remaining 90 were RVP titles, all covering the period 1996–2002. Words per title were firstly counted to measure their length and all structural constructions detected, namely, nominal, question, compound, and full-sentence constructions, were registered. Results evidence an interesting finding regarding the full-sentence title construction which appears not only as a generic peculiarity of RPs but also as a disciplinary peculiarity of Biology RP titles. The lines of evidence registered in this RD support suggestions as to how to guide novice scientists to write titles appropriately.

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## 1. Introduction

Titles in science mirror a set of requisites that are crucial to the construction, communication, and progress of new knowledge. They also play a key role within the papers to which they belong as they are indicative of, among other things, the content and the audience papers address. They give clues as to the section of bibliographic databases in which papers should be appropriately included to further reach the correct audience. To scientists, titles in publications are thus key elements in the organization and retrieval of scholarly data. Title-scanning, in particular, is a regular activity within the scientific community for whom part of its daily routine is to search titles in libraries, catalogues, periodical indexes, references, databases, and tables of contents of edited books, reports, and proceedings. In view of this, writing scientific titles is a challenging exercise as it requires a series of skills from authors to be able to include all these requirements appropriately in the titles of their papers.

The research paper (RP) is one of the most researched scientific genres because it is the means through which new knowledge is generated and reported to the scientific community. Literature indicates that certain sections of RPs have been studied in detail (Hopkins & Dudley-Evans, 1988; Swales, 1990; Thompson, 1993 among others). In contrast, RP titles do not share the same privilege. Swales (1990) claims that they constitute an aspect in academic genres which has not been fully studied to date. This observation can also be extended to the titles of scientific review papers (RVP).

Our literature search regarding the study of scientific titles reveals heterogeneity in the investigations about this topic in terms of study design (Goodman, Thacker, & Siegel, 2001), variable analysis (Berkenkotter & Huckin, 1995; Fortanet, Coll, Palmer, & Posteguillo, 1997; Fortanet Gómez, Posteguillo Gómez, Coll García, & Palmer Silveira, 1997; Haggan, 2004; Laurence, 2001; Whissell, 1999), database sizes (Laurence, 2001), genre selection (Dudley-Evans, 1984; Hamp-Lyons, 1987; Soler, 2003; Yakhontova, 2002), and outcoming applications (Goodman et al., 2001; Huth, 1987).

In addition, discussions on titles tend to be short and intuitively-based (Day, 1994; Nakajima & Tsukamoto, 1996). They are also either descriptive with emphasis on the analysis of specific variables (Berkenkotter & Huckin, 1995; Buxton & Meadows, 1977; Fortanet et al., 1997; Fortanet Gómez et al., 1997; Laurence, 2001; among others) or normative (Day, 1994). Still, no agreement seems to have been found on the standard and good title writing practice in different scientific disciplines and genres. Contradictions between what writing norms state and what real instances of scientific titles show may be problematic. For example, Day (1994) claims that compound titles, i.e. those that are divided into two parts, the division being indicated by a punctuation mark, “appear pedantic, place emphasis on a general term rather than a more significant term, necessitate punctuation, scramble indexes. . .” (p. 20). He also disregards titles written as questions, an observation with which Zorrilla (2003) also agrees. Still, a very high number of current high-impact factor scientific journals regularly include articles whose titles are structured either in the compound or the interrogative construction.

On the other hand, genre-based data on scientific titles are scarce. Exceptions are Dudley-Evans' (1984) research on dissertation titles; Hamp-Lyons's (1987) study of techniques to analyze essay titles in order to obtain better results on formal writing tasks; Yakhontova's (2002) analysis of titles of conference presentation abstracts, and Soler's (2003) comparative and contrastive analysis of RP and RVP titles following a textual analysis

perspective. The study of scientific titles on a genre-based perspective becomes fully necessary to avoid observations indicating, for example, that the ambiguity of some titles preclude assertion of whether they correspond to RPs or RVPs (Goodman et al., 2001).

As to methodology, study design and size of databases, it can be observed that almost the majority of studies on titles favor the collection of numerical evidence on a first instance, trusting the power of quantitative studies of language usage. This is, in fact, the trend followed in this Research and Discussion Note (RD). In addition, our literature retrieval indicates (i) that the current state-of-the-art of research on scientific titles corroborates Swales' observation (1990) that they have not been fully researched, and (ii) that research on titles appears to be heterogeneous and focuses separately on a diversity of topics, leading to unconnected studies rather than to a global review evidencing the integration of such studies. Novice scientists are therefore placed in a problematic situation with little indication on title writing styles in the different disciplines and genres.

