
DESIGNING ESP MATERIAL FOR SPANISH-SPEAKING SCIENTISTS: THE CASE OF SPECIALIZED SCIENTIFIC TITLES UNDER THE NOMINAL-GROUP CONSTRUCTION IN ENGLISH AND IN SPANISH*

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Abstract

This research focuses on highly advanced scientific titles framed within a nominal-group structure in the light of English for Specific Purposes (ESP). It is well known that ESP within the context of science helps both non-native researchers report successfully their results in English in the international disciplinary community and translators to appropriately translate – into English – scientific findings from non-native scientists. This study attempts to show in what way a comparative and contrastive analysis of scientific titles can be useful to design ESP materials on reading, writing and translating from English into Spanish and *vice versa* scientific titles constructed with a nominal group structure. To this end, the main difficulties this title construction poses in English and Spanish are identified, compared, contrasted, and analysed, and practical activities on the basis of the results collected are presented. They are aimed at raising English- and Spanish-speaking scientists and translators' awareness of the specific uses and pragmatic function of highly specialized scientific titles having a nominal group structure in the two languages concerned.

1. Introduction

Titles came to critical attention during the 1970s (Duchet 1973; Grivel 1973; Hoek 1973, 1981). At that time, concern was centred exclusively on titles of written literary texts until the emergence of the systematic study of titles under the name of 'titology', a term which is a translation of the French '*titrologie*' (after *titre* the word for "title"), first used in this context by Duchet in '*Eléments de titrologie*'. In his seminal work on titles, Genette (1987: 55) claimed that titles pose problems of definition and therefore require careful analysis as "the titular apparatus – conceived as such as of the Renaissance – is an issue of complexity which is not precisely derived from length". Genette's study is a seminal research in which literary titles are not only considered critically but also subjected to an extensive synchronic and systematic analysis. Literature can thus be considered to be the discipline which seems to have kept the first records of the systematic study of titles of written texts.

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On the other hand, an interest in highly specialized scientific titles in high impact scientific journals written in English can be traced to the beginning of the 1900s (Wilder 1904; Baskerville 1904), i.e. earlier than the observations originally published in the area of Literature. Nonetheless, while studies on title writing began to be published earlier in other scientific disciplines (such as Biology) with respect to Literature, it is within the scope of Literature that the first instances of seminal systematic research on titles were recorded.

As for scientific titles in particular, at the beginning of the 1990s Swales claimed that they are an issue in academic genres which has not yet been studied in detail. Swales' observation generated a productive response in this respect as thirteen years later the newly-reformulated term *titleology* (Baicchi 2003) entered the scene. The term 'titleology' was coined by Baicchi (p.c.) in an attempt not only to spell it differently from its calque (also a branch of chemistry) but also to connect it more straightforwardly to the word 'title'. Titleology has diversified itself through a heterogeneous range of fields, one of which is titleology in highly advanced scientific discourse. The latter is a branch that attempts to cope with the varied range of difficulties posed by appropriate scientific title writing and reading and appropriate translation of scientific titles. At present, scientists are not only aware of the pivotal role of titles in their manuscripts and contributions but also of the need to secure both accurate and appropriate titles for their studies. Brenner's (1998: R1) comments seem to be representative of the urgency to treat titles in detail within the scientific community:

this is about the most important issue in science, which is the difficult task of choosing titles for seminars, lectures, scientific papers, books and even the titles of the journals themselves [...] Titles are an area neglected by those who study the history and sociology of science and I hope that my remarks will stimulate the growth of an important new research field. Unfortunately, I can't yet think of a title for it.

On the other hand, scientific titles are of considerable interest to at least three different groups, namely i) potential authors of titles (biologists, biochemists, paleontologists, linguists, anthropologists, among many others), ii) researchers on titles, and iii) bibliographers and librarians. Groups i) and ii) sometimes merge, as in the case of linguists whose contributions are very useful tools for potential authors of titles as well as for bibliographers and librarians at the stage of scientific title decision-making and appropriate indexing of written scientific material, respectively. Furthermore, basic research on titles has proved to be varied from the point of view of – among others – study designs, size of databases examined, resulting applications, specific lexico-grammatical issues considered, genres considered, languages considered, disciplines considered, etc. (Gesuato 2008; see also references listed in Soler 2011). In contrast, little seems to have been done to date within the field of applied research on highly advanced scientific titles. Thus, in an attempt to fill this gap, the present study aims at i) identifying the main difficulties that reading, writing and translating scientific titles constructed

with a nominal group (NG) structure pose for the scientific community, particularly for those whose mother tongue is not English; ii) showing in what way a comparative and contrastive analysis can be useful to design English for Specific Purposes (ESP) materials on reading, writing and translating this title-type from Spanish into English (and *vice versa*); and iii) designing practical activities to cope with the difficulties described in i). To this end, the main difficulties this title construction written in English poses to Spanish-speaking scientists were firstly identified and pedagogical activities were subsequently proposed to deal with them.

