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Introduction

Students that enter the world of academic specialized knowledge face the challenge of understanding the contents of the reading material in order to access disciplinary knowledge. Furthermore, as in English Language Teaching (ELT) programs students are faced with these academic texts written in a foreign language, this difficulty increases. One of the cases is the ELT Program at Pontificia Universidad Católica de Valparaíso (PUCV), in which 30 out of the 38 courses in the program are conducted completely in English; consequently, all the compulsory readings are written in English.

Textbook chapter (TBc) is undeniably one of the most relevant tools to access disciplinary knowledge when entering a specialized academic field; thus, at University understanding TBc plays a fundamental role in the optimal performance of students. According to Hyland (2001) TB is indispensable to academic life for both teachers and students, because they make available the main concepts of a discipline ordered coherently and provide an epistemological map of the disciplinary landscape; in addition, Bathia (2004) argues that textbook has similar trades in all disciplines since its communicative purpose is to make available disciplinary knowledge to large sections of the novice academic community, he highlights the relationship between an uninitiated reader and an expert. Moreover, Parodi (2010) asserts that large numbers of textbooks circulate in undergraduate university settings. In agreement with the previously mentioned authors, he adds that TB is specially used to construct specialized knowledge in various disciplines.

In a survey applied in 2014, students in the program at PUCV stated that linguistics courses are the most difficult to pass. They also maintain that TBc are fundamental in acquiring disciplinary knowledge in those courses; besides being the genre that students report more relevant in their initiation to specialized knowledge, textbook is the most frequent compulsory reading for linguistics courses. Additionally, students highlight the difficulty to understand those texts. In detail, 71% of students claim that, when reading TBc, the most important difficulty is to establish coherence relations between ideas. Sanders, Spooren and Noordman (1993) state that coherence is the mental representation of ideas in a text guided

by coherence relations, defined as a means of combining discourse segments present in the text.

Although Textbook is reported to be one of the most relevant academic genres to approach disciplinary knowledge, there are few studies that describe it in terms of coherence. Even less studies describe TB in ELT programs focusing on the main difficulty students must overcome in reading this genre; reportedly, the coherence relations between ideas. Thus, identifying and describing these structures in TB chapters may set a basis to a further understanding of the contents and ideas present in this genre, providing a means to develop strategies of reading comprehension.

Considering all aspects mentioned above, the objective of this study is to identify and describe coherence relations in TB chapters assigned in four linguistics courses at PUCV's ELT program. These courses have been chosen because they carry most of the theory needed to understand the following courses in the program. To do this, the following questions will be addressed: (1) Is there a predominant coherence relation in TB chapters? (2) Which is the most frequent order of segments and polarity? These questions will be addressed under the light of the four primitives proposed by Sanders, Spooren and Noordman (1993) and the Taxonomy of Coherence relations put forward by Ibáñez, Moncada and Santana (2012). The results of this study may be useful to (1) know what to expect from the genre, (2) identify relevant information more efficiently, and (3) design a way to help students understand the purpose and content of this genre.

Section I: Theoretical framework

1.1.1 Academic Discourse

Hyland (2001) states that Academic Discourse is the Language used by an academic community. Moreover, Bathia (2004) claims that Academic Discourse is fundamental to build and communicate disciplinary knowledge to the novice members of the academic community. The importance of academic discourse lies in the successful comprehension novice member of the academic community must achieve to approach disciplinary knowledge and become specialists in the discipline they are immersed. The successful comprehension of Academic texts will result not only in the appraisal of key contents of the discipline, but also in the means of communication that occurs in the academic community. There are several studies that describe differences in disciplinary communication (Parodi 2010; Bathia, 2004; Ibañez, 2008). This is defined as interdisciplinary generic variation, which means that disciplines builds and shares disciplinary knowledge in a different way. One of the academic genres that is widely used to disseminate disciplinary knowledge is the Textbook. This study is focused on the description of this academic genre.