In view of this, this RD aims at registering the most recurrent structural constructions of titles in RPs and RVPs in two fields: biological sciences and social sciences. The questions raised are, in particular: (i) whether the structural construction of titles is a key distinctive feature between RP titles and RVP titles, and (ii) whether the inherent peculiarities of scientific disciplines imprint differences on the structural constructions of RP and RVP titles. In this sense, the present RD framed on an empirical, descriptive and exploratory basis, may be considered as a cross-generic and cross-disciplinary study.

At the stage of deciding which would be the most convenient starting point in our analysis, two approaches were envisaged to this end and were respectively coined as "macroscopic" and "microscopic". By the former is meant an analysis restricted to the structure with which titles appear at surface level. By "microscopic" approach is meant an analysis restricted to specific internal variables in titles, such as content words, structural words, initial words, and punctuation marks. To our view, the data collected on one external variable will facilitate further studies of internal variables as they will provide a background to elucidate the reasons why certain internal variables are recurrent within specific structural constructions.

Our RD was based on a *corpus* of 570 titles, of which 480 were RP titles and the remaining 90 were RVP titles from the following selected disciplines: Anthropology, Linguistics, and Psychology (social sciences), and Medicine, Biology, and Biochemistry (biological sciences). None of the selected journals indicate specific instructions regarding the structural construction of titles. Table 1 shows the selected journals across a span of 7 years (from 1996 to 2002) from which RP titles were chosen for this RD.

To frame the discussion in this RD a distinction between RPs and RVPs must be firstly made. The former, which generally displays the IMRAD format, i.e. an Introduction, a Materials and Methods section, a Results section, and a Discussion, is a specific genre which serves as a generator of new knowledge about a specific subject. All these sections evidence a good deal of experimental work. An RVP describes an integral type of research in the sense that it includes findings gathered on a given subject by different groups of researchers after several years of study. Thus, RVPs result from several previous RPs and are therefore markedly less in number than the latter. For example, the *Journal of Cell Biology* volume 135, which was selected for our *corpus*, includes 150 articles, of which, only 2 are RVPs. This peculiarity of RVPs made it difficult to find as high a number as that of RPs for this RD. As a result, the *corpus* containing RVP titles in this RD could

Table 1  
Journals (1996–2002) from which RP titles were selected

<i>Social sciences</i>		
Linguistics	Anthropology	Psychology
Journal of Linguistics	Journal of Human Evolution	Journal of School Psychology
Cambridge University Press; place of publication: UK; ISSN: 0022-2267	Elsevier B.V.; place of publication: USA; ISSN: 0047-2484	Elsevier; place of publication: USA; ISSN: 0022-4405
Language and Communication	Journal of Anthropological Archaeology	Journal of Experimental Child Psychology
Elsevier; place of publication: UK; ISSN: 0271-5309	Elsevier; place of publication: Holland; ISSN: 0278-4165	Elsevier; place of publication: USA; ISSN: 0022-0965
<i>Biological sciences</i>		
Biology	Medicine	Biochemistry
Journal of Biological Chemistry	American Journal of Cardiology	Journal of Neuroscience
High Wire Press/Am. Soc. for Biochem. & Molec. Biol. Inc.;	Elsevier; place of publication: USA; ISSN: 0002-9149	Elsevier Ltd. Stanford University's HighWire Press;
place of publication: USA; ISSN: 0021-9258		place of publication: USA; ISSN 0270-6474
Journal of Cell Biology	Journal of Hepatology	Journal of Neuroimmunology
Rockefeller University Press; place of publication: USA, ISSN: 0021-9525	Elsevier; place of publication: Ireland; ISSN: 0168-8278	Elsevier, place of publication: Ireland; ISSN: 0165-5728

not be strictly restricted to the same journals as those that included RPs. Still, our *corpus* includes RVP titles from different high-impact factor journals provided they refer to the scientific disciplines selected for this RD. Table 2 shows the selected journals across a span of 7 years (from 1996 to 2002) from which RVP titles were chosen for this RD.

