

*Theme, cohesion devices and translation*¹

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ABSTRACT

This paper will focus on the crucial topics of cohesion and thematic structure and the relevance of these options for translation studies (translation students, teachers of translation and actual translators). Throughout the discussion, illustrative examples will be provided of some of the textual options that translators have at their disposal and some of the difficulties encountered by them in translations. The texts that will be presented to illustrate these issues come from three sources: popular science texts translated from English into Spanish, abstracts translated into English from a Spanish academic journal and a translation made by a Spanish undergraduate student.

1. INTRODUCTION

Until recently research in translation tended to focus on language as a formal system and the mere transfer of linguistic structure from one language to another. As a consequence, this type of research did not pay attention to the pragmatic and discursal functions of structure as reflecting the basic function of language as a means of communication.

Much of the recent literature (Papegaaij and Schubert 1988; Hatim and Mason 1990; Bell 1991; Baker 1992) has foregrounded the relevance of discourse grammar for translation studies. Discourse grammar aims to give an explanation of how sentences and utterances go together to make up a longer discourse or speech event. It is believed that research in discourse grammar and in contrastive rhetoric in general will be helpful to all those people interested in translation (translation students, translation teachers and actual translators).

The present paper concentrates on the relevance of cohesion and thematic choice for translation studies, as well as on the ways in which both professional and unskilled translators of English and Spanish deal with these resources. Three types of texts will be provided to illustrate these issues: a) three popular science texts translated from English into Spanish by professional translators; b) two abstracts taken from a Spanish academic journal dealing with classical studies, rendered into English by the authors of the articles themselves, possibly without the help of native English speakers²; c) a text translated from English into Spanish by a Spanish undergraduate student.

The aim of our analysis here is thus merely descriptive. More detailed corpus-based studies, based on translations of specific types of texts, are likely to quantify precisely those problems most commonly found by skilled and unskilled translators in dealing with thematization and cohesion devices, although that type of work is beyond the scope of the present study.

Translation is a process primarily realized on texts, rather than on lexical items or sentences. For Halliday and Hasan a text is “any passage, spoken or written, of whatever length, that does form a unified whole” (Halliday and Hasan 1976: 1). Furthermore, a text can be defined as a structured series of units (sentences and paragraphs) linked together by specific semantic relationships with the aid of the co-text and the wider context of situation. For a text to have communicative value it must have certain textual properties usually known as texture or textuality (Halliday and Hasan 1976: 27, 229; Beaugrande and Dressler 1981: 3; Hatim and Mason 1990: 192-93; Bell 1991: 149-50). These properties mean that

(a) A text must belong to a particular genre and to a specific text-type. Genres are conventionalized forms adopted by texts in different social contexts: jokes, advertisements, novels, newspaper headlines, etc. Text-types reflect the main rhetorical function of a text: descriptive, argumentative, persuasive, informational, etc.

(b) A text must have a thematic and information structure; it must reflect the selection of options from the Theme and information systems.

(c) A text must be coherent; this necessary feature for texts may be signalled by explicit means (cohesion) or not.

The choices in (b) and (c) (as regards cohesion) are subject to language-specific norms. English and Spanish, for instance, differ in the way they encode the selections in the Theme system and in the way they make use of cohesion devices.

Relationships between sentences and paragraphs cannot be accounted for in terms of constituent structure (Halliday and Hasan 1976: 7). Strictly speaking, thematicity and cohesion are not grammatical notions; they have nothing to do with whether a given sequence is grammatical, but with acceptability and

naturalness. Thus, sentences in a stretch of language might be grammatical but not constitute a unified acceptable text. This is shown by the following much-quoted example by Halliday (1978: 134):

- (1) Now comes the President here. It's the window he's stepping though to wave to the crowd. On his victory his opponent congratulates him. "Gentlemen and ladies. That you are confident in me honours me..."

Here, although each one of the sentences is syntactically well-formed, neither of them seems to be properly related to the other ones. It is only by means of cohesion devices and options in the Theme and information system that translations may turn out to be not only equivalent but also acceptable. The unnaturalness and lack of cohesion of many translations must be accounted for by these devices and not only by lexical and syntactic equivalence.