1.1.2 Textbook

According to Bathia (2004), TB's communicative purpose is to disseminate discipline based knowledge; thus, TB displays an unequal reader-writer relationship, the writer being a specialist and the reader a non-initiated apprentice of the discipline. Hyland (2001) states that Textbooks represent disciplinary orthodoxy and allow writers to disseminate a vision of their discipline to members of the academic community, both novices and experts. He adds that this genre is a complex professional discourse that involves two dimensions; one that involves students or non-initiated members of the academic community as consumers, and other involving other experts as peer evaluators; in addition, the author defines Textbooks as repositories of codified knowledge that is made available to large audience through a variety of rhetorical devices. He states that, through textbooks, learners acquire an understanding of the field as a coherent canon, a uni-linear progression to current knowledge rather than a rational reconstruction of contested perspectives.

Parodi, Ibáñez and Venegas (2010) identify and describe 29 academic genres in a corpus of 491 academic texts in PUCV-2006 Academic and professional Corpus of Spanish. They describe academic genres relying on five criteria: (1) communicative macro-purposes, (2) discourse organization mode (3) relationship between participants, (4) context of circulation, and (5) modality. They conclude that the macro-purpose of this discourse genre is to instruct regarding concepts and/or procedures within a specialized subject matter, its context of circulation is the pedagogical field, and the relationship between participants is between an expert writer and a semi-lay or lay reader; in addition Textbook presents a descriptive discourse organization mode and multimodal resources are used.

As previously stated Textbook has been described from several perspectives. Hyland (2001) describes textbook in terms of functions of metadiscourse. The author identifies 10 categories, distinguishing between Textual Metadiscourse and Interpersonal metadiscourse. Hyland (2001) concludes that textbooks not only report the state of disciplinary knowledge, but also reflect the position of their authors explicitly about this knowledge. He also states that authors of these texts are concerned with guiding the readers, emphasizing the instructional goal of this genre

1.2.1. Coherence

According to Sanders, Spooren and Noordman (1993), coherence is the mental representation of a text, rather than a property of text itself. They understand coherence as the cognitive representation that results from linking ideas and building mental images of such ideas in a text. Spooren and Sanders (2008) state that coherence is a mental representation produced by a cognitive process, they claim that this process is signaled by linguistic indicators in the text. Ibañez, Moncada and Santana (2012) share the perspective that coherence is a cognitive activity that, on the basis of textual information, originates in and develops from the generation of meaning relations between cognitive events (E); thus becoming more complex as it links more events. In this study, coherence will be viewed as the mental representation of the events in a text.

1.2.2 Coherence relations

One of the main reasons that discourse is coherent is the presence of Coherence relations. Sanders et al. (1993) assert that a coherence relation is a means of combining elementary discourse segments. They explain that a coherence relation is an aspect of the meaning of two or more discourse segments which cannot be described in terms of the meaning of the segments in isolation. Ibañez et al. (2012) propose that the basic unit among which coherence relations are formed is a cognitive unit, an Event. Thus, a coherence relation is the mental representation that generates in discourse processing from the relation between two or more events. They distinguish 3 types of coherence; namely, referential, relational and additive, depending on how events relate to one another. This study will focus on relational coherence. Sanders et al. (1993) put forward four primitives to identify all coherence relations: (1) Basic Operation, (2) Source of coherence, (3) Polarity, and (4) Order of the segments.

Basic operation

This primitive distinguishes between Additive and Causal relations, the first of which is weakly connected and the second one is strongly connected. Similarly, Ibañez et al. (2012) distinguishes between additive and relational coherence; in the latter, the authors distinguish between adjacency and causality. Additive coherence establishes a link of complementarity between an event or its contituents; consequently, a distinction is made between relations in which an event complements another event, shown in example (1); relations in which an event complements a concept in another event, as in example (2); and relations in which one event complements an action in another event, as can be seen in (3). On the other hand, relational coherence distinguishes between the events that are contextually adjacent (adjacency), as shown in (4); with events that implicate another event (causality), as in (5):

- 1. Rosa forgot her things at home. She left her keys and her wallet.
- 2. Rosa forgot her wallet at home. It has blue and green leaves.
- 3. Rosa left her home. This was done carelessly.
- 4. María bought oranges and apples. Rosa bought peaches and pears.
- 5. María bought oranges and apples. She had a craving for fruit.