The journals chosen for this RD were selected taking the following parameters into account:

- They all include highly advanced RPs and RVPs and therefore address a peer reader with expertise in specific fields of study related to the disciplines selected for the present RD.
- They all have a very high impact factor ranging between 3.2 and 16.98 in the biological sciences and between 0.77 and 4.1 in the social sciences, as corroborated by the Journal Citation Reports.
- They are ranked within the first 11 journals in the disciplines of Biology, Biochemistry and Medicine (biological sciences category) and the first 10 journals in the disciplines of Linguistics, Anthropology and Psychology (social sciences category), a characteristic which makes them representative, within the scientific community, of the respective fields selected for the present RD.
- They all include RPs and RVPs published during the same 7-year span, i.e., from 1996 to 2002.
- In agreement with regular scientific policies, they all publish highly advanced RPs and RVPs that have previously undergone a reviewing process whereby referees evaluate not only the scientific studies performed but also the writing strategies used.

Table 2  
Journals (1996–2002) from which RVP titles were selected

<i>Social sciences</i>		
Linguistics	Anthropology	Psychology
Journal of Linguistics	American Journal of Physical Anthropology	Journal of Applied Psychology
Cambridge University Press; place of publication: UK; ISSN: 0022-2267	Wiley-Liss, Inc; place of publication: USA, ISSN: 0002-9483	Taylor & Francis Group; place of publication: UK; ISSN: 0021-9010
ELT Journal	Journal of Human Evolution	Journal of School Psychology
Oxford University Press; place of publication: UK; ISSN 0951-0893	Elsevier B.V.; place of publication: USA; ISSN: 0047-2484	Elsevier; place of publication: USA; ISSN: 0022-4405
–	–	International Journal of Psychology
–	–	Taylor & Francis Group; place of publication: UK; ISSN: 0020-7594
–	–	Psychological Review
–	–	American Psychological Association; place of publication: USA; ISSN: 0033-295X
<i>Biological sciences</i>		
Biology	Medicine	Biochemistry
Journal of Cell Biology	Arteriosclerosis, Thrombosis, and Vascular Biology	Trends in Neurosciences
Rockefeller University Press; place of publication: USA; ISSN: 0021-9525	Lippincott Williams & Wilkins/ Am. Heart Association; place of publication: USA; ISSN: 1079-5642	Elsevier; place of publication: UK; ISSN: 0166-2236
BioEssays	Transfusion Medicine Reviews	Nature Neuroscience
John Wiley & Sons Ltd.; place of publication: UK; ISSN: 0265-9247.	Elsevier; place of publication: Holland; ISSN: 0887-7963.	Nature Publishing Group; place of publication: USA; ISSN: 1097-6256
International Review of Neurobiology	Archives of Internal Medicine	–
Elsevier; place of publication: Holland; ISBN: 0-12-366857-3	Am. Medical Association; place of publication: USA; ISSN: 0003-9926	–

## 2. Results

### 2.1. Structural construction occurrence of the titles analyzed

Tables 3–6 show the occurrence of the structural constructions found in the titles analyzed, namely, the nominal-group construction (Bloor & Bloor, 1997), e.g. “Acute liver failure caused by diffuse hepatic melanoma infiltration”, *J. Hepatol.* 37(4):540–541, 2002; the compound construction – e.g. “Romanian nominalizations: case and aspectual structure”, *J. Linguistics* 37(3):467–501, 2001; the full-sentence construction – e.g. “Learning induces a CDC2-related protein kinase”, *J. Neurosc.* 19(21):9530–9535, 1999, and the question construction – e.g. “Does the Flynn effect affect IQ scores of students classified as

Table 3  
Nominal group construction occurrence

Research paper titles			Review paper titles		
Discipline	Number of instances of occurrence	Percentual occurrence (%)	Discipline	Number of instances of occurrence	Percentual occurrence (%)
Medicine	58	72	Medicine	07	46
Biology	35	28	Biology	10	66
Biochemistry	33	26	Biochemistry	08	53
Linguistics	48	38	Linguistics	11	73
Psychology	52	41	Psychology	06	40
Anthropology	43	34	Anthropology	08	53

Table 4  
Full-sentence construction occurrence

Research paper titles			Review paper titles		
Discipline	Number of instances of occurrence (%)	Percentual occurrence (%)	Discipline	Number of instances of occurrence	Percentual occurrence (%)
Medicine	13	16	Medicine	0	0
Biology	41	51	Biology	0	0
Biochemistry	37	46	Biochemistry	0	0
Linguistics	0	0	Linguistics	0	0
Psychology	0	0	Psychology	0	0
Anthropology	1	1	Anthropology	0	0