2. THEME, METHOD OF DEVELOPMENT AND THEMATIC PROGRESSION

One way of exploring the organization of information in texts is to suggest that a sentence in a piece of language does not come out of the blue but builds on the previous sentence or sentences to carry its meaning forward (Halliday 1985: 38). From the point of view of textual meaning, clauses consist of two segments, Theme and Rheme. The Theme is realized grammatically by the initial element in the clause, the starting-point of the clause as a message, i. e. that element which the clause is about (but cf Downing 1991 for a different view on Theme). The Theme has two main functions: firstly it acts as a point of orientation of the sentence by connecting back to previous stretches of discourse (Themes or Rhemes) and thereby maintaining a coherent point of view. Secondly, the Theme acts as a point of departure by presenting the second segment of the sentence, the Rheme. The Rheme contributes to the goal of discourse; it usually represents the non-recoverable new information that the writer or speaker wants to convey.

Following Mauranen's proposals (Mauranen 1993a: 121), we might subdivide Themes in English into two subcategories: orienting Themes (connectors, adverbials, complements, modal clauses, reporting clauses...) and topical Themes (cf also Downing 1991; Gómez González 1996). The following example illustrates how the above scheme is applied to English sentences (Themes are marked in bold):

- (2) Nevertheless, **when scientists debate the validity of competing theories in medicine and biology,**] ORIENTING [**they**] TOPICAL often cite animal studies as evidence.

The overall choice and ordering of Themes and Rhemes plays a crucial role in organizing a text and in providing a point of orientation for a stretch of language. Thematization is important as the translator has to respect the source text arrangement of information in terms of given/new information and also in terms of the desired thematic prominence, all of which is grammaticalized in distinct ways in the source and in the target language (Hatim and Mason 1992: 220).

Thematic progression in English texts is usually maintained in translations into Spanish because basic word-order in English (SVO) can be easily kept in Spanish. Sometimes lexical or grammatical adjustments are needed to render the Spanish version more natural, mainly because word-order in Spanish and in other languages is determined by pragmatic, discourse and stylistic reasons (old/new information, Theme/Rheme, end-weight, presentative order, etc.) whereas word-order in English has become grammaticalized and fixed (Hickey 1997: 31).

This tension between the grammatical and communicative functions of thematic structure can be resolved by a variety of strategies such as voice change, change of verb, nominalization, extraposition, etc. (Baker 1992: 167-72). Thus, thematic structure should be preserved in translations only if the source text word order can be retained in the translation; otherwise grammatical, lexical and other readjustments are needed. A case in point is the passive voice; when the passive is used in English to maintain thematic continuity by placing the object in Theme position, it is commonly rendered into Spanish as a *se*-passive construction or as an active construction with change of word order (Colina 1997: 132). The latter is the case in the translation of (3), taken from *Scientific American*, a popular science magazine. The Spanish version of this journal is called *Investigación y Ciencia*³:

- (3) Contrast the way cocaine works with the way heroin works. Heroin binds to a neurotransmitter receptor... Heroin can be stopped by inactive, dummy compounds (such as naltrexone) that bind to the same receptors and thereby block heroin's access to them.

La forma de actuar de la cocaína contrasta con el mecanismo empleado por la heroína. Ésta se une al receptor de neurotransmisor... Podemos detener la heroína mediante compuestos sustitutivos inactivos (como la naltrexona), que se unen a los mismos receptores e impiden así que la droga acceda a ellos (PT).

Thematic structure is connected to two related concepts: method of development and thematic progression. These two concepts are useful in explaining methods of organizing and developing information in different types of texts. The method of development in a paragraph is indicated by the information contained within the topical ("ideational" in the sense of Halliday)

Themes of all the sentences of that paragraph (Fries 1981: 20). If the Themes of the majority of the sentences in a paragraph refer to one semantic field, then that semantic field will indicate the method of development of the paragraph. For instance, travel brochures have been found to display a high percentage of place adjuncts in thematic position because, in the context of travel, location provides a natural point of orientation to organize the text as a whole. The translation of these brochures should then respect that semantic continuity of thematic choices so that reader's attention does not wander from the topic of a paragraph (Baker 1992: 126). As this is easily conveyed in translations, no mistakes have been found in the texts examined here as regards the method of development.