Source of Coherence

This primitive distinguishes between semantic and pragmatic relations (Sanders, Spooren & Noordman, 1993) or content, epistemic and speech act relations (Spooren & Sanders, 2008). Depending on this primitive, Sanders et al. (1993) poses that a relation is semantic if the segments relate because of their propositional content, and pragmatic if they relate because of the illocutionary meaning in one of the segments. Later, Spooren and Sanders (2008) establish that discourse segments can be related by content and distinguish between epistemic and speech act. In the same way, Ibañez et al. (2012) propose that events can be related by content: the link between discourse segments involves a real world connection, in example (6) (the relation involves the propositional or ideational content of the related segments); Spooren and Sanders (2008) and Ibañez et al. (2012) distinguish between epistemic and speech act relations. They state that the relation is Epistemic if an inference is implied in the events, as shown in (7); and Speech act if the nature of one of the events is illocutionary, as in example (8). This last distinction is the criterion that will be applied in this study.

- 6. Rosa slipped on wet floor. She fell down.
- 7. Cleo realized the sink was broken, so she called the plumber
- 8. The sink broke, I'm calling the plumber.

Regarding Content relations, Ibáñez et al. (2012) also distinguish between volitional and deontological. The criterion of volition differentiates volitional and non volitional links; in other words, the authors separate relations that are mediated by intentions from those that aren't. Example (7) shows an example of volitional relation, while example (6) shows a non volitional relation. In addition, they identify deontological relations, in which it is necessary to perform an action, as shown in example (9):

9. If a student is caught plagiarizing academic works, he or she must be expelled.

Polarity

According to Sanders et al. (1993) and Ibáñez et al. (2012), the polarity of a causal relation is positive when the effect is the logical conclusion of the cause, as in example (10); and a relation has a negative polarity when the effect is not the logical conclusion of the cause, as in example (11).

- 10. Rosa needed money. She got a job and a bank account
- 11. María slipped on wet floor, but she didn't fall.

Order of the segments

Sanders et al. (1993) and Ibañez et al. (2012) agree that this criterion refers to the position of the antecedent and the consequent. When E1 is the antecedent, then a Basic order relation holds, shown in example (12). On the contrary, if E1 is the consequent then a Non-basic order relation is established, in example (13).

- 12. Rosa was terribly hungry, so she ate a large pizza.
- 13. María fell down the stairs. Someone pushed her.

Considering the criteria mentioned above, Sanders et al. (1993) propose the following categorization

Basic Operation	Source of coherence	Order of the segments	Polarity	Class	Relation
Causal	Semantic	Basic	Positive	1a 1b	Cause -Consequence Condition- Consequence
Causal Causal	Semantic Semantic	Basic Non Basic	Negative Positive	2 3a 3b	Contrastive- Cause consequence Consequence -Cause Consequence -Condition
Causal Causal	Semantic Pragmatic	Non Basic Basic	Negative Positive	4 5a 5b	Contrastive- Consequence- Cause Argument -Claim Condition- Claim
Causal Causal	Pragmatic Pragmatic	Basic Non Basic	Negative Positive	6 7a 7b	Contrastive- Argument- Claim Claim -Argument Claim -Condition

Causal	Pragmatic	Non Basic	Negative	8	Contrastive- Claim -
Additive	Semantic		Positive	9	Argument
Additive	Semantic		Negative	10a	List
				10b	Opposition
					Exception
Additive	Pragmatic		Positive	11	Enumeration
Additive	Pragmatic		Negative	12	Concession

Figure 1. Coherence relations (Sanders, Spooren & Noordman. 1993)

Additionally, Ibáñez et al. (2012) describe another type of coherence: additivity. They propose the following criteria:

Information Focus

This criterion refers to the element complemented by new information. The authors propose three elements to which another event can add information. The first element is a whole event (E). The second one is a concept (C) constituting another event. Finally, an action (A) constituting one event can be modified by another event.

