Results of the Validation of the PACTE Translation Competence Model: Translation Problems and Translation Competence

PACTE GROUP

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Abstract

PACTE[1] Group has been carrying out experimental research into translation competence since 1977. The aim of this paper is to present the results obtained for one of our study variables: "Identification and Solution of Translation Problems". A brief introduction to PACTE Group's research project on translation competence is followed by a description of the variable "Identification and Solution of Translation Problems", its indicators, and the instruments used for data collection. Finally, the results obtained are presented. These show that the translation problems identified by subjects varied greatly depending on the individual; directionality plays a role in the definition of the difficulty of translation problems; there was no relation between subjects' perception of the overall difficulty of a texts to be translated and the acceptability of their solutions to translation problems; and, finally, the characterisation of translation problems would not appear to be a feature of translation competence.

Keywords: Translation competence; translation problems; Rich points; empirical-experimental research; acceptability of translations

Introduction

PACTE Group has been carrying out experimental research into translation competence and its acquisition in written translation since 1977.

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[1] The acronym PACTE corresponds, in Spanish, to the English: Process in the Acquisition of Translation Competence and Evaluation.

Research has been carried out from two complementary perspectives: (1) the translation process: gathering and analyzing data obtained from experimental studies concerning the mental processes involved in translating and the competences and abilities required; (2) the translation product: gathering and analyzing data obtained from the results of the translation process (translated texts).

Our project is designed in two phases: (1) a first phase, now nearing completion, consisting of an empirical study of translation competence in which data concerning the knowledge and behaviour of professional translators is compared with that of foreign-language teachers with no experience in translation; (2) a second phase, begun in 2010, consisting of a longitudinal study of the acquisition of translation competence in trainee translators.

After first completing exploratory tests and a pilot study (PACTE 2002, 2005a, 2005b) to validate different aspects of our research design, an experiment was carried out to determine translation competence in 35 professional translators and 24 foreign language teachers. Data have been collected on inverse and direct translations involving six language combinations: English-Spanish/Catalan, French-Spanish/Catalan, German-Spanish/Catalan.

The aim of this paper is to present the results obtained for the variable "Identification and Solution of Translation Problems".

1. PACTE's Research on Translation Competence

1.1. Theoretical model

The PACTE Group has defined translation competence as the underlying system of knowledge required to translate. In our opinion, translation competence: (a) pertains to a field of expert knowledge since it is not possessed by all bilinguals; (b) is predominantly procedural knowledge; (c) comprises different inter-related sub-competences; and (d) includes a strategic component which is of particular importance.

Following the PACTE model (cf. PACTE 2003), translation competence comprises five sub-competences as well as psycho-physiological components[2]:

Figure.1.PACTE Holistic Model (PACTE 2003)

@@Insert Figure 1 here (see File Figure PACTE. TIF)

- Bilingual sub-competence. Predominantly procedural knowledge required to communicate in two languages. It comprises pragmatic, socio-linguistic, textual, grammatical and lexical knowledge.

- Extra-linguistic sub-competence. Predominantly declarative knowledge. It comprises general world knowledge, domain-specific knowledge, bicultural and encyclopaedic knowledge.

- Knowledge about translation. Predominantly declarative knowledge about translation and aspects of the profession. It comprises knowledge about how translation functions and knowledge about professional translation practice.

- Instrumental sub-competence. Predominantly procedural knowledge related to the use of documentation resources and information and communication technologies applied to translation (dictionaries of all kinds, encyclopaedias, grammars, style books, parallel texts, electronic corpora, search engines, etc.).

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[2] PACTE (2003) believes that psycho-physiological aspects of translation competence should be differentiated from other sub-competences since they form an integral part of any expert knowledge. They are thus referred to as 'components' and not as a sub-competence. This denomination is based on Bachman 1990.

- Strategic sub-competence. Procedural knowledge to guarantee the efficiency of the translation process and solve problems encountered. This sub-competence serves to control the translation process. Its function is to plan the process and carry out the translation project (selecting the most appropriate method); evaluate the process and the partial results obtained in relation to the final purpose; activate the different sub-competences and compensate for any shortcomings; identify translation problems and apply procedures to solve them.

-Psycho-physiological components. Different types of cognitive and attitudinal components and psycho-motor mechanisms, including cognitive components such as memory, perception, attention and emotion; attitudinal aspects such as intellectual curiosity, perseverance, rigour, the ability to think critically, etc.; abilities such as creativity, logical reasoning, analysis and synthesis, etc.

Since all bilinguals possess knowledge of two languages as well as different degrees of extra-linguistic knowledge, the sub-competences that we believe are specific to translation competence are: strategic competence; instrumental competence and knowledge of translation. It is for this reason our research focuses on these three competences of which strategic competence is the most important since it interacts with all other sub-competences during the translation process, and serves to make decisions and solve problems.

1.2. Research design

Our general hypothesis is that the degree of expertise in translation (i.e. translation competence) is reflected in both the process and the product of translation.[3]

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[3] Our empirical and working hypotheses are based on the PACTE translation competence model (PACTE 2003).

Variables

One independent variable and five dependent variables were selected for our study. The independent variable established was the degree of expertise in translation. In the independent variable expertise in translation was manipulated in terms of greater or lesser degrees of expertise. Two categories were established: greater degree of expertise (translators with more than 5 years of professional experience guaranteed) and lesser degree of expertise (foreign-language teachers without any professional experience in translation and with more than 5 years' guaranteed experience as teachers).

Years of experience is obviously not the only criterion to define expertise. Additional criteria are required, such as acceptability of solutions to translation problems, knowledge of translation, decision-making behaviour, etc. The objective of our research is precisely to identify the features that characterise expertise in translation (translation competence) which serve to establish criteria and develop tests. For this reason we wish to observe the behaviour of the 'best' translators from a number of different perspectives. For example, to determine the Efficacy of the Process (PACTE 2008), a comparison was made of the behaviour of translators that obtained the best and those that had obtained the worst results for the acceptability of their translations[4].

The dependent variables in our study were: (a) 'Knowledge about Translation'; (b) 'Efficacy of the Translation Process'; (c) 'Decision-making'; (d) 'Translation Project'; and (e) 'Identification and Solution of Translation Problems'. During the experiment a further variable 'Use of Instrumental Resources' was added. This was done because a large amount of data was collected on the use of instrumental resources by translators, and the indicators of the variables associated with the instrumental sub-

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[4] See also 3.4 where the distribution in quartiles is used to study the relation between Coefficient of Satisfaction and the Acceptability of solutions.

competence ('Decision-Making' and 'Identification and Solution of Translation Problems') were unable to provide a sufficiently detailed analysis of the data obtained.