The present research derives from three previous cross-generic and cross-disciplinary studies, the first of which examined the most recurrent title structural constructions written in English (Soler 2007) in two different genres, namely research papers (RP) and review papers (RVP) in two fields: biological sciences (Biochemistry, Biology and Medicine) and social sciences (Anthropology, Linguistics and Psychology). The second of these studies followed the same analysis as that of the first study but on titles written in Spanish (Soler 2009), and the third study, which was conducted on a database including 1140 titles from English and Spanish, merged results from the former two and analysed them following a statistical, comparative and contrastive approach (Soler 2011). The latter revealed the following major findings: i) a prevalence of NG titles in the two genres considered, in all the disciplines analysed and in the two languages considered; ii) a prevalence of full-sentence title constructions in RP titles of the biological sciences; iii) a prevalence of RP compound titles in the social sciences, and more flexibility in Spanish in the use of punctuation marks for the division of this title type; and iv) statistically significant differences in length in RP titles in terms of discipline and language. These findings provide tools to delineate the framework within which applied research on titles can be conducted to help two main groups, namely, English- and Spanish-speaking scientists, and translators, to overcome the difficulties resulting from the differences found. The material analysed and proposed for practical activities in the present work belongs to the database constructed for the third study conducted on scientific titles in RPs and RVPs (Soler 2011).

As to the two groups for whom practical activities are herein designed, and in terms of the conceptual and technical knowledge with which young scientists and students (particularly at the post-graduate level) are equipped, it is important to take into account that this group, in particular, seems to be much more advantaged than translators working in highly advanced scientific translation. This is due to the fact that disciplinary, conceptual and technical knowledge is a useful non-linguistic tool that does help appropriately understand complex nominal group scientific titles though not necessarily write them appropriately. In contrast, scientific translators may not be so well-equipped with conceptual and technical knowledge, in which case they are confronted with difficulties in both decodifying and codifying complex nominal group scientific titles. Our analysis and the practical activities herein proposed aim at helping these two groups to cope with the difficulties posed by NG titles.

2. General title-related problems in highly advanced scientific discourse

In order to address scientists' linguistic needs independently of their mother tongue, a comprehensive syllabus must be carefully planned to include title reading and writing among the topics to be taught. Concomitantly, title analysis must include a heterogeneous set of variables (such as content and function words, punctuation marks, length, structural constructions, etc.) and their semantic as well as pragmatic implications must be analysed in detail with the potential readers, writers and translators. Based on previous research (Soler 2003, 2005), and taking into account our daily interaction with researchers from the Instituto de Investigaciones Bioquímicas de Bahía Blanca (INIBIBB), Argentina, who are expected to report results from their studies in English as well as to read highly advanced scientific literature written in English, the following general title-related problems could be detected:

- a) appropriate title writing evidencing the genre of the type of work done. That is, at the title writing stage, genre may not be taken into account and therefore the resulting title may not appropriately fit the specific genre or correctly guide bibliographers and librarians to index scientific literature;
- b) successfully accomplishing both synthesis and accuracy of the information that titles are expected to provide;
- c) correctly decodifying from English and codifying into Spanish NG title constructions and *vice versa*;
- d) correctly decodifying from English and codifying into Spanish (and *vice versa*) single title words straightforwardly related to the purpose of the RP or RVP to which titles belong;
- e) correctly assigning word-order patterns to titles whose composition includes numerous constituents.

3. Difficulties deriving from the differences between scientific NG titles in English and in Spanish

The reason why highly advanced scientific titles having a NG structure were chosen in particular for the present study lies in the fact that this title type is the most recurrent construction in highly advanced scientific discourse in English (Bloor & Bloor 1997; Haggan 2004; Soler 2007). Concomitantly, previous research has demonstrated that it is the most recurrent title structure in highly advanced RPs and RVPs written in English (Gesuatò 2008; Soler 2007, 2011) and in Spanish (Soler 2009).