Table 5  
Compound construction occurrence

Research paper titles			Review paper titles		
Discipline	Number of instances of occurrence	Percentual occurrence (%)	Discipline	Number of instances of occurrence	Percentual occurrence (%)
Medicine	10	12	Medicine	6	40
Biology	04	5	Biology	4	26
Biochemistry	11	13	Biochemistry	7	46
Linguistics	25	31	<b>Linguistics</b>	3	20
Psychology	30	37	<b>Psychology</b>	8	53
Anthropology	33	41	Anthropology	4	26

Table 6  
Question construction occurrence

Research paper titles			Review paper titles		
Discipline	Number of instances of occurrence	Percentual occurrence (%)	Discipline	Number of instances of occurrence	Percentual occurrence (%)
Medicine	1	1	Medicine	1	6
Biology	0	0	Biology	1	6
Biochemistry	0	0	Biochemistry	0	0
Linguistics	4	5	Linguistics	1	6
Psychology	1	1	Psychology	2	13
Anthropology	1	1	Anthropology	3	20

LD?”, *J. School Psychol.* 39(4):319–334, 2001. Although the latter could have been included within the full-sentence construction, for reasons of clarity, they were analyzed separately.

## 2.2. Cross-disciplinary characteristics of the titles analyzed

The most recurrent construction corresponds to the nominal group construction, a phenomenon which is observed in all the disciplines analyzed. As to the grammatical components of the titles registered within the nominal group construction, heterogeneity is shown to be another cross-disciplinary similarity. Such heterogeneity varies from the simple nominal group complex made up of a head and pre-modifiers as in “German noun inflection” (*Linguistics* RP title) to more complex constructions consisting of pre-modifiers followed by a head followed by a post-modifier made up of a prepositional phrase as shown in these examples: (1) “Glucocorticoid receptor expression in the spina cord after traumatic injury in adult rats” (*Biochemistry* RP title); (2) “A generalized rightward movement analysis of antecedent-contained deletion” (*Linguistics* RP title). More complex constructions, such as “-ing” constructions inside prepositional-phrase post-modifiers, were also found, e.g.: “Utility of immediate exercise treadmill testing in patients taking beta blockers or calcium channel blockers” (*Medicine* RP title).

Another interesting cross-disciplinary peculiarity concerns the full-sentence title construction which, according to our counts, evidences a high percentual occurrence in RP Biology titles, a finding which is not only in agreement with Berkenkotter and Huckin’s (1995) results and Haggan’s (2004) conclusions but is also indicative of a marked contrast with respect to the same construction in the titles of the social sciences.

As to the length of the titles selected, quantitative data indicate that titles in the social sciences are shorter than those in the biological sciences (Tables 7 and 8). Interestingly, our counts reveal that titles in Linguistics are the shortest in the group of the social sciences, a

Table 7  
Length of research paper titles

Social sciences				Natural sciences			
Discipline	Number of RP titles	Number of words	Title length (words/title)	Discipline	Number of RP titles	Number of words	Title length (words/title)
Linguistics	80	639	7.98	Biology	80	1227	15.33
Anthropology	80	965	12.06	Medicine	80	1239	15.48
Psychology	80	1011	12.63	Biochemistry	80	1132	14.15

Table 8  
Length of review paper titles

Social sciences				Natural sciences			
Discipline	Number of RP titles	Number of words	Title length (words/title)	Discipline	Number of RP titles	Number of words	Title length (words/title)
Linguistics	15	82	5.46	Biology	15	114	7.60
Anthropology	15	100	6.66	Medicine	15	161	10.73
Psychology	15	158	10.53	Biochemistry	15	131	8.73

peculiarity which is even more marked with respect to the length of Biochemistry, Biology and Medicine titles. This finding coincides with Haggan's (2004) observations on RP titles.