When variables cannot be measured directly, indicators of the variables provide the necessary numerical data. In the PACTE experiment, a total of 18 indicators of the variables selected were identified, based on data obtained in the exploratory tests and pilot study (see Table 1). Of these, the most relevant is the acceptability of subjects' translations given that it reflects the quality of their translations (an important aspect of their translation competence). The indicator 'Acceptability' is used as a transversal indicator in conjunction with indicators of all the variables under study in order to determine the relationship that exists between the results obtained in these indicators and the quality of subjects' translations.

Sample and experimental tasks

Two experimental groups were selected from the population of professionals working with foreign languages: (i) professional translators with guaranteed experience in translation (potentially with a greater degree of expertise in translation); and (ii)foreign-language teachers with no professional experience in translation (potentially with a lesser degree of expertise in translation). All subjects were required to be native speakers of Spanish and/or Catalan and to work in a professional capacity with German, French or English as their foreign language, and the period of their professional activity should be equivalent.

Given that not all professional translators are not necessarily experts[5], and also for the economy of the experiment (Giegler 1994), other selection criteria were: years of professional experience as translators; and translation as their main source of income. A

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[5] In Spain, officially recognised expertise, i.e. accreditation of translators (sworn translators) is limited to legal translation.

further criteria was that the translators should not be specialised in any particular field of translation. To ensure the absence of confounding variables, it was decided that translators should not be specialists in any particular field of translation since specialisation in any specific field - literary, legal, audiovisual etc. - could distort results[6].

A questionnaire was used to select subjects for both groups who fulfilled these criteria.

Thirty-five professional translators[7] and twenty-four foreign-language teachers participated in the experiment. The translators included in the study had an average of seven and a half (7.51) years of experience in translating; the average percentage of their income from translating was 86.43%; and their experience included translating a wide range of texts into their native language. Foreign-language teachers all had a minimum of five years' experience of teaching in the Spanish Ministry of Education's Modern Language School (*Escuela Oficial de Idiomas*). Subjects were paid for their translations, simulating a real-life translation task.

Subjects performed the following tasks: (1) direct translation; (2) completion of a questionnaire about the problems encountered in the translation; (3) inverse translation; (4) completion of a questionnaire about the problems encountered in the translation; (5) completion of a questionnaire about translation knowledge; (6) participation in a retrospective interview.

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[6] This was done to ensure the homogeneity of the sample. In future studies should be carried out on translation competence in the fields of literary translation, legal translation, audiovisual translation etc.

[7] Translators were contacted through professional associations.

Each of these tasks provided data for analysis. Further data were obtained from real-time recordings of subjects' actions during the translation process using the software programs PROXY and Camtasia[8], and direct observation.

Table 1 summarises the most important information relating to the research design.

Table 1. Relevant aspects relating to the research design (adapted from PACTE 2005a, 2005b).

KNOWLEDGE ABOUT TRANSLATION Related to the knowledge about translation sub-competence	
CONCEPTUAL DEFINITION	The subject's implicit knowledge about the principles of translation and aspects of the translation profession
INDICATORS	Dynamic index and coherence coefficient
INSTRUMENTS	Questionnaire on knowledge about translation
EFFICACY OF THE TRANSLATION PROCESS Related to the strategic sub-competence	
CONCEPTUAL DEFINITION	Optimum relationship between time taken to complete a translation task and the acceptability of the solution
INDICATORS	Total time taken; time taken at each stage of the translation process (orientation, development, revision)[9]; acceptability.
INSTRUMENTS	Translations, direct observation chart, PROXY and Camtasia recordings.
DECISION-MAKING This is the most complex variable. It provides data on subjects' procedural behaviour Related to strategic and instrumental sub-competences	
CONCEPTUAL DEFINITION	Decisions made during the translation process which involve the use of automatized and non-automatized cognitive resources (internal support) and the use of different sources of documentation (external support) (Alves, 1995, 1997)
INDICATORS	Sequences of actions; acceptability
INSTRUMENTS	Translations, direct observation charts, PROXY and Camtasia recordings
TRANSLATION PROJECT Related to the strategic sub-competence	
CONCEPTUAL DEFINITION	The subject's approach to the translation of a specific text and of the units it comprises
INDICATORS	Dynamic index in the overall translation project and that of each Rich Point; coherence between the overall translation project and that of each Rich Point; acceptability
INSTRUMENTS	Translation problems questionnaire and retrospective interview
IDENTIFICATION AND SOLUTION OF TRANSLATION PROBLEMS Related to the strategic sub-competence and the knowledge about translation sub-competence	

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[8] PROXY is a program (compatible with Windows) designed for the remote control of computers and users connected to a network. Camtasia records the subject's actions on the computer in real time and stores these recordings for subsequent study and data collection.

[9] Based on the distinction made by Jakobsen 2002.

CONCEPTUAL DEFINITION	Difficulties encountered by the subjects when carrying out a translation task
INDICATORS	Coefficient of perception of the overall difficulty of the text; subjects' identification of Rich Points; characterisation of Rich Points identified by subjects; coefficient of subjects' satisfaction with the solution found for each Rich Point; type of internal support used to solve each Rich Point; acceptability
INSTRUMENTS	Translation problems questionnaire and retrospective interview
USE OF INSTRUMENTAL RESOURCES Related to the instrumental competence	
CONCEPTUAL DEFINITION	Strategies used when consulting documentary resources in electronic format (websites, dictionaries and encyclopaedias in CD-ROM)
INDICATORS	Variety of resources, number of searches, time spent on searches (total and for each phase)
INSTRUMENTS	PROXY/Camtasia recordings, Catalogue of searches

The methods used and the findings obtained for the variables 'Knowledge about Translation', 'Efficacy of the Process', 'Decision-making' and 'Acceptability' have been published in PACTE (2007a, 2007b, 2008, 2010). The results obtained for the variable 'Translation Project' and their triangulation with those obtained for the variable 'Knowledge about Translation' will be published in PACTE (2011).