Type of Information

This criterion refer to the nature of the added information and is closely related to the criteria described above. The information can be of three types: adjectival when the event corresponds to the characteristics of another event (E) or concept (C), constituent of another event; adverbial when the event corresponds to antecedents regarding how, when and where the action (A) of another event occurs; finally, the information can be meta-discursive, when E2 refers to the structure of the text or its content to complement E1.

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Ibáñez et al. (2012) propose a similar categorization. They differentiate between additivity, and relational coherence: adjacency and causality. This study will consider this categorization to analyze the material:

		Orden of Events	Polarity	٥	Source			
					Content	Speech Act	Epistemic	
				Neutral	Volitional	Deontic		
	400	N/A	POSITIVE	Conjunction		4		
	163	N/A	NEGATIVE	Opposition		3		8
	Adjacency	N/A	POSITIVE	Substitution				
=	=	N/A	POSITIVE	Disjunction		50 50		S
tio.	γV	N/A	POSITIVE	Sequence				
Basic Operation	Causal	BASIC	POSITIVE	Cause-Effect	Reason- Action	Condition- Obligation	Argument- Claim	Evidence- Deduction
		NON BASIC	POSITIVE	Effect-Cause	Action-Reason	Obligation -Condition	Claim- Argument	
Ba		BASIC	NEGATIVE	Basic Contrast			covilla secono.	
		NON BASIC	NEGATIVE	Non Basic Contrast		8 :		
		BASIC	POSITIVE	Condition-Event	Condition- Action			
		NON BASIC	POSITIVE	Event-Condition				8
		BASIC	POSITIVE		Purpose-Act			
		NON BASIC	POSITIVE		Act-Purpose			(C) (S)

Figure 2. Relational Coherence (Ibañez, Moncada & Santana. 2012)

Elaboration	Extensive	Circumstantial	Metadiscursive
Concept-Definition	Example	Temporal	Deictic
Concept-Example	Reformulation	Simultaneity	Evaluative
Concept-Specification	Specification	Spacial	
Concept- Reformulation	Comparison	Mode	

Concept-Comparison	Description	
Concept- Description		

Figure 3. Additive coherence (Ibañez, Moncada & Santana. 2012)

In this study, the taxonomy proposed by Ibañez et al. (2012) is used.

Taboada and Habel (2013) describe coherence in multimodal texts. They find that relations between figures and text may be a small set from a larger set of possible rhetorical relations; furthermore, the authors claim that figures and illustrations relate to text by more than one relation which can be established by the reader with or without looking at the picture for a second time. They conclude that there is a necessity to further identify and describe coherence relations between text and illustrations in multimodal texts.

Desiderato and Rahmen (2012) use the Rhetorical structure theory (RST) to describe academic spoken discourse. RST states that implicit propositions emerge from the combination of pieces of text which hang together. Implicit propositions have been labelled in several ways: coherence relations, discourse relations, rhetorical relations or relational propositions. These relations occur when a reader recognizes a connection between two portions of a text, even without the presence of connectives or explicit discourse markers. The authors analyze a corpus consisting of five lectures in Brazilian Portuguese and conclude that repetition, paraphrasing, correction and parenthetical insertion hold coherence relations between two portions of spoken text, thus contributing to the construction of coherence. They state that correction and paraphrasing are reformulation strategies that allow speakers to correct possible mistakes which are not editable in spoken discourse; in addition they found that repetition is fundamental for topic continuity because it may be useful to compare events, or to reiterate state of affairs. Finally, they claim that parenthetical relations are useful to add information that may be left out because of the non -editable nature of spoken discourse.

Section II: Methods

2.1 Objective

The objective of this study is to describe coherence relations in Textbook chapters used in the ELT program at PUCV.

2.2 Materials

2.2.1. Needs Analysis

An online survey was conducted to assert the difficulties in academic reading (Appendix 1). The questions were directed to first and second year students and were aimed at uncovering which subjects and compulsory readings presented the most challenges for students that are in an early stage in approaching disciplinary knowledge.