The other important concept connected to thematic structure is that of thematic progression, which is determined by how Themes can be related to previous Themes and Rhemes by means of different semantic links: identity, synonymy, partial identity, contrast, specification, etc. (Mauranen 1993b: 103). In texts, various rhetorical patterns of thematic progression can be created (Daneš 1974: 118-120): (a) Simple Linear Progression (typical of expository-argumentative texts), where each Rheme becomes the Theme of the next utterance: $T1 \rightarrow R1 // T2 [=R1] \rightarrow R2 // T3 [=R2] \rightarrow R3$; (b) Thematic progression with a constant Theme (typical of narrative-descriptive texts), where the Theme of the first clause becomes the Theme of the following clause: $T1 \rightarrow R1 // T1 \rightarrow R2 // T1 \rightarrow R3$; (c) Thematic progression with a split Rheme, where the Rheme of the second clause is split into two elements, each being taken as a Theme in the next sentences: $T1 \rightarrow R1 // T2 [=R1] \rightarrow R2 // T3 [=R1] \rightarrow R3$; (d) Thematic progression with Derived Themes, where Themes are derived from a Hypertheme [T]: $[T] (=T1, T2, T3) // T1 \rightarrow R1 // T2 \rightarrow R2 // T3 \rightarrow R3$.

According to Baker (1992: 128) translators are faced with two possibilities in dealing with thematic progression. If the elements placed in thematic position in the source text can easily and naturally be placed in Theme position in the target language, then the method of development of the two texts will be very much alike. But if the thematic patterning of the source text cannot be easily accommodated in the Theme, then the translator must abandon it, bearing in mind that the target version should have a method of development and continuity in its own right. One of the main mistakes that untrained translators make is trying to impose the thematic patterning of one language on the structure of the other.

Several types of errors connected with thematic progression can be found in translations from English into Spanish (Fernández Polo 1995: 259-26). One source for mistakes appears when there is not a clear connection between the Theme in a sentence and the Theme or Rheme of a preceding one. This does not allow information to progress smoothly, and the reader can have problems

in interpreting what he or she reads, as can be shown in the following example. Both the source text and its translation into Spanish were taken from a popular science text and have been commented on by Fernández Polo (1995: 259):

- (4) Guanine consists of a combination of five carbon and four nitrogen atoms, arranged into two adjacent rings. (*Each carbon and nitrogen in the rings is assigned a number from one to nine.*)

Esta purina consta de una combinación de cinco átomos de carbono y cuatro de nitrógeno, dispuestos en dos anillos contiguos. (*Se asigna un número del uno al nueve a cada carbono y a cada nitrógeno de los anillos.*)

In the English text we have a thematic progression with a simple linear pattern of development. The Theme of the second clause (*Each carbon and nitrogen in the rings*) chooses as the point of departure an element recoverable from the Rheme of the previous clause (*carbon and nitrogen*), thus providing a transition between the information presented in the two sentences. However, in the Spanish version the given element is placed in rhematic position and the reader's task of interpreting this part of the text is made rather difficult.

Sometimes translators have problems in using Theme and Rheme to give the necessary emphasis to a piece of information or to set up expectations in the reader about what is to come in the discourse. The latter is the case in the Spanish rendering of (5), taken from *Scientific American* and *Investigación y Ciencia* respectively:

- (5) *There is no question about it: the number of animals used in laboratory experiments is going down. (...)*

Indiscutiblemente, en los laboratorios está disminuyendo el número de animales de experimentación. (...) (PT)

This is the first sentence in the introduction to an article on the benefits and disadvantages of using animals in scientific research. The article starts as if one was already in the middle of it. The first sentence in the source text may be divided into two utterances; the first utterance appears to presuppose much of what has gone before but in fact the reader has to supply the referent for *it*, which refers cataphorically to the whole of the next utterance. In this way, by having to search for the interpretation of the *it*, the interest of the reader is emphatically engaged. Thus, the first utterance acts as a point of departure for the second utterance (*the number of animals used in laboratory experiments is going down*). It signals what the article is about (animal testing in research experiments). On the other hand, none of these effects have been retained in the Spanish version. The two information units have been rendered as a single one. The opening evaluative adverbial (*indiscutiblemente*) is not powerful

enough to set the tone for the ensuing argumentation and the prepositional phrase as marked Theme (*en los laboratorios*) does not seem to act as a proper point of departure of the thesis defended in the article nor is the interest of the reader engaged as it was in the English version.