Data Analysis

Data obtained for each study variable was analysed and the results triangulated thereby: (1) relating results for the different indicators of study variables; (2) relating translators' and teachers' behaviour; (3) relating translators' and teachers' performance in direct and inverse translation; and (4) relating the results for indicators of all variables and the indicator 'Acceptability'.

For the purposes of data collection and analysis, the decision was made to focus attention on specific source-text segments that contained "prototypical" translation problems (cf. Infra 2.2.) i.e. the most salient, characteristic, and difficult problems in a text. These we refer to as Rich Points. The decision to focus data collection on selected Rich Points was taken to facilitate data collection, following Giegler's concept of

"scientific economy" (Giegler 1994), and the triangulation of data (cf. PACTE 2007b, 2008, 2009). The Rich Points selected were determined as a result of exploratory studies and pilot tests carried out prior to the final experiment (PACTE 2002, 2005a, 2005b). The texts selected for use in the experiment, together with five Rich Points identified in each, were trialled in the pilot study carried out in 2004 (PACTE 2005a, 2005b). The Spanish source text used for inverse translation and the English source text used for direct translation are included in Appendix 1.

The use of 'Acceptability' as a transversal indicator when analysing study variables should be noted. 'Acceptability' is an indicator of the quality of the translation product. Quantitative and qualitative analysis of the data collected in our exploratory tests (PACTE 2002) and pilot study (PACTE 2005a, 2005b) confirmed the importance of this indicator in measuring subjects' expertise in translation. It is the only indicator that is used in conjunction with specific indicators of each variable (see Table 1). In our research project, 'Acceptability' is defined in terms of whether or not the solution effectively communicates (a) the meaning of the source text; (b) the function of the translation (within the context of the translation brief, the readers' expectations, genre conventions in the target culture); and (c) makes use of appropriate language.

The following criteria were used to identify acceptable, semi-acceptable and not acceptable solutions (PACTE 2008):

- *Acceptable solution* (A): The solution activates all the relevant connotations of the ST in the context of the translation related to the meaning of the ST, function of the translation and language use.
- *Semi-acceptable solution* (SA): The solution activates some of the relevant connotations of the ST and maintains the coherence of the TL in the context of the

translation related to the meaning of the ST, function of the translation and language use.

-   *Not acceptable solution* (NA): The solution activates none of the relevant connotations of the ST or introduces connotations that are incoherent in the context of the translation related to the meaning of the ST, function of the translation and/or language use.

Our definition of what consituted aceptable, semi-acceptable and non-acceptable solutions for each Rich Point was based on these criteria taking into account the features of the Rich Point that had previously been established. The evaluation of solutions was carried out using the procedure of peer review for each Rich Point in each language combination. To ensure reliability in the application of the criteria established in all language combinations the group as a whole was consulted when any doubts arose.

Thus, each translation solution given was classified as A, SA, NA. Twenty-seven possible permutations obtained by triangulating these categories (PACTE 2007b, 2008). Subsequently numeric values were then assigned to each category: A = 1; SA = 0.5; NA = 0 (Table 2). Finally, a descriptive analysis was made of the numerical values obtained for each RP, in both direct and inverse translation, and for each experimental group.

Table 2. Permutations, categories and numeric values for the indicator 'Acceptability'(PACTE 2009).

Meaning	Function	Language	Category	Numeric value
A	A	A		
A	A	SA		
A	SA	A	**A**	**1**
A	SA	SA		
SA	A	A		
A	A	NA		
A	SA	NA		
A	NA	A		
A	NA	SA	**SA**	**0.5**
SA	SA	A		
SA	SA	SA		
SA	A	SA		
A	NA	NA		
SA	SA	NA	**NA**	**0**
etc.				

Acceptability scores for direct and inverse translation (PACTE 2008, 2009) showed that the group of translators obtained more acceptable results in their translations than the group of foreign-language teachers. Results also showed that the difference in the acceptability of the results obtained in both groups is much greater in direct translation (see Table 3).

Table 3:

'Acceptability' in direct and inverse translation (PACTE 2008,2009)		Translators	Teachers
Direct translation	Mean	.73	.49
	Median	.80	.45
Inverse translation	Mean	.52	.48
	Median	.50	.40

2. Identification and Solution of Translation Problems

According to Wilss, there is no uniform concept in Translation Studies of what constitutes a translation problem nor any appropriate, reliable conceptual framework (Wilss 1996: 47). Lörscher draws attention to the fact that the debate over translation problems has been largely speculative and that little in the way of empirical study has been carried out (Lörscher 1991:12).

2.1. Translation problems

Until the 1980s, translation problems were approached almost exclusively from a linguistic point of view (Vinay and Darbelnet 1958, Mounin 1963, Catford 1965, Váquez Ayora 1977, Scavée and Intravaia 1979, Hönig and Kussmaul 1982, etc.). Since then, other authors have taken a wider view and have identified a number of different types of problems: textual, pragmatic, cultural and linguistic (Nord 1991); textual,

pragmatic and semiotic (Presas 1996); text-linguistic, extralinguistic, pragmatic, instrumental (Hurtado 2001), etc.

From a cognitive perspective, translation problems have been linked to the cognitive processes taking place while translating, and to the concept of translation competence. Krings (1986) used the notion of translation problems as a category in his analysis of subjects' comments recorded in think-aloud protocols. He claims that the presence of a problem is evidenced implicitly or explicitly by subjects during the translation process through pauses, use of strategies, omissions, corrections, etc. Krings differentiates between two types of indicators: primary (explicit reference made by the subject; recourse to dictionaries; omissions in translation) and secondary (tentative translations; corrections; notes made on the source text). He suggests that translation problems may be divided into problems of reception, problems of production, and problems of reception-production (in which both types of problems are combined).

Bell (1998) also notes that translation problems are part of the process of transfer of a text (reception, production) and are associated with non-automatic processes: "A translation problem is some part of the process of transfer, whether deriving from the reception of the source text or the production of the target text, which makes analysis or synthesis non-automatic" (Bell 1998: 188). Citing Lörscher, he goes on to define the role of strategies in solving translation problems: "On the basis of this definition, a translation strategy is a potentially conscious procedure for solving a problem faced in translating a text, or any segment of it" (Lörscher 1991a: 76; cit. Bell 1998: 188).