### 2.3. Cross-generic characteristics of the titles analyzed

In agreement with our observations of the cross-disciplinary characteristics in the titles framed under the nominal group construction, our counts reveal that this structural construction is also the most recurrent one in the two genres analyzed (Table 3). Likewise, heterogeneity in the grammatical components of the titles registered within the nominal group construction is shown to be another cross-generic similarity. Such heterogeneity varies from the simple nominal group complex made up of a head and pre-modifiers as in "Specific tetraspanin functions" (*Biochemistry* RVP title) to more complex constructions consisting of pre-modifiers followed by a head followed by a post-modifier made up of a prepositional phrase as shown in "A meta-analytic review of gender differences in perceptions of sexual harassment" (*Psychology* RVP title). More complex constructions, such as "-ing" constructions inside prepositional-phrase post-modifiers, were also found, e.g.: "A review of randomized controlled trials using therapeutic apheresis" (*Medicine* RVP title).

The full-sentence construction was found to be a peculiarity exclusively of RP titles of Biology, Medicine and Biochemistry (Table 4). Interestingly, no instance of this type of construction was detected in the selected RVP titles of the same disciplines and the social sciences.

The compound title construction evidences (Table 5), in the light of our counts, a tendency to be a generic peculiarity as it is more frequently found in RP titles than in RVP titles although its occurrence is, in general, significantly lower with respect to that of the nominal group construction and the full-sentence construction.

Other cross-generic peculiarities concern the question title construction and the length of the titles analyzed. As to the former, a higher percentual occurrence of the question construction especially in RVP titles of the social sciences was observed with respect to the same construction in the RP titles (Table 6). As to length of titles in the two genres analyzed, our numerical results (Tables 7 and 8) reveal that RVP titles are shorter than the RP ones.

## 3. Discussion

In agreement with previous studies on titles (Buxton & Meadows, 1977; Haggan, 2004) our RD corroborates that there are two features that are common to all the titles analyzed independently of the genre or the discipline to which the title belongs, namely, informativity and economy. The latter results from the need to adjust the title to an extremely small section of the paper without affecting intelligibility. To this end, scientists use different linguistic strategies, such as omission of articles, nominal group constructions (further details below), simple full-sentence constructions (further details below), and monosyllabic verbs and/or nouns. Concomitantly, these strategies contribute to constructing informativity in the sense that the topic that will be further discussed in the paper is presented in miniature in the title.

As stated above, our counts show that the most recurrent structural construction corresponds to the *nominal group construction* in the two genres analyzed as well as in all the



disciplines analyzed. This cross-generic and cross-disciplinary similarity has been also observed in previous studies (Bloor & Bloor, 1997; Soler, 1994; Soler, 2003, among others). This title construction seems to corroborate the classificatory process of the scientific activity. That is, “the possibility of ordering the things of the experiential world in some field-specific way presupposes both observing and naming relevant phenomena. Observation may be, in part, an empirical and nonlinguistic activity, but the record of observation is always a linguistic one: it involves giving things names” (Wignell, Martin, & Eggins, 1993, p. 143).

In the examples above (see Section 2), the straightforward materialization of informativity is evidenced through a piling up of pre- and post-modifiers, which enables scientists to account for findings synoptically. The nominal group construction contributes thus to revealing the specification of the object of study meeting the readers’ particular need as these titles map the main subject matter of the papers within the corresponding scientific field. This corroborates Haggan’s observation (2004) that “titles are texts in miniature” (p. 20), which guide the reader in such a way that what he sees printed below the title deals with something in particular.

The *full-sentence construction* was found to be, as stated above, a peculiarity exclusively of RP titles of Biology, Medicine and Biochemistry. In the absence of instances of this type of construction in the selected RVP titles of the same disciplines and of those of the social sciences, it would therefore be appropriate to categorize this characteristic as a cross-generic difference resulting from the different communicative function of each genre.

In this respect, RPs are restricted to reporting about one study in particular while RVPs summarize the state-of-the-art on a given subject making reference to all the previous studies conducted in relation to that topic. RVPs are thus indicative of the “ceiling” reached thanks to previous RPs and contribute to paving the way to future RPs on a given subject. Past, present and future studies seem to be jointly together in RVPs and title constructions should therefore evidence this fusion. In our research, the full-sentence construction seems not to be the ideal framework to convey this in RVP titles.