The NG structure has been defined as "a rhetorical structure which soon developed as the prototypical discourse pattern for experimental science" (Halliday & Martin 1993: 7). NGs have been central to research particularly in the field of Language for Specific Purposes (LSP) and in the field of ESP within which – following above all a lexico-grammatical approach – attention has mainly focused on con-

stituency (León Pérez 2003; León & Divasson 2006, 2008; Varantola 1993), internal syntax (Giorgi & Longobardi 1991), and translation (Soler 1994, 2003; Woolley 1997). All in all, and because NGs are useful tools for the linguistic representation and ordering of entities of the experiential world in some field-specific way, thus allowing us to name observed phenomena (Wignell *et al.* 1993) in a condensed way, basic and applied comprehensive research on scientific NG title types is still not thorough.

A NG is a structure consisting of a noun or a head and an optional group of modifiers which could operate as premodifiers and/or postmodifiers. The grammatical category of these inner constituents can vary to the extent that NGs may range from concise units to long word strings of changeable arrangement (León & Divasson 2008). Although this NG pattern applies for English and Spanish, a few but very important differences between the two languages must be taken into account to ensure correct title writing, reading and translating from English into Spanish and from Spanish into English.

Based on previous research conducted on adjectives (Soler 2002) and on titles in highly advanced scientific discourse (Soler 2007, 2009, 2011), it can be inferred that the main difficulties that NG titles written in English pose to Spanish-speaking scientists lie in correct identification and decodification of titles written in English with a NG construction, appropriate reading of such title-types by Spanish-speaking scientists and appropriate codification of such titles in Spanish, should the latter be necessary, particularly in the case of complex and long NG titles, e.g.:

(1) Prevalence and prognostic value of perfusion defects detected by stress technetium-99m sestamibi myocardial perfusion single-photon emission computed tomography in asymptomatic patients with diabetes mellitus and not known coronary artery disease (*The Am. J. Cardiol.* 90/8: 827-832, 2002). Total number of words in English: 30

Prevalencia y valor pronóstico de los déficits de perfusión detectados por medio del estudio de perfusión miocárdica en esfuerzo con tecnecio 99 sestamibi por tomografía computada por emisión de fotón único en pacientes asintomáticos portadores de diabetes melitus y sin patología arterial coronaria conocida. Total number of words in Spanish: 44

(2) Comparison of contrast-enhanced breath-hold and free-breathing respiratory-gated imaging in three-dimensional magnetic resonance coronary angiography (*The Am. J. Cardiol.* 90/7: 725-730, 2002). Total number of words in English: 14

Comparación de imágenes con contraste enriquecido con y sin retención de la respiración evidenciadas en angiografía coronaria tridimensional por resonancia magnética. Total number of words in Spanish: 21.

The two examples above clearly show that due to the “expansive” nature of NGs in Spanish, the latter tend to be longer in Spanish than in English. This is not just a trivial difference between the two languages considered but a key indicative of the *modus operandi* of each language in particular. Thus, when a given concept is com-

municated in English by means of a NG construction, this is done by putting mainly functional words together. In contrast, when the same concept is communicated in Spanish, this is done by putting functional words together as well, with the difference that structural words are necessary to join the functional words. This seems to respond to the fact that English effectively captures concepts synthetically while Spanish needs to add further linguistic items, such as structural words, to be able to explain the meaning of the concept that is conveyed by a NG construction. Thus, English can be thought of as a “concept-synthesizing” language while Spanish can be thought of as a “concept-expanding” language. Concomitantly, when comparing the planning of prenominal adjectives in English and postnominal adjectives in Spanish by speakers of these languages, Brown-Schmidt & Konopka (2008) observed that information is added to the message later in Spanish than in English, suggesting that both English and Spanish speakers mentally design pre-linguistic messages in lexically-sized units but tend to add information in terms of length in Spanish. This is clearly shown by the examples provided above.

In view of this *modus operandi*, English-speaking scientists are expected to expand NG titles written in English should such titles be written in Spanish. In contrast, Spanish-speaking scientists are expected to synthesize NG titles written in Spanish should such titles be written in English. The same mechanisms are involved in reading and translating. Thus, young scientists in particular should be alerted to this so as not to transfer the *modus operandi* of English to Spanish and *vice versa*.