Kiraly (1995: 99-105) believes that there is no clear dichotomy between controlled and uncontrolled processes in a translator's mind. Thus, in his model of the cognitive processes involved in translation, he suggests that translators have a relatively uncontrolled processing centre (intuitive, less conscious) and a relatively controlled

processing centre (strategic, more conscious). Like Bell, Kiraly associates translation problems with non-automatic processes. Translation problems emerge from the intuitive workspace when automatic processing does not produce tentative translation elements. These problems are considered in the controlled processing centre and a strategy is chosen and implemented in an attempt to deal with them (1995: 105).

Another subject of debate in Translation Studies is whether or not all problems translators have when translating may be deemed translation problems. Nord distinguishes between problems and difficulties in translation. Thus, a translation problem is "an objective problem which every translator (irrespective of his level of competence and of the technical conditions of his work) has to solve during a particular translation task" (1991: 151). Difficulties in translation are "subjective and have to do with the translator himself and his specific working conditions" (1991: 151).

2.2. Translation problems in PACTE's research on translation competence

We believe that one of the main characteristics of translation competence, like all expert knowledge, is the ability to solve problems. The solution of translation problems involves, different cognitive operations within the translation process, and requires constant decision-making on the part of the translator.

In PACTE's holistic model of translation competence, this ability to solve problems is directly linked to the strategic sub-competence. Strategic competence is the most important of all the sub-competences since it serves to control the translation process and is involved in decision-making processes. In order to obtain data concerning the role of strategic competence in our study of the translation process, the following variables were selected: 'Efficacy of the Process', 'Decision-making',

'Translation Project' and 'Identification and Solution of Translation Problems'. (PACTE 2008, 2010).

Prototypical translation problems

We believe that being competent in a profession implies being able to effectively carry out the tasks required of that profession, and, therefore, of being able to solve the types of problems most frequently encountered in the course of one's professional activity.

When selecting the texts used in our experiment, therefore, an effort was made to find texts that posed the types of translation problems most frequently encountered by professional translators. As mentioned above (supra 1.2.), the decision was made to focus data collection and analysis on specific source-text segments that contained this type of translation problems: those we refer to as Rich Points.

When identifying the Rich Points in the SL texts selected - one involving direct and the other involving inverse translation[10] - the following categories of translation problems were included:

Table 4: Categories of translation problems

Linguistic problems	Lexis (non-specialised) and morphosyntax. Problems of both comprehension or re-expression may be involved.
Textual problems	Coherence, cohesion, text type and genre, and style. Problems of comprehension or re-expression may be involved, and are associated with differences in the way texts function in each language.
Extralinguistic problems	Cultural, encyclopaedic and subject-domain knowledge. Problems that also derive from cultural differences.
Problems of intentionality	Difficulty in understanding information in the source text (intertextuality, speech acts, presuppositions, implicatures). Problems of comprehension.
Problems relating to the translation brief and/or the target-text reader	Difficulties (affecting reformulation) which, from a functionalist point of view, would affect all Rich Points.

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[10] As an example of the texts used, Appendix 1 presents the English source text for direct translation and Spanish source text for inverse translation.

Our research has shown that translation problems are not uni-dimensional - they may share features of several different categories.

In the text used for inverse translation (see Appendix 1) the following Rich Points were selected:

RP1: *indiano … fortuna del Americano* - extralinguistic, textual problem

RP2: *gobierno alfonsino* - extralinguistic problem

RP3: *desenfreno y dilapidación* - linguistic problem of re-expression

RP4: *la geografía comarcal de Cataluña* - problem of intentionality

RP5: *común ... trona* - extralinguistic, textual, and problem of intentionality.

For the purposes of direct translation, parallel texts in English, French and German on the subject of computer viruses were used: The English source text (EST) was entitled "E-mail virus strikes in new form" (*The Guardian*, June 6, 2003)[11]; the German source text (GST): "Wurm in der Leitung" (*Frankfurter Allgemeine Zeitung*, June 14, 2003); and French source text (FST): "Bugbear.B, le virus informatique qui lit par-dessus l'épaule de ses victimes" (*Le Monde*, June 13, 2003). (See Appendix 1).

In the texts used for direct translation, the types of problems selected were:

RP1. Title: Problem of intentionality; textual problem .

RP2. Technical term: *keylogger* (EST); *Download-Verzeichnis* (GST)*; Édition de logiciels antivirus* (FST*)*. Linguistic problem of re-expression; extralinguistic problem.

RP3. Reference: *propagation rate…doubled…surg*e (EST); *Schädling ... E-Mail Würmer...Vorgängervariante* (GST)*; Le ver...résurgence...ses congeners* (FST). Textual problem.

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[11] We would like to thank F. Alves for providing this text.

RP4. Element in apposition: *"Trojan horse" program which could allow a hacker to take remote control of infected machines* (EST)*; Dateien-Tauchbörse Kazaa; Soumissions* (GST)*; des communications du virus* (FST). Textual problem; problem of intentionality.

RP5. Element involving difficulties in comprehension and reformulation: *Cheltenham-based virus filtering firm* (EST)*; Tastatureingaben von PC-Nutzern nach Kreditkartennummern und Ähnlichem überwacht* (GST)*; Enregistrer les caractères tapés sur le clavier* (FST). Problem of intentionality; linguistic problem of re-expression.

It was assumed that, from a functional concept of translation, the purpose of the text and the target reader affected all Rich Points.

Translation problems and cognitive processes

From a cognitive point of view, and based on Bell (1998) and Kiraly (1995), we believe that a translation problem exists when "automatized"[12] solutions, i.e. spontaneous and immediate solutions, are not found for source-text segments in translation and different strategies are then put into effect to solve them. These strategies we believe are actions that are used to obtain specific objectives or outcomes (Pozo, Gonzalo and Postigo 1993).

Following Alves (1995, 1997), we believe that translators use two types of resources during the translation process: internal support (automatized and non-automatized cognitive resources) and external support (all kinds of information resources).

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[12] We prefer the use of the term "automatized" and "non-automatized" rather than "automatic" and "non-automatic" since we believe that when translating a text, intentionality is always involved and therefore, as Kiraly (1995) observes, there are no totally unconscious processes involved in translation. It would be more appropriate to speak of "automatized" processes, the product of experience.