In contrast, this construction in RP titles allows researchers to present the general findings of their research both conclusively and synthetically in one sentence. Interestingly, the prevailing verb tense in the full-sentence RP titles found in this RD corresponds to the present tense, e.g. “Abelson kinase regulates epithelial morphogenesis in *Drosophila*” (*Biology* RP title); “Vps34p differentially regulates endocytosis from the apical and basolateral domains in polarized hepatic cells” (*Biology* RP title). This phenomenon is indicative of, in Haggan’s terms (2004, p. 5), “a note of confident optimism being projected by the writer that what he is reporting stands true for all the time”. In addition, this verb tense evidences a high degree of proximity to the present although the conclusion revealed in the title occurred in the past.

A striking aspect of the frequency counts in this RD is the high occurrence of this construction in the biological sciences groups, particularly, as stated above, in Biology, which, in fact, registers the highest percentage. This phenomenon seems to contribute to strengthening the differences regarding, on the one hand, the way and the strategies through which biological sciences and social sciences progress with respect to the object of study, and on the other, the degree of compromise of researchers in the presentation of their results through RPs in the biological sciences and the social sciences, respectively. As to the former, the biological sciences tend to trust the findings of more “evidentials” and quantitative methods and they seem therefore to report their arguments as proofs based on them

(Hyland, 2004). “Evidentials are metadiscoursal features which provide intertextual support for the writer’s position” (Hyland, 2004, p. 147). The presentation of results via the full-sentence construction in the biological sciences seems to be easier as evidentials (tables, photographs, figures, substances, and cultures) support such results. The compromise that involves the researcher for presenting results in an assertive way is thus attenuated as there are evidentials that fully support his conclusions. In contrast, the social sciences, which deal with human subjects, “rely on qualitative analyses or statistical probabilities to construct and represent knowledge. For these reasons, they require elaborate exposition and considerable tentativeness in expressing claims” (Hyland, 2004, p. 145). The absence of this type of title construction in the social sciences in our study (except for one instance of occurrence in a RP title of Anthropology) corroborates Hyland’s observation.

On the other hand, Berkenkotter and Huckin (1995) claim that full-sentence titles illustrate the growth of informativity of RP titles while Haggan (2004), based on her study on Science, Linguistics, and the Literature titles, claims that their conclusion seems to be the case for science titles while it does not seem to be so for Linguistics and Literature titles. In this respect, our numerical findings related to social sciences titles coincide with Haggan’s observation.

*Compound titles* evidence in our RD an interrelationship between the two parts constituting them, thus succinctly showing the presentation of the object of study in two different ways. Swales and Feak (1994) proposed the problem–solution, general–specific, topic–method, and major–minor in a similar way to Fortanet et al. (1997) as categories of such interrelationship. Of these, the general–specific prevailed in the examples registered in this RD, i.e. authors make a general presentation of the object of study and simultaneously indicate a specificity of such study. Examples: “Cotext as context: vague answers in court” (*Linguistics* RP title); “Numerical and arithmetical cognition: a longitudinal study of process and concept deficits in children with learning disability” (*Psychology* RP title); “Emotions: from neuropsychology to functional imaging” (*Psychology* RVP title). In this sense, this type of construction shows that titles are not only a succinct presentation of a given study but also a succinct reference to a specificity related to that study, evidencing a sort of cadence from the general to the particular.

The prevalence of this construction in RP titles over RVP titles could be related to the nature of RPs, which, as stated above, focalize on the study of a specific aspect of the object of study, thus not contemplating other aspects. This specificity is linguistically facilitated via this type of construction. In this sense, the compound construction could also be interpreted not only as a descriptive device to denote such specificity but also as a stylistic alternative with respect to the regular nominal group title presentation of the RP content. The difference of this alternative with the latter lies in that the compound construction evidences a cadence that is not present in the nominal group title construction. As to the disciplinary prevalence of compound title construction in the social sciences with respect to the biological sciences, further studies including larger databases are naturally necessary to conclude whether or not this phenomenon is a disciplinary variation or whether it depends on the type of research being conducted independently of the discipline. Still, and in the light of interpreting this construction as a possible stylistic title alternative, social sciences evidence a higher degree of flexibility for title formatting in contrast to the biological sciences, which evidence preference to the straightforward presentation of the object of study.