Another typical error occurs when retrospective Themes (orienting Themes in the terminology used above), which incorporate important links to previous clauses, are eliminated in the process of translation. The following is the beginning of a paragraph taken again from *Scientific American* and its Spanish version, *Investigación y Ciencia*:

- (6) **In addition to medical research, animals** are also used in the laboratory to test the safety of drugs and other chemicals.
Se recurre a la experimentación animal para comprobar la inocuidad de fármacos y otros productos químicos (PT).

The Theme of the English sentence, realized by a Prepositional Phrase, contains information linking back to the previous paragraphs dealing with the use of animals in studying human diseases. This connection is lost in the Spanish sentence and this makes reading much more difficult: the transition between the two uses the use of animals in medicine (research and testing) is thus omitted.

Sometimes the opposite procedure is taken, and the translator has to make the connections between previous Themes and Rhemes much more explicit. This so-called “explicitation hypothesis” (Blum-Kulka 1986: 19) would account for the existence in translations of an observed cohesive explicitness from the source language to the target language regardless of the differences between the linguistic and textual differences between languages. In the following extract taken from the same popular science journal above, the translator has considered it necessary to include in the Theme of the second clause of the paragraph (*en esta prueba*) information picked up from the Rheme of the previous sentence. The transition between the two sentences is made smoother, thus helping the readers to make up for their limited knowledge of the subject matter under discussion:

- (7) **Another unpleasant procedure** is the LD80 test for vaccines. **Experimental animals** are vaccinated against a disease; **they** and a control group are then exposed to it.
Otro procedimiento desagradable es el del test LD80 para las vacunas. **En esta prueba**, se vacunan los animales de experimentación contra cierta enfermedad, a la que se exponen los animales del ensayo y un grupo de control (PT).

Finally, sometimes new information is taken as the method of development and placed in Theme position, which leaves the Rheme empty of content

(Ventola 1994: 268; Ventola 1997: 100). The latter is the case in (8), an extract taken from an abstract in an academic article dealing with classical studies (the Themes in the first sentence are marked in bold):

- (8) **El autor** discute la ubicación del fr. 113 H. dentro del hipotético orden de los fragmentos de *Hecate*. No es probable, contra la opinión más común, que se trate de una simple indicación temporal. Y sugiere, en cambio, como más razonable su adscripción, con la mención de Venus como elemento comparativo, al pasaje en que la anciana Hécate narra la ruina de su próspera casa.

In this paper the position of fr. 113 H. within the hypothetical order of the fragments of *Hecate* is discussed. It is arguable that this fragment might be, as it is usually defended, a mere time reference. In the author's opinion it is suggested that it may belong, with the mention of Venus as a comparative term, to the passage in which the old Hecate narrates the decay of her prosperous house (NPT).

In the English version, the first sentence in the abstract violates well-known principles of English word order, which prefers placing focal elements (end-focus) and syntactically heavy elements (end-weight) towards the end of the clause. Whereas the Theme is realized by a complex nominal group, which makes the sentence difficult to read, the Rheme is rather trivial and simple. Readers expect something new to be said about the Theme in the Rheme part of the sentence, not merely the reporting process (*is discussed*). This type of mistake was common in the translation of the abstracts, which were undoubtedly translated by the authors of the articles themselves.

3. OTHER TYPES OF TEXTUAL COHESION

A distinction must be drawn between cohesion and coherence. Coherence can be defined as the universal set of procedures which guarantee conceptual connectivity such as relations of cause-effect, problem-solution, temporal sequence, etc. (Beaugrande and Dressler 1981: 4-7; Hatim and Mason 1990: 195). For coherence to be maintained readers must relate what they read to their knowledge of the world. Cohesion, on the other hand, is the indication of coherence by linguistic means. From these definitions we can reach a conclusion: a given text can be cohesive at the textual level and, nevertheless, lack conceptual coherence. Such is the case of (9):

- (9) He took a tin-opener. He opened a tin. He went to the kitchen.

The sequence of three sentences is fully cohesive because the continuity of reference is maintained throughout by the use of the third person pronoun

“he”, and as far as tense is concerned we could even make sense of the three clauses as a sequence of past events. However, this ordering of events does not correspond to our common knowledge of a sequence of events in the real world. That is why the text can be cohesive while still remaining incoherent.

For our purposes here we shall concentrate our attention on the linguistic concept of cohesion encoded by lexical and grammatical means, and leave coherence relations aside. As defined by Halliday and Hasan (1976: 10): “Cohesion refers to the range of possibilities that exist for linking something with what has gone before.” In this sense, cohesion is language and text-specific. Reference, substitution, ellipsis, conjunction and lexical cohesion are the devices identified by these two researchers for establishing cohesive links.