To do so, five multiple choice questions, two open ended questions and one question with checkboxes were asked. The first were directed to determine what academic genre is most difficult to comprehend for students that have recently entered the ELT program at PUCV, and to determine the relevance of these genres in appraising new contents of disciplinary knowledge; the second were aimed at uncovering the reasons behind the challenge and the relevance of this challenge; Finally, the checkbox question was aimed at determining what was the main challenge in reading academic genres.

Students sustained that linguistic courses in the ELT program at PUCV are the most difficult to pass; In addition, they stated that TBc were the most relevant compulsory reading in the appraisal of new contents. They claimed that these TBc were also the most difficult to understand, being the coherence relations the most difficult aspect in the comprehension of new disciplinary knowledge.

2.2.2. Corpus

The academic curriculum of the ELT program has 39 courses, of which 26 are dictated in English; from those, 9 are linguistics courses. Four of them comprise the theory necessary to move forward into the following subjects. The corpus is constituted by 4 textbook

chapters taken from compulsory readings assigned in those four linguistics lessons in the ELT program at PUCV.

Text	Number of pages	Number of words
T1	18	8813
T2	14	6883
T3	19	7614
T4	5	2451
Total	56	25761

Figure 4. Corpus description

2.3. Analisys

2.3.1. Procedure

The corpus was analyzed manually with a top down approach based on Ibañez, Moncada and Santana (2012), as previously described. The focus is on the relations between consecutive events that exist in the same paragraph without considering multimodal elements of the text such as images or exercises.

2.3.2 Triangulation

To validate the analysis, the data obtained from it was discussed and triangulated with two specialists.

Section III: Results

3. 1 The most frequent type of Coherence

The analysis shows a total of 1196 coherence relations from which the most frequent type is Causality (512). Additive relations add up to a total of 351, and adjacency relations a total of 333. As shown in figure 5.

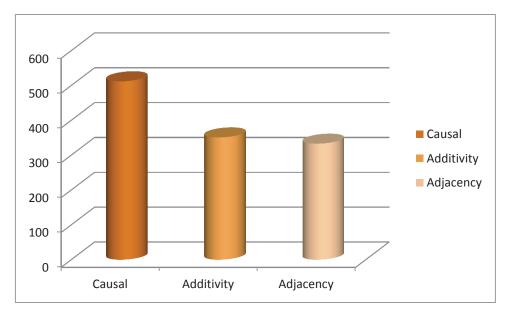


Figure 5. Frequency of Type of Coherence

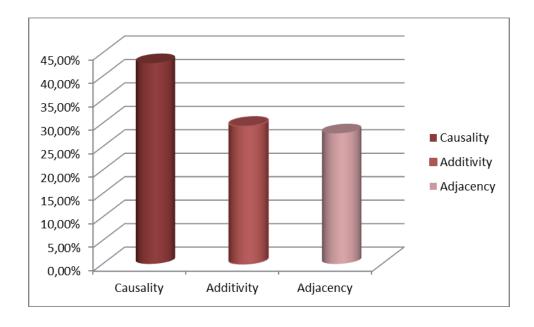


Figure 6. Frequency of type of Coherence percentage.

As shown in figure 6, out of 1196 coherence relations, 512 relations are causal, and correspond to the 42,81 % of the total found in the corpus. 351 additive relations correspond to the 29,35% of the relations found in the corpus. Finally, 333 are adjacency relations corresponding to a 27,84 % of the total

3.2 Frequency of Relations per type of Coherence Adjacency

Adjacency relations compose a 27,84 % (333) of the total amount of relations found in the corpus. From them, only 15,6% was of negative polarity.