Another important difference between English and Spanish NG titles lies in constituency which, in turn, concerns the grammatical category of modifiers and the word order pattern in the inner structures of modification. As to the former, in English nouns can operate as either the nucleus of NGs or as modifiers of NGs or as both. In contrast, nouns in Spanish can, in general, only operate as the nucleus of NGs while adjectives operate as modifiers. Frequency rates of both nominal and adjectival modification in highly advanced scientific discourse are statistically very high. Previous research in Biomedicine RPs has, for example, demonstrated that of the two modification strategies that typify English scientific discourse, adjectival modification occupies the first place, the rate of occurrence being in the following order: i) 67.2% in the Discussion section; ii) 58.9% in the Title section and Abstract; iii) 51.7% in the Introduction section, and iv) 51.4% in the Results section. Nominal modification in Biomedicine RPs was found to occupy the second place after adjectival modification, the frequency of occurrence being highest in the Introduction and Results sections (León Pérez 2003). Thus, in view of the high rate of occurrence of modification structures in highly advanced scientific discourse, particularly when confronted with NG titles composed of several nouns as in:

(3) Cystic fibrosis transmembrane conductance regulator (CFTR) gene defects [“defects” = nucleus of the NG] in patients with primary sclerosing cholangitis (*J. Hepatol.* 37/2: 192-197, 2002). (The five underlined words are nouns used as modifiers in this NG).

Spanish-speaking scientists will have problems in correctly decodifying this title construction, the major difficulty lying in the ability to appropriately differentiate the nucleus from the modifiers. Practical activities to cope with this difficulty are suggested below.

Word-order pattern in the inner structures of modification in NG titles could be another conflicting issue, which includes either premodification or postmodification or both in English and in Spanish. This, in turn, is related to the position of modifiers, particularly of adjectives which, when used attributively in English, are mainly prenominal while, under the same conditions, they are postnominal in Spanish. Thus, in the example below:

(4) A quantitative [adjectival premodifier] morphometric [adjectival premodifier] comparative [adjectival premodifier] analysis [nucleus of NG] of the primate temporal lobe (*J. Hum. Evol.* 42/5: 505-533, 2002)

the word-order pattern 'adjectival premodification + nucleus' in English, becomes 'nucleus + adjectival postmodification' in Spanish, i.e.:

Análisis [nucleus of the NG] *cuantitativo* [adjectival postmodifier] *morfométrico* [adjectival postmodifier] *comparativo* [adjectival postmodifier] *del lóbulo temporal del primate*.

In view of this different adjectival pattern between English and Spanish, when Spanish-speaking scientists are confronted with a regular attributive adjectival construction in a NG title written in English, they are expected first to identify the nucleus in the construction under consideration and then read to the left of such a nucleus. Interestingly, should such a construction be translated into Spanish, adjectives will be positioned to the right of the nucleus. In addition, though not as a general rule, the transfer of certain attributively-used adjectives in Spanish from postnominal modification to prenominal modification is accompanied with a variance in the degree of subjectivity of such adjectives to effect specific semantic purposes. Thus, in the title example below:

(5) Surprising results following conditional podocyte inactivation (*J. Am. Soc. Nephrol.* 20/10: 2086-2088, 2009)

the adjective 'surprising' could be used either prenominally or postnominally in Spanish with differences in meaning in the two cases. Previous research in this respect has concluded that when used in the canonical and ambiguity-free pattern, i.e. postnominally, adjectives in Spanish indicate the quality of the noun they modify. In contrast, when used prenominally the same adjectives do not convey the meaning of the nouns they modify but a kind of emotional resonance experienced by the speaker/writer towards such nouns (Baduy & Bompadre 1999). Therefore, in the Spanish version of (6a) and (6b):

(6a) *Resultados* [nucleus of NG] + *sorprendentes* [adjectival postmodifier] *posteriores a la inactivación podocitaria condicional*.

(6b) *Sorprendentes* [adjectival premodifier] + *resultados* [nucleus of NG] *posteriores a la inactivación podocitaria condicional*.

the adjective *sorprendente* in postnominal position (example 6a), i.e. the regular word-order pattern in adjectival modification in Spanish, restricts the meaning of the noun *resultados* by signalling a property of such a noun in a particular context. In example (6b) neutrality is altered both structurally by transferring the adjective *sorprendente* from a postnominal position to a prenominal position, and semantically by adding a note of expressiveness to the neutrality that prevails in example (6a).