As to the *question title construction*, our counts reveal, in general, a very low occurrence of this title-type. Still, a higher occurrence was detected in the RVP titles of the social sciences with respect to the RP and RVP titles of the biological sciences. Taking into account the lower number of RVP titles included in our *corpus* with respect to that of RP titles for the above-mentioned reasons, the percentual occurrence of this type of construction is much higher in the former than in the latter. In keeping with the integral nature typical of RVPs resulting from years and years of intensive research on a certain object of study, the question title construction in this genre seems to allow authors the possibility of posing questions on such object as an indication that, in spite of the current state-of-the-art about it, there are, still, queries in need of reply, interpretation, and conclusion. In this sense, question titles parallel science as a question process.

On the other hand, the low occurrence of this construction in general with respect to that of the nominal group construction, may be due to the fact that it obstructs the correct indexing of papers into databases, particularly in those titles containing what Haggan (2004) calls “suggestive and enigmatic hints” through which no explicit reference to the object of study is made. In Haggan’s (2004) terms, this seems to be typical of Literature titles which “characteristically set out to attract the reader through a kind of verbal flirtation, enticing the reader with suggestive and tantalisingly enigmatic hints of the delights that follow” (p. 21). This phenomenon evidenced a very low occurrence in our study, e.g.: “Viral infection, inflammation, and the risk of idiopathic dilated cardiomyopathy: can the fire be extinguished?” (*Medicine* RP); “Is the Emperor Wearing Clothes? Clinical Trials of Vitamin E and the LDL Oxidation Hypothesis” (*Medicine* RVP). These examples are interestingly constructed under a compound construction consisting of a question with the addition of a nominal group or vice versa. This nominal group seems to be the means through which the object of study is straightforwardly presented, otherwise librarians and/or indexers may have difficulties in correctly indexing the paper in databases.

An interesting difference between this title construction with respect to the others is that although the question constructions detected do not occur within a face-to-face conversational situation, it is evident that, as it regularly happens in adjacency conversational pairs, the author interacts with his reader and this lets him imprint expectations as to the content of his paper.

#### 4. Conclusion

This RD provides the first lines of evidence of a study restricted to the most recurrent structural constructions of RP and RVP titles in the fields of the biological sciences and the social sciences. It also provides information on the frequency of such constructions.

As to the two queries posed in the Introduction, this RD shows that RP and RVP titles in the biological and social sciences resort, in general, to the same structural constructions though with a significantly different rate of occurrence and with the peculiarity that (i) RVP titles in Linguistics are surprisingly shorter than those in the other disciplines selected and (ii) compound titles show a tendency to be a generic peculiarity of RP papers particularly of the social sciences. In addition, this RD interestingly evidences that the full-sentence title construction shows (i) a tendency to be a generic peculiarity of RPs and (ii) a tendency to be a disciplinary peculiarity of RP Biology titles.

In addition, the present study contributes to:

- corroborating the fact that sections in scientific papers, of which, the title is one, have particular rhetorical functions which predetermine the prevalence of certain linguistic features. For example, the high prevalence of nominal-group title constructions in the two scientific genres analyzed corroborates the prototypical nature of science, which tends to classify its objects of study;
- corroborating that the construction of titles has a role of pivotal importance because titles may either show “propositional information” (Dahl, 1976, p. 38) when titles are constructed as a synoptic account of the paper’s findings under the nominal group construction or the full sentence construction, or they may make the reader read papers in search of full propositional information when titles are the result of a juxtaposition of elements of information under the compound construction or the question construction.

In view of the above, it can be concluded that in order to address researchers’ needs as writers of highly advanced scientific papers, a comprehensive syllabus must be carefully planned to include titles and their writing practice among the topics to be taught. In this respect, the analysis of titles must take into account a good deal of variables, such as content and function words, punctuation marks, length, and structural constructions. In all instances, their semantic as well as pragmatic implications must be analyzed in detail with the potential writers.

This RD constitutes the starting framework to further proceed with the analysis of internal title variables in relation to the most recurrent structural title constructions as well as to further analyze title structural constructions in larger databases including not only a higher number of journals per discipline but also other genres and disciplines.

## Acknowledgements

I thank Dr. P. Vallejos Llobet from the Departamento de Humanidades, Universidad Nacional del Sur (UNS), for her comments, cooperation, and guidance in the present report. I am also grateful to Ms. Adriana Grossi Treadway from Arkansas University for her assistance in editing this manuscript. This work was supported by Grant 24/I126 from the *Universidad Nacional del Sur* (UNS) to Dr. P. Vallejos-Llobet, director of the project “Textual aspects of scientific knowledge”, within which this study was carried out.

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