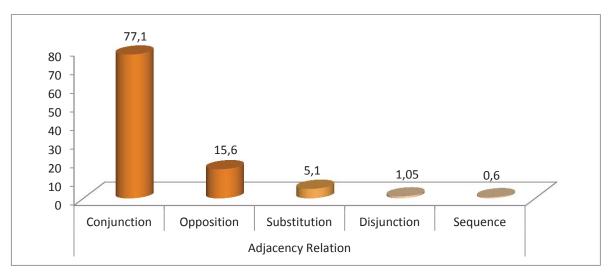


Figure 7. Frequency of adjacency relations

Additivity

Additive relations represent a 29, 35 % (351) of coherence relations found in the corpus. Among them, 53,84 % (189) were extension relations, from which a 21, 9% (77) correspond to Exemplification and 20, 22% (71) to Specification. As shown by figures 8 and 9.

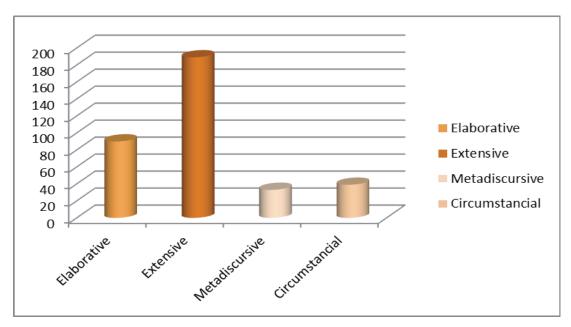


Figure 8. Frequency of sub types of additive Coherence

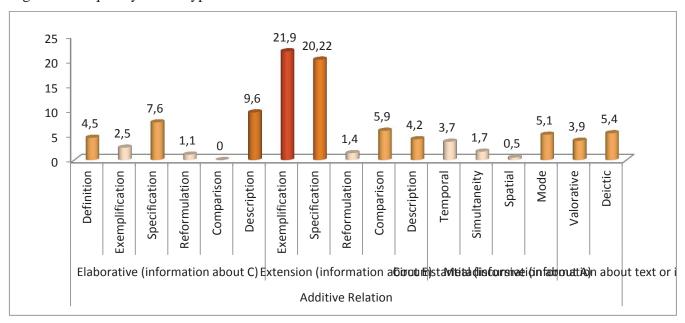


Figure 9. Frequency of Additive relations

Causality

Causal relations represent a 42,81 % (512) of the relations in the corpus. Among them, Basic contrast was the most frequent relation (30,1%).

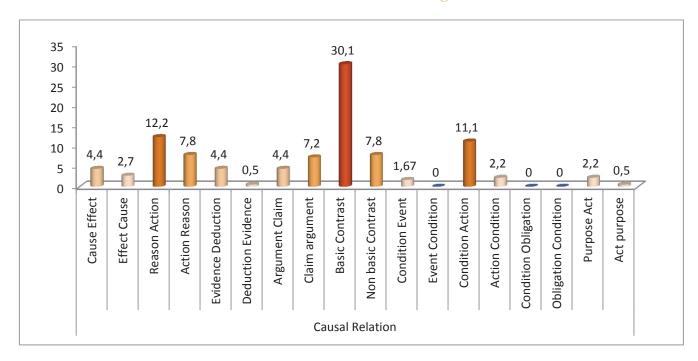


Figure 10. Frequency of Causal relations

Considering the data above, the prevalent polarity is positive and the predominant order of the segments is basic order. In appendix 2, charts showing the frequency of type of coherence in each text can be found.

Section IV: Discussion

As previously mentioned, the analysis was carried out by taking into account only consecutive events. This limited the amount and type of coherence relations found in the texts. As Taboada and Habel (2013) state, there is still much to say about coherence relations in multimodal texts and how illustrations and imagery relate to text and the coherence relations that account for it.

Hyland (2001) assert that Textbooks are repositories of orthodox academic knowledge, this may account for the high amount of conjunction relations found in the texts. In addition, he claims that textbook's authors not only deliver disciplinary knowledge traditionally accepted by the academic community, but also state their position on the topic. This may account for the high number of certain type of relation: opposition, basic contrast, claim argument, and valorative relations found in the texts.

As opposed to spoken academic discourse described by Desiderato and Rahmen (2012), TBc showed a low frequency of reformulation. Because of the nature of written discourse, reformulation is not a fundamental device to convey meaning. However, additive coherence was found to be predominant in spoken discourse (parenthetical insertions) and in this study in TBc.