Thus, in our study of the variable 'Decision-making' (PACTE 2005b, 2009) different sequences of actions (strategies) were found to be used to solve translation problems:

- Internal Support: the Definitive Solution is based exclusively on internal support, with no consultation prior to the Definitive Solution being adopted. Example: Definitive Solution; Provisional Solution → Definitive Solution.

- Predominantly Internal Support: the Definitive Solution is based essentially on internal support, i.e., any combination of consultations which does not include a consultation of bilingual resources from which the variant offered is adopted in translation. Example: Provisional Solution → Consultation of Alternative Resources → Consultation of Alternative Resources → Consultation of Bilingual Resources (but the variant is not adopted in the translation) → Definitive Solution.

- Predominantly External Support: the Definitive Solution is based essentially on external support, i.e., any combination of consultations that includes consultations of bilingual resources from which the variant offered is adopted in translation. Example: Provisional Solution → Consultation of Alternative Resources → Consultation of Alternative Resources → Consultation of Bilingual Resources (and the variant offered is adopted in the translation) → Definitive Solution.

- External Support: the Definitive Solution is based exclusively on consultation of bilingual resources, from which the variant offered is accepted in the translation. Example: Consultation in Bilingual Resources (and the variant offered adopted in translation) → Definitive Solution.

Regarding the use of Internal Support, following Bell and Kiraly, we believe that automatized internal support is used when a translator finds no problem in translating a

source-text segment. When a problem *is* encountered non-automatized internal support, i.e. cognitive strategies, is used to solve the problem.

2.3. The variable 'Identification and Solution of Translation Problems'

The variable was designed to obtain data on the way in which the process of identification and resolution of translation problems evolves and its relation to translation competence. The variable 'Identification and Solution of Translation Problems' is defined as difficulties encountered by subjects when carrying out a translation task. When determining this variable the following questions were asked:

- Is the ability to identify and solve translation problems really a characteristic of translation competence? Do translators and non-translators behave in the same way? Do they perceive the same degree of difficulty in translating a text? Do they identify the same kinds of problem? Do they describe the problems in the same terms? Is there any difference between direct and inverse translation in relation to translation problems?

- Is there any link between translation problems and non-automatized cognitive processes? Do translators and non-translators make the same use of automatized and non-automatized internal support?

- Can we distinguish between translation problems (objective) and difficulties in translation (subjective)?

- Is there a link between the difficulties encountered by subjects and the acceptability of results?

- Is the ability to evaluate the solutions of translation problems a characteristic of translation competence?

The desire to obtain answers to these questions informed the selection of indicators for the variable under study both in relation to the text as a whole as well as the selection of prototypical translation problems (Rich Points). These indicators were:

1. Coefficient of perception of the overall difficulty of the translation of the text

2. Subjects' identification of prototypical translation problems

3. Characterisation of the prototypical translation problems identified by subjects

4. Coefficient of subjects' satisfaction with their solution for each of the prototypical translation problems identified

5. Type of internal support used to solve prototypical translation problems

Data for the variable was collected using a translation problems questionnaire and a retrospective interview, both of which focused on the Rich Points selected in each of the source texts to be translated (see Appendix 2). Questions were designed to provide data relating to the indicators established, specifically:

- Question 1**:** *How difficult do you think this text is to translate?* (Indicator 1)

- Question 4: *What were the main problems you found when translating this text? Name 5 and answer the following questions about each* (Indicator 2)

- *Why was it a problem?* (Indicator 3)

- *Are you satisfied with the solution?* (Indicator 4)

Information concerning the identification and characterisation of the Rich Points which was not obtained from subjects' answers in the questionnaire was subsequently solicited in the retrospective interview. The information obtained from the interview was then used to complement the information obtained from the questionnaire and the data as a whole was analysed.

Data concerning the type of internal support (see Supra 2.2) used (non-automatized or automatized) was obtained by cross-referencing the data for the use of internal support in the variable 'Decision-making' (PACTE 2009) with subjects' identification of problems in the questionnaire and retrospective interview. If a problem had existed it was deemed that non-automatized internal support was used (thinking), and if it had not existed, it was deemed that automatized internal support was used. These data were then triangulated with the acceptability of the solutions obtained.

This article presents only the results obtained for the first four indicators of the variable 'Identification and Solution of Translation Problems'. The fifth indicator (type of internal support), related to the indicator 'Sequences of Actions' and the variable "Decision-making" (PACTE 2009), requires more in-depth explanation than this article permits and will be the subject of a future publication.

3. Results

3.1. Coefficient of perception of the overall difficulty of the text

Subjects' perception of the overall difficulty of the texts to be translated was recorded on a scale of 1-30. For the purposes of data analysis the scores recorded were converted to 100 to obtain a coefficient of 0-1. Scores were classified by language to determine whether or not the degree of difficulty perceived was in any way influenced by language.

Results obtained for direct translation

The average of the coefficients obtained for translators and foreign language teachers in direct translation were as follows:

Table 5: Mean coefficient of perception of the overall difficulty of the text (direct translation)

	TRANSLATORS	TEACHERS
English	.27	.56
French	.30	.34
German	.30	.38
Overall	**.28**	**.43**

Results show that the group of translators in general perceived the text to be relatively easy to translate.

A comparison of both the teachers' and translators' perception of the overall difficulty of the text shows that whilst there is little difference between the difficulty perceived by the French and German translators (.30) and the French and German language teachers (.34; .38), the English language teachers (.56) perceived the text to be much more difficult than the English translators (.27). As a result of the marked difficulty perceived by teachers of English, the difference between translators' and teachers' perception of the overall difficulty of the translation of the text is relevant (translators: .28; teachers: .43). The group of teachers perceived the text to be more difficult.

The homogeneity of the results obtained for the group of translators (English, French and German) for the coefficient of perception of the overall difficulty of the text contrasts with that of the group of teachers.

Results obtained for inverse translation

The average of the coefficients obtained for translators and foreign language teachers in

inverse translation were as follows:

Table 6: Mean coefficient of perception of the overall difficulty of the text (inverse translation)

	TRANSLATORS	TEACHERS
English	.66	.77
French	.60	.56
German	.64	.77
Overall	**.63**	**.70**

These results show that subjects in both groups perceived the text to be difficult. However, whilst the degree of difficulty perceived by the group of translators was similar (.66; .60; .64), it varied within the group of teachers: teachers of English and German perceived the text to be more difficult to translate (.77) than teachers of French did (.56). The proximity of the French and Spanish languages may well account for the difference in difficulty perceived by teachers of French. As a result of the low level of difficulty of the text perceived by teachers of French[13], the difference between translators' and teachers' perception of the overall difficulty of the translation of the text is not relevant (translators: .63; teachers: .70).