Reference and substitution are used by writers to allow readers to trace participants, things, events, etc., in a text or in the context of situation by means of chains of reference. Once a new participant is mentioned in a text the writer must keep track of the participant by attenuated forms such as definite articles and pronouns (Halliday 1985: 311; Ventola 1992: 277ff; Ventola 1994: 282).

Each language has its own preferences and norms for certain types of reference as well as specific tendencies being sensitive to different text types (Mauranen 1990: 239; Baker 1992: 183). It has been shown, for instance, that academic texts in English use more lexical repetition than similar Spanish texts belonging to the same register and genre (Aznar Mas, Gil Salom, Jaime Pastor and Montero Fleta 1989: 30). Spanish, on the other hand, is said to favour pronominal references or deicticals to connect back to previous referents. As the English system of reference makes few distinctions as regards gender, number or verb agreement, lexical reiteration is the norm in contexts of ambiguity in which Spanish prefers devices such as substitution, ellipsis or collocation. This state of affairs is common in translations of popular science texts. For instance, in (10) the compound *animal research* (repeated three times in the source text) is rendered twice in Spanish with attenuated forms such as *la experimentación* and *esta controversia*:

- (10) There is also much room to challenge the benefits of *animal research* and much room to defend such research. In the next few pages, you will find a debate between opponents and supporters of *animal research*. It is followed by an article that sets out the historical, philosophical and social context of the *animal research controversy*. We leave it to you to judge the case.
 Hay razones para poner en tela de juicio los beneficios de la *experimentación* y razones para defender tal investigación. En las siguientes páginas se abre un debate entre oponentes y defensores de la *experimentación animal*, y, a continuación, un artículo en el que se expone el contexto histórico, filosófico y social de *esta controversia*. Juzgue cada lector por si mismo el caso (PT).

Vehmas-Lehto (1991: 179) has noted that there exist two opposite reasons for cohesion flaws in translations. First of all, some cohesion devices present in the source text may not be reproduced in the translation. Secondly, there may be undue transfer with attention not paid to the differences in usage between the source and the target text. Unskilled translators, for instance, are prone to make use of reference marking (article usage, pronouns, etc.) in an inconsistent way. Fernández Polo (1995: 258) comments on the main problems with reference and substitution that can be found in translations. Basically these problems have to do with:

- a) Failing to assign the correct referent to a pronominal form.
- b) Failing to establish the connection between two different expressions referring to the same entity by means of synonymy or hyperonymy.
- c) Failing to make clear whether two similar forms refer to the same or two different entities.

Text (11) is a translation from English into Spanish carried out by a university student of English Philology at the undergraduate level. Notice the ambiguous status of the ellipted subject form of the verb *estaba*: it is not clear in the translation whether *estaba* refers to the car or to the first person protagonist who is telling the story:

- (11) Well, I must go now –I’ve got to go and collect the car from the garage. *I* was out in the middle of nowhere yesterday, when *it* broke down for no apparent reason. (...)
 Bueno, ahora me tengo que ir, tengo que ir a recoger el coche del taller. Ayer estaba en medio de ninguna parte cuando se estropeó sin razón aparente. (...) (NPT)

It has been pointed out that the interplay of the systems of reference and Theme should be smooth so that ambiguities do not appear in texts (Ventola 1994: 2811-282). For example, the reader of the Spanish version in (12), from *Investigación y Ciencia*, might not be able to determine who the subject (and Theme) of the last sentence might be:

- (12) [1] **Animal experimenters** often defend their work with brief historical accounts of the supposedly pivotal role of animal data in past advances. [2] **Such interpretations** are easily skewed. [3] **For example, proponents of animal use** often point to the significance of animals to diabetes research.
 [1] **Quienes son partidarios de los ensayos con animales** acostumbran reforzar su defensa con breves alusiones históricas del supuesto papel central del pasado. [2] **Se trata** de de interpretaciones sesgadas. [3] **Recuerdan, por ejemplo,** su interés decisivo en la investigación de la diabetes (PT).