Finally, Degand and Sanders (2002) stress the importance of causal markers in reading comprehension for L1 and L2 readers. The amount of Causal relations found in the TBcs in the corpus may helpful to design materials to help students identify the most relevant information in the text.

6. Conclusions

This study was motivated by the fact that in PUCV's ELT programs present a challenging scene for students who approach disciplinary texts for the first time, because students must not only read academic texts for the first time—As in every University program—, but also understand academic texts in a second language. Since Textbook is reported to be the most relevant and frequent academic text in PUCV's ELT program and Coherence relations in them are declared to be the most difficult aspect in reading comprehension of this academic genre, and account of coherence relations in Textbook chapter used in PUCV's ELT program contributes to the design of tools for reading comprehension in academic settings.

According to our results, causal relations are the most frequent in TBc; within them, Basic contrast relations are predominant. In addition, two other causal relations are predominant: reason action and Action condition. Also, it is important to highlight the high frequency of Conjunctions within adjacent coherence and the predominance of Extensive relations within additive coherence. Within this sub type of coherence, the most frequent relations are Specification and Exemplification. The results of this study confirm the frequency of causal relations in academic writing and add a new interesting finding about the frequency of extensive relations. Finally, another interesting result of this work was the analysis and identification of coherence relations found in the corpus that consist of an example and its posterior deconstruction and explanation. Although here they were marked as specification of an Event, a future challenge remains in a further account of these relations.

Despite the very interesting patterns found in this study, we believe this work presents some limitations. The first one is the size of the corpus, because a bigger one would allow a generalization of the results of this work. The second limitation refers to the account of deictic relations. This relation was difficult to identify, the reason for this is that the taxonomy used for this work is very specific about coherence relations between events; while the relations accounted for in this work were identified under the criteria proposed by Ibañez et al. (2012), it is important to highlight the need to explore this type of relation in future work.

In spite of the limitations to this study, it contributes to other descriptive studies of academic text. In addition, students in the ELT program at PUCV need to understand TBc in order to successfully become members of the academic community, as previously stated in this study; consequently, the frequency of coherence relations may be an important tool to achieve reading comprehension of academic texts. A workshop that examines and helps students to comprehend TBc more effectively should consider these relations as tools for reading comprehension.

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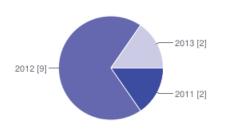
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Appendix 1

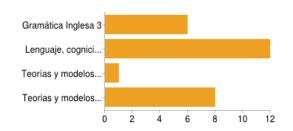
Academic Reading Survey

1. What year did you enroll at the program?



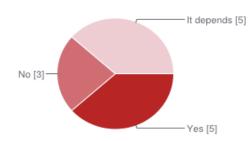
2011 **2** 14% 2012 **9** 64% 2013 **2** 14%

2. Check the courses you have passed



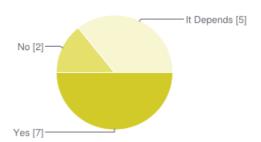
Gramática Inglesa 3 6 43%
Lenguaje, cognición y sociedad 12 86%
Teorías y modelos de producción 1 7%
Teorias y modelos para la comprensión 8 57%

3. Has it been difficult for you to comprehend book chapters assigned in these courses?



Yes 5 36% No 3 21% It depends 5 36%

4. Has it been difficult for you to comprehend Research articles assigned in any of those courses?



Yes 7 50% No 2 14% It Depends 5 36% 5. In your opinion, which of the following has been more important to understand the contents and to pass the course?