The homogeneity of the results obtained for the group of translators (English, French and German) for the coefficient of perception of the overall difficulty of the text in inverse translation, as in direct translation, contrasts with that of the group of teachers and would indicate that translators were not influenced by the language into which they had to translate.

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[13] It should be noted that the low level of difficulty perceived by the French language teachers may also be attributable to an overall tendency on the part of teachers in general to perceive translation problems as linguistic problems.

A comparison of the results obtained for direct and inverse translation shows that both groups find inverse translation (translators: .63; teachers: .70) much more difficult than direct translation (translators: .28; teachers: .43).

Coefficient of perception of the difficulty of the text and acceptability

When subjects are ranked according to the level of acceptability of their solutions to translation problems, no tendency or pattern can be observed between acceptability and the overall difficulty of the text perceived by translators and teachers in inverse or direct translation.

Pearson's coefficient of correlation (Pearson r) shows that the correlation between acceptability and the perceived difficulty of the text is not statistically significant in either of the two experimental groups (cf.Table 7)[14]. No tendencies can be observed in inverse or direct translation. The perceived difficulty of the text does not, therefore, lead to more acceptable, or less acceptable, solutions.

Table 7: Coefficient of perception of the difficulty of the text and acceptability

	Pearson (r) coefficient of correlation	Degree of freedom	Significance
Translators (direct)	0.13	32	Not significant
Teachers (direct)	0.01	22	Not significant
Translators (inverse)	0.04	32	Not significant
Teachers (inverse)	0.19	22	Not significant

3.2. Subjects' identification of prototypical translation problems

A calculation was made of the percentage of Rich Points (RP) identified by each group (translators and teachers) in both the questionnaire and the retrospective interview.

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[14] To be significant, Pearson r would have to be: translators > 0.35; teachers >0.39

Table 8: Identification of prototypical translation problems (direct translation)

DIRECT TRANSLATIO	RP 1 Title	RP 2 Technical ter	RP3 Reference	RP 4 Apposition	RP 5 Comprehension and reformulatio
Translators	62.9%	51.4%	54.3%	40.0%	22.9%
Teachers	33.3%	45.8%	62.5%	50.0%	33.3%

In direct translation, more translators (62.9%) than teachers (33.3%) identified the title (RP1: problem of intentionality) as a translation problem. Fewer translators than teachers identified RP3 and RP4 (textual) as problems - these are precisely the Rich Points that translators would have solved most acceptably (0.8 in each case; PACTE 2010). The problem least often identified by both translators (22.9%) and teachers (33.3%) was RP5: problem of intentionality and linguistic problem of re-expression).

Since all five Rich Points posed problems for subjects in both groups these results would confirm that the Rich Points selected for our experiment were appropriate.

Table 9: Identification of prototypical translation problems (inverse translation)

INVERSE TRANSLATION	RP1 *indiano. fortuna*	RP 2 *gobierno alfonsino*	RP 3 *desenfreno dilapidación*	RP 4 *geografía comarcal*	RP 5 *Común...trona*
Translators	71.4%	65.7%	57.1%	68.6%	68.6%
Teachers	66.7%	66.7%	70.8 %	62.5%	75.0 %

In inverse translation, many more teachers (70.8%) than translators (57.1%) identified RP3 *desenfreno y dilapidación* (linguistic problem of re-expression) as a problem. The percentage of subjects who identified the remaining Rich Points as translation problems was similar.

It should be noted that the percentage of Rich Points identified as translation problems was higher in inverse translation than in direct translation. The greater overall difficulty of the text perceived by subjects in inverse translation is thus reflected in the high percentage of Rich Points identified as problems.

The results confirm that the Rich Points selected for our experiment constituted an effective sample of problems found in inverse translation since they were identified by most of the subjects.

Finally, each subject selected different prototypical problems. Subjective difficulties, depending on personal knowledge and skills, may well account for the difference in which of the Rich Points was identified as a problem and by whom.

3.3. Characterisation of the prototypical translation problems identified

An analysis was made of subjects' characterisation of the Rich Points identified as problems in the questionnaire and retrospective interview (Question: *Why was it a problem?)*. The range and lack of precision of subjects' answers to this open-ended question made it necessary at times to interpret their answers. It was observed that it was difficult for subjects to explain the difficulties they encountered given the procedural cognitive processes involved in translation and the automization of all expert knowledge.

Subjects' answers were assigned to the categories below using the following criteria:
- *Linguistic difficulties*. When subjects refer to lexical or morphosyntactical difficulties. A distinction is made between linguistic difficulties of comprehension (C) and re-expression (R) in order to determine whether a specific difficulty is due to shortcomings in a subject's knowledge of the source-text or target-text language, and whether or not it occurs in the same way in direct or inverse translation in each of the subject groups.[15] In some cases both types of linguistic difficulties (C and R) arose. When dealing with

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[15] We consider this to be of importance when determining the appropriateness of our sample: if marked shortcomings had been observed in subjects' knowledge of the source language in either groups, acceptability would have be conditioned by those shortcomings and not by other features of translation competence. In general, subjects did not mention difficulties in language comprehension.

technical terms, reference is made to a linguistic difficulty of re-expression of terminology (T) since this is a special case linked to extralinguistic knowledge. Examples of how answers were assigned: "I've never heard this word before" (linguistic C); "I didn't know how to say it in X" (linguistic R); "Difficulty in finding the exact term" (linguistic R T)

- T*extual difficulty.* When subjects refer to difficulties of coherence, cohesion, text types (genre conventions) and style. In this case, no difference is made between comprehension and re-expression since this type of difficulty is considered to be one of contrastivity between two languages Example: "I've already mentioned the American"; "Because I wanted it to conform to the characteristics of the genre".

- *Extralinguistic difficulty.* When subjects refer to difficulties relating to a specific field of knowledge (specialised concepts) cultural or encyclopaedic knowledge. Examples: "The concept does not exist in German"; "An equivalent territorial and administrative division does not exist".