Whereas in the source text, sentence [3] explicitly picks up the Theme of the first sentence (*animal experimenters / for example, proponents of animal use*), the Spanish rendering of [3] avoids the repetition of this point of departure. The referent of *recuerdan* is not made clear: the reader might process this verb as referring to the Rheme of the previous sentence (*interpretaciones sesgadas*). In order to process this last sentence correctly, the reader will have to make a mental backtrack, making a referential link back from *recuerdan* in [3] to *acostumbran* in [1].

Another important cohesion device is provided by sentence connectors, which function as explicit markers of the semantic relations (addition, temporal progression, contrast...) existing between sentences and between textual units such as paragraphs and sections in a text. It has been found that English prefers to present information in relatively small chunks and to signal the relation between chunks in unambiguous ways, using a variety of conjunctions to make semantic relations between sentences and paragraphs explicit. What happens in translations from English into Spanish is that many conjunctions are either omitted or misinterpreted and this no doubt may cause an important loss of intelligibility. Recent studies on contrastive rhetoric have demonstrated that whereas English lies at the higher level in a scale of explicitness, Spanish is probably one of those languages and cultures halfway between English and other so-called “reader-responsible” languages such as Japanese or Korean, and therefore less explicit than English in such cohesive devices as reference and textual connectors (Fernández Polo 1995: 262). Text (13) is again taken from the translation of an abstract taken from the research article dealing with classical studies. Notice that the connectors *en el primer caso* and *en el segundo* (which should have been rendered as *in the former case* and *in the latter case*) have been erroneously rendered as *firstly* and *secondly*:

- (13) El tema del presente artículo es algunos aspectos puntuales sobre la “forma agrorum” que hasta ahora no han sido tenidos en cuenta o que se han interpretado erróneamente. **En el primer caso** está la naturaleza semántica del vocablo “forma” y de sus sinónimos en la literatura gramática; **en el segundo**, el sentido que las expresiones “ex forma”, “in formis” o “secundum formam” tienen en las inscripciones en las que aparecen.

This paper is an analysis of some unhandled questions and erroneous interpretations about the “forma agrorum”. **Firstly**, the meaning of the term “forma” and its synonym in the landsurveyor’s works; **secondly**, the sense of the expressions “ex forma”, “in formis” or “secundum formam” in the inscriptions in which these are employed (NPT).

4. CONCLUSION

The theoretical study of translation carried out by discourse analysis and the practice of translation must centre not only on levels of lexis and grammar but also on aspects of cohesion and thematic structure. Studies dealing with contrastive rhetoric are needed to show how Spanish, English and other languages differ in terms of reference marking, thematic progression, the use of textual connectors and so on (Blum-Kulka 1986: 23). Translators should at least be conscious of the fact that translations must not proceed clause by clause, more or less translating each piece of language at a time (Ventola 1992: 233). The previous discussion should have a bearing on the teaching of translation theory and the practices of translating texts. Translation theoreticians have started to acknowledge that since the writer of a text and its translator belong to different cultural and linguistic systems not normally sharing the same textual features, translations should be compatible with target language norms and with the generic conventions of authentic target language texts. As Vehmas-Lehto (1991: 171) puts it “translations need to be not only equivalent, but also acceptable and natural”.

NOTES

¹ The research reported in this article was funded by the Galician Ministry of Education (XUGA 20401A97). This grant is hereby gratefully acknowledged.

² Due to the illustrative nature of this paper and to protect the identity of the writers, the sources of the academic examples will not be mentioned. Professionally translated texts are marked by the symbol (PT), non-professional translations by (NPT). The remaining illustrations are not from the corpus.

³ The three popular science articles quoted in this paper are: Mukerjee, M (1997). Trends in animal research. *Scientific American*. February, 1997: 70-77; Barnard, N. D. and S. R. Kaufman (1997). Animal research is wasteful and misleading. *Scientific American*. February, 1997: 64-66; Landry, D.W (1997). Immunotherapy for cocaine addiction. *Scientific American*. February, 1997: 28-31. The Spanish versions of these articles are: Mukerjee, M (1997). Tendencias de la investigación animal. *Investigación y Ciencia*. Abril, 1997: 74-83; Barnard, N. D. and S. R. Kaufman (1997). Una investigación despilfarradora y engañosa. *Investigación y Ciencia*. Abril, 1997: 66-69; Landry, D.W (1997). Inmunoterapia contra la drogodependencia. *Investigación y Ciencia*. Abril, 1997: 46-49.

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