Adjective form is another issue that may pose problems because in Spanish adjectives generally vary in form to agree with nouns while there is no adjectival form variance to agree with nouns in English. Thus, in the examples below

English		Spanish	
Adjective	Noun (nucleus of NG)	Noun (nucleus of NG)	Adjective
Semantic and phonological	← influences	<i>influencias</i> →	<i>semánticas</i> (plural, feminine) <i>y</i> <i>fonológicas</i> (plural, feminine)
Phonetic	← biases	<i>prejuicios</i> →	<i>fonéticos</i> (plural, masculine)

(7) Semantic and phonological influences on picture naming by children and teenagers (*J. Mem. & Lang.* 47/2: 229-249, 2002)

(8) Phonetic biases in voice key response time measurements (*J. Mem. & Lang.* 47/1: 145-171, 2002)

Spanish-speaking scientists with poor writing training in English may therefore transfer adjectival rules from their mother tongue to English. Nonetheless, of the difficulties arising from the differences between NG title constructions in English and Spanish, this appears to be the easiest to deal with by means of mechanical drill exercises. This is due to the fact that once novice scientists get acquainted with the grammatical rules from both languages regarding this issue in particular, the rate of mistakes and misunderstandings is expected to decrease immediately.

Appropriate decodification of non-verbal forms, particularly those ending in *-ing*, may also pose problems for young Spanish-speaking researchers who may misinter-

pret these forms and associate them with verb tenses (e.g. present/past continuous), as in:

- (9) Effects of different oxidizing agents on neutral amino acid transport systems in isolated bovine brain microvessels (*Neurochem. Int.* 41/2: 29-36, 2002)
- (10) Individual differences in gains from computer-assisted remedial reading (*J. Exp. Child Psychol.* 77/3: 197-235, 2000)
- (11) A comparison of the femoral head and neck trabecular architecture of Galago and Perodicticus using micro-computed tomography (μ CT) (*J. Hum. Evol.* 43/1: 89-105, 2002).

The non-verbal forms in the three examples above have in each case a different grammatical category in English. Furthermore, should these examples be translated into Spanish, the word-order pattern will be changed except in example (11) in which the postnominal complement order in English remains the same in Spanish. In contrast, in examples (9) and (10) there is a change in the word-order pattern as shown in the table below:

English	Spanish
(9) <i>-ing</i> prenominal adjective + noun of NG ←	Noun of NG + postnominal adjective →
oxidizing agents	<i>agentes oxidantes</i>
(10) prenominal adjective + <i>-ing</i> -noun of NG ←	<i>-ing</i> -noun of NG + postnominal adjective →
remedial reading	<i>lectura correctiva</i>

Examples (9) and (10) also clearly show the two different reading strategies that prevail separately in English and in Spanish, i.e. English-speaking scientists read to the left of the nucleus of NG titles while Spanish-speaking scientists read to the right of the nucleus of NG titles. Example (11) illustrates a case in which the reading direction of the nucleus of NGs is the same in English and Spanish, the latter not always being the case.

4. Design of ESP material for Spanish-speaking scientists

In the absence of linguistic applied research centred on the above-listed issues, and, based on the findings derived from our comparative and contrastive analysis of NG titles written in English and in Spanish, the following plan of practical activities is suggested in an attempt to cope with the difficulties that may arise from them.

4.1. *Differentiation between NG title constructions and other title constructions*

- 4.1.a) Say whether the following titles (4.1.c.1; 4.1.c.2; 4.1.c.3; 4.1.c.4) are NG titles or full-sentence titles;
- 4.1.b) Turn those which are NG titles into full-sentence titles and *vice versa*;
- 4.1.c) Analyse whether semantic differences arise as a result of such conversion in relation to the genre of the paper to which the titles below belong:
- 4.1.c.1 Autocrine epidermal growth factor signaling stimulates directionally persistent mammary epithelial cell migration (*J. Cell Biol.* 155: 1123-1128, 2001)
- 4.1.c.2 Intravascular ultrasound evidence of ostial narrowing in nonatherosclerotic left main coronary arteries (*Am. J. Cardiol.* 90: 773-775, 2002)
- 4.1.c.3 Molecular evidence that the hepatitis C virus replicates in the oral mucosa (*J. Hepatol.* 37: 364-369, 2002)
- 4.1.c.4 Emergent literacy skills and training time uniquely predict variability in responses to phonemic awareness training in disadvantaged kindergartens (*J. Exp. Child Psychol.* 82: 93-115, 2002).