With regard to terminology (specialised concepts), when reference is made to difficulties of understanding concepts expressed in the source text (example: "I didn't know the meaning of the word") these are assigned to the category of extralinguistic difficulties. In those cases in which reference is made to difficulties of finding the word in the target text language, terminology is classified as Linguistic R T. Example: "I had difficulty in finding the exact term.

- *Difficulties of intentionality.* When subjects refer to difficulties in understanding the information contained in the source text. A clear distinction is made between difficulties related to intentionality and difficulties of comprehension that are purely linguistic in nature. When the difficulties referred to by subjects are those that involve the information load of a Rich Point, they are classified as difficulties of intentionality.

When they refer to lexical or syntactical difficulties they are considered to be linguistic. Example: "I didn't know what it meant in this context" (intentionality); "I didn't know what it meant" (linguistic C - when referring to non-specialist terms).

- *Difficulties relating to the function of the text and the target reader.* When subjects refer to problems relating to the function of the translated text (according to the translation brief) and/or the target reader. Example: "Because it depends on the reader's knowledge".

Results in direct and inverse translation

The percentage of each of the categories used to describe the Rich Points identified was then calculated for each group (translators and teachers). It was, however, difficult to observe any relevant differences between the two groups as a result of quantitative analysis for two reasons: (i) subjects' answers were often confusing and therefore difficult to catagorise; (ii) the number of subjects in each case was small (only those who had identified the problem and had been able to attribute it to a specific category of problem).

Taken overall, there would appear to be no notable difference between the way in which translators and teachers characterise the translation problems they identified. The only differences observed were the following:

- There was a greater tendency on the part of teachers to describe difficulties as linguistic, e.g. in direct translation they described RP1 (title) and RP4 (element in apposition) as linguistic difficulties of expression and RP5 (*común….trona*) as a linguistic difficulty of comprehension.

- There was a difference in the way in which problems of intentionality were described (in direct translation: RP1 the title; in inverse translation: RP4 *geografía comarcal* and

RP5 *común…trona).* Most teachers described the difficulties posed by these Rich Points as linguistic whilst most translators assign them to a wider range of categories: function of the text, textual difficulties and difficulties of intentionality, underlining the multidimensionality of translation problems.

On the basis of these results, we cannot affirm that the ability to explain the nature of a translation problem is a characteristic of translation competence.

3.4. Coefficient of subjects' satisfaction

To calculate this coefficient, the answers to the questionnaire (YES/NO/ Partially) were given numerical values: YES = 1; NO = 0, P = 0.5. A coefficient of 0-1 was calculated for each subject.

The following coefficients were calculated: (1) Coefficient of subjects' satisfaction; (2) Coefficient of subjects' satisfaction for each Rich Point; (3) Coefficient of satisfaction and acceptability.

Coefficient of subjects' satisfaction overall

Both groups were satisfied with their performance. Some subjects were very satisfied, whilst others were not so satisfied.

The mean coefficient of subjects' satisfaction in direct translation was the following: translators (.84); teachers (.76). In inverse translation, the mean coefficient was: translators (.73); teachers (.76).

Taking all subjects with a coefficient of satisfaction of 1, it may be observed that a total of twenty subjects had a coefficient of 1 in direct translation (15 translators and 5 teachers). Of a total of 12 subjects with a coefficient of 1 in inverse translation, 6 were

translators and 6 were teachers. All translators with a coefficient of 1 in inverse translation had a coefficient of 1 in direct translation whilst only one teacher (PF7) had. It would thus appear that translators have more clearly-defined, homogenous criteria that inform their perception of the acceptability of their translations.

Coefficient of satisfaction for each Rich Point

Subjects' coefficient of satisfaction is similar for each Rich Point. Satisfaction would therefore not appear to depend on the nature of the problem solved.

Table 10: Coefficient of satisfaction for each Rich Point

	DIRECT TRANSLATION		INVERSE TRANSLATION	
	Translators	Teachers	Translators	Teachers
RP1	.78	.76	.78	.79
RP2	.76	.61	.82	.74
RP3	.89	.90	.74	.70
RP4	.83	.64	.61	.85
RP5	.89	.76	.69	.76

There would appear to be only a slight difference in inverse translation (RP4: *geografía comarcal*, problem of intentionality). Although a similar number of subjects in both groups identified this Rich Point as a problem (translators: 68.6%; teachers: 62.5%) teachers were more satisfied (.85) with their solutions to the problem than translators (.61)

Coefficient of satisfaction and acceptability

Finally, the coefficient of subjects' satisfaction was compared with the index of acceptability to determine whether or not subjects' satisfaction had a bearing on the

acceptability of their solutions to translation problems.

There is a marked dispersion of subjects in both inverse and direct translation (some subjects cannot be seen because they overlap).

Figure 2: Coefficient of satisfaction and acceptability (direct translation)

@@ Insert Figure 2 here (see file Figure 1.TIF)

Figure 3: Coefficient of satisfaction and acceptability (inverse translation)

@@ Insert Figure 3 here (see file Figure 2.TIF)

No relation between subjects' satisfaction and the acceptability of their solutions is observed in either of the two groups .

To confirm this finding, the coefficient of satisfaction was compared with the index of acceptability in those subjects that had obtained the highest[16] and lowest[17] indices of acceptability.A high index of acceptability for translators was set at .90-1.00 (direct translation) and .80–1.00 (inverse translation). A low index of acceptability for translators was set at .60-.30 (direct translation) and .30-.10 (inverse translation). In the case of the teachers, a high index of acceptability was set at .70 - .90 (direct and inverse translation); a low index of acceptability was set at 30 - .00 (direct and inverse translation). No significant difference was found in direct or indirect translation between translators or teachers with high or low indices of acceptability. This would confirm the result already obtained - that no relation exists between subjects' satisfaction and acceptability.

Moreover, a comparison of the acceptability of the solutions of translators with a

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[16] The top 25% in each group
[17] The bottom 25% of each group

coefficient of satisfaction 1 (very satisfied with their solutions) and the acceptability of the solutions of all translators in both inverse and direct translation confirms that there is no correlation between subjects' perception of the acceptability of their solutions and true acceptability.

Table 11: Comparison of satisfaction and acceptability in translators

Acceptability	Direct	Inverse
Translators (coefficient of satisfaction 1)	.76	.52
All translators	.73	.52

A high degree of satisfaction does not guarantee the acceptability of solutions.

Conclusions

In the first place, results of particular significance for our research design were obtained:

1. The homogeneous results obtained for the coefficient of perception of the overall difficulty of the text in direct and inverse translation leads us to conclude:

a. The homogeneity of the texts used °for direct translation in our experiment: the difficulties presented in the texts appeared to be similar. The way in which comparable texts were selected in the three languages for direct translation was thus deemed appropriate since translators perceived the texts to be of comparable difficulty.

b. The homogeneity of the sample of translators: there was no language-dependent difference in the perceived difficulty of the texts to be translated either in direct or

inverse translation. The questionnaire used to select subjects for the experimental group of translators was therefore appropriate.

2. The Rich Points selected were appropriate since all subjects found them difficult to translate, both in inverse and direct translation, and described them in terms of different categories (multidimensionality of translation problems).

Regarding translators' and teachers' behaviour in relation to translation problems, and their ability to identify and solve them, we have found, first, that each group differs in their perception of the overall difficulty of the texts. In direct translation, the group of teachers perceived the text to be more difficult than the translators, possibly due to their inexperience in text production in their mother tongue, and their inexperience in translation. In inverse translation the teachers (with the exception of the teachers of French) also perceived the text to be more difficult than the translators. In both groups the perceived degree of difficulty of the text was much higher in inverse translation. This would indicate that directionality plays a role in the definition of the difficulty of translation problems.

No relation, however, was found between subjects' perception of the overall difficulty of the text and the acceptability of their solution to translation problems. Nor was a relation found between subjects' satisfaction with their solutions to translation problems, i.e. personal perception of the quality of the translation, and real acceptability. We may therefore conclude that subjects' perception of the difficulty of the translation of a text and their perception of the quality of their performance, have to do with personality traits such as self-esteem, self-criticism etc. -psychophysiological components in PACTE's theoretical model (PACTE 2003).

Moreover, the problems identified both by translators and teachers varied greatly depending on the individual. This would appear to point to subjectivity when facing

prototypical problems. This may well have to do with the distinction between difficulties in translation (subjective) and translation problems (objective) proposed by Nord (1991).

Finally, on the basis of the results obtained, we cannot affirm that the characterisation of translation problems is a feature of translation competence. Rather, the ability to explain the nature of a problem would pertain to the field of *explicative knowledge*, characteristic of the theorist in Translation Studies. It has to do with the distinction made in cognitive psychology between explicative knowledge (*know why*) which identifies theoretical knowledge; declarative knowledge (*know what*); operative knowledge (*know how*); and conditional knowledge (*know when and why to use knowledge*) (Anderson 1983, Paris 1983, Wellington 1989, Pozo y Postigo 1993, etc.)[18]. A characteristic of translation competence would therefore be to possess declarative knowledge specific to translation (cf. PACTE 2008), as well as operative, and conditional knowledge: *know how* to identify and solve translation problems by applying the relevant knowledge and strategies.

Nevertheless, the results obtained have yet to be triangulated with results of other variables. In particular in relation to the translators who had obtained the highest score in different aspects of our study (acceptability of solutions, knowledge of translation, decision making, use of instrumental resources, etc.).

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[18] See Anderson (1983) for information on the characteristics of declarative and operational (procedural) knowledge. Based on Wellington (1989) Pozo and Postigo (1993, p. 49) propose a third type of knowledge: explicative knowledge (*know what for*) which reflects theoretical knowledge. Some authors (Paris, Lipson et Wixson , 1983 ; Paris, Cross et Lipson, 1984 ; Schraw et Moshman, 1995 ; etc.) have referred to conditional knowledge which consists of knowledge about *when* and *why* declarative and operational knowledge may be used .

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Appendix 1: Texts

Direct Translation Text

1Email virus strikes in new form

Computer users were warned last night to be on the lookout for an email virus that can steal confidential information and allow hackers to take control of infected machines. The virus, a new variant of the BugBear email worm that infected tens of thousands of computers around the world last October, began to spread rapidly from Australia to Europe and the USA at around 8am yesterday. According to MessageLabs, a **5Cheltenham-based virus filtering firm** which reported about 30,000 infected messages in 115 countries, the **3propagation rate** of BugBear.B almost **3doubled** every hour throughout the morning. There was also a huge **3surge** as US users came online. Like its predecessor, the variant spreads by sending itself as an attachment to every address in an infected machine's email address book. To disguise where it came from, it uses different subject headings. As well as searching for anti-virus software and disabling it, BugBear.B installs a **2keylogger** to record what the user types, which may allow hackers to record confidential information such as credit card details and passwords. It also installs a **4"Trojan horse" program which could allow a hacker to take remote control of infected machines**. [...]

The Guardian - Friday, June 6, 2003

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Inverse Translation Text

La Plana Novella

La Plana Novella es una antigua heredad por el **1Indiano** Pere Domenech i Grau en encuentra en una pequeña planicie en el Parc Natural del Garraf y pertenece al adquirida 1885 que se centro del municipio de Olivella. La Finca fue declarada colonia agrícola 10 años más tarde por el **2gobierno alfonsino**, pero de aquella época perdura una leyenda de **3desenfreno y dilapidación** que hizo desaparecer la **1fortuna del americano**. El estilo arquitectónico del Palacete es ecléctico, es decir que mezcla diferentes estilos. **4La geografía comarcal de Cataluña** lo califica de "Castillo de Bambalinas" como si fuese un decorado de teatro. Sin ningún tipo de duda la construcción estilísticamente más original de Palau Novella es el lavadero gaudiniano, pero una de las piezas más características y llamativas del Palau es el **5común**, conocido como **5"la trona".**

http://www.laplananovella.

Appendix 2: Questionnaire on problems of translation

1. How difficult do you think this text is to translate?
On the scale between 'very easy' and' very difficult', put a cross on the line of squares below to show how difficult you think it would be to translate this text.

Translation of this   Translation of this text is

text is very easy   very difficult

☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐
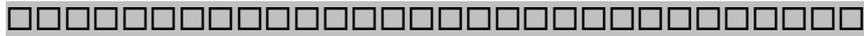
2. What are the general characteristics of the text that make you think so?

3. What were your priorities when translating the text?

4. What were the main problems you found when translating this text? Name 5 and answer the following questions about each.

Problem 1:	Why was it a problem?
....	What were your priorities when solving it?
	Explain as clearly as possible what you did to solve it
	Are you satisfied with the solution? ☐ Yes ☐ No Why?