4.2. *Constituency: identification of NG title components*

- 4.2.a) Say whether this title is a NG title or a full-sentence title:
- 4.2.a.1 Cystic fibrosis transmembrane conductance regulator (CFTR) gene defects in patients with primary sclerosing cholangitis (*J. Hepatol.* 37/2: 192-197, 2002).
- 4.2.b) Choose its equivalent in Spanish from the following suggested alternatives:
- 4.2.b.1) *Fibrosis quística en la membrana por déficits genéticos en pacientes con colangitis esclerótica primaria.*
- 4.2.b.2) *Alteraciones del gen regulador de conductancia transmembranal de la fibrosis quística en pacientes con colangitis primaria esclerosante.*
- 4.2.b.3) *Regulador de la conductancia de la membrana en fibrosis quística con déficits genéticos en pacientes con colangitis esclerótica primaria.*
- 4.2.c) If the example in 4.2.a.1) above is a NG title, turn it into a full-sentence title. If it is a full-sentence title, turn it into a NG title and analyse the semantic implications that may arise as a result of such conversion.

In activity 4.2.b) above, the major difficulty of finding an appropriate equivalent in Spanish does not necessarily lie in the technical specificity of the nouns and adjectives that form part of each NG title, but in the correct position that each of these constituents should have. Thus, the following activity can be proposed to deal with this word-order pattern problem:

- 4.3.a) Identify which of the titles below have a NG construction:
- 4.3.a.1 Intravascular ultrasound evidence of ostial narrowing in nonatherosclerotic left main coronary arteries. (*The Am. J. Cardiol.* 90: 773-775, 2002)

4.3.a.2 Autocrine epidermal growth factor signaling stimulates directionally persistent mammary epithelial cell migration. (*J. Cell Biol.* 155: 1123-1128, 2001).

4.3.b) Translate them into Spanish;

4.3.c) Corroborate whether or not your translation corresponds to that in the specific literature and analyse both the similarities and differences between the English version and the Spanish version;

4.3.d) Decide whether the selected titles belong to a RP or to a RVP and discuss whether or not there is a relationship between the title construction and the genre of the titles selected.

Interestingly, the modifiers “directionally” and “persistent” in the inner NG “directionally persistent mammary epithelial cell migration” of the example in 4.3.a.2 pose a challenging polysemy problem in the whole constituent which cannot be linguistically solved unless technical specificity is provided by experts in the field. The following are thus possible equivalents in Spanish, each of which with different meanings:

- a) *migración direccionalmente persistente de células epiteliales mamarias*
- b) *migración de células epiteliales mamarias direccionalmente persistentes*
- c) *señalización del factor de crecimiento autocrino epidérmico que estimula direccionalmente la migración persistente de células epiteliales mamarias.*

Antollini (p.c.) confirmed that cell migrations are persistently directional. Thus, the original order of modifiers in this NG title in English should have been: “Autocrine epidermal growth factor signaling stimulates **persistently directional** mammary epithelial cell migration”, whose equivalent in Spanish is: “*La señalización del factor de crecimiento autocrino epidérmico estimula la migración persistentemente direccional de células epiteliales mamarias*”. This adds a further difficulty to the above-listed problems as it is demonstrated that published scientific texts may contain mistakes which may lead to misinterpretations.

5. Conclusions

Rutherford (1987) claims that the innate linguistic competence of students of any foreign language includes two basic types of knowledge, namely, “the what” and “the how”. The former is an unconscious type of competence concerning the system and function of their mother tongue. The “how” – following Rutherford (1987) – concerns the ability to transfer reading and writing strategies from their mother tongue to a foreign language. He insists on the fact that language learners already have a broad knowledge of language of both a specific and a universal kind to build on and calls the language learning process “an interaction of the universal with the specific” (*ibid.*: 14). He consequently sees grammatical consciousness-raising as a means of opening the learner’s path from the known to the unknown, in other words, from innate linguistic competence to foreign language competence. This is – very briefly –

what is known as linguistic consciousness-raising. Thus extra work by English- and Spanish-speaking scientists towards linguistic consciousness-raising will greatly help them to be able to codify NG titles appropriately within the conventions of the scientific community discourse.

On the other hand, and due to the relevance of scientific titles as facilitators of the access to texts of any genre-type, it is imperative to insist on the need to study titles with the same rigour as that of studies on other sections of highly-advanced scientific texts. The practical activities proposed in the present study are flexible as they admit a varied range of title reading, writing and translation work combining both referential and affective instruction, both being pivotal ingredients to internalize the code of the scientific community discourse. This, in turn, may be highly beneficial for members of a scientific community as, if properly guided, they learn about the system of a foreign language following a procedure whereby title grammatical issues are systematically related with title meaning and genre types.

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