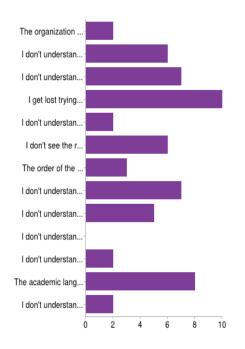


 Research Articles
 1
 7%

 Book Chapters
 9
 64%

 Neither
 3
 21%

6. What do you find more challenging about reading research articles?

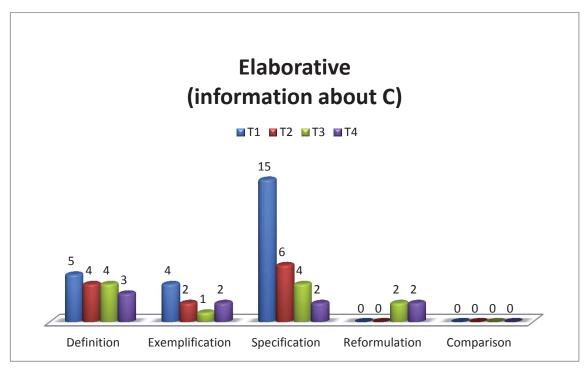


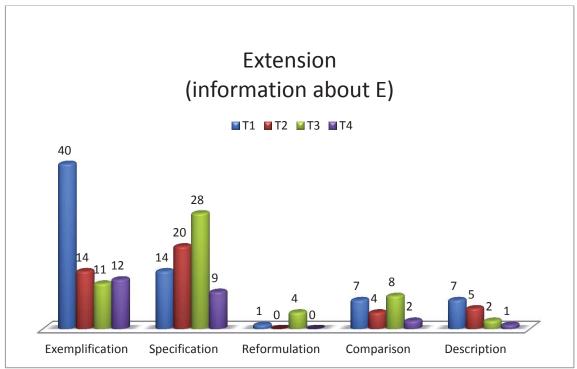
The organization (titles, subtitles) is confusing	2	14%
I don't understand the results	6	43%
I don't understand the concepts	7	50%
I get lost trying to follow the ideas in the text	10	71%
I don't understand the importance of the Discussion	2	14%
I don't see the relevance of the Results	6	43%
The order of the ideas is confusing	3	21%
I don't understand the relation between the ideas in the theoretical framework	7	50%
I don't understand the relevance of the methodology	5	36%
I don't understand the Discussion	0	0%
I don't understand the relation between the parts of the article	2	14%
The academic language present in the texts is too difficult	8	57%
I don't understand the comparison and contrast of ideas in the text	2	14%

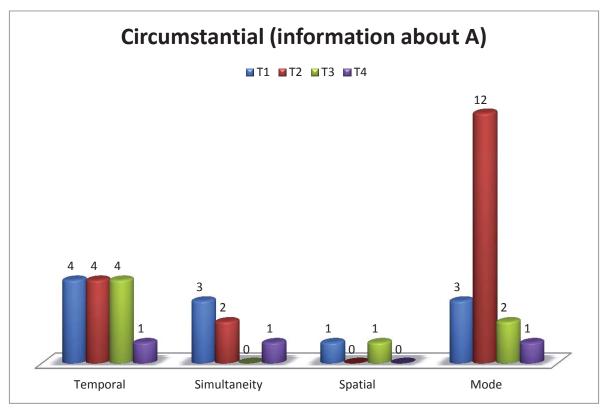
Appendix 2

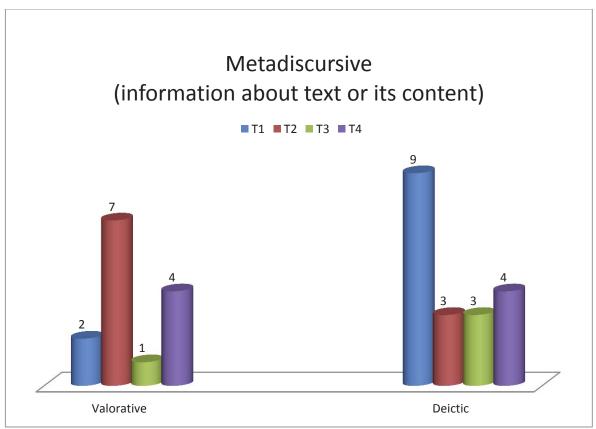
Charts per type of coherence

1. Additive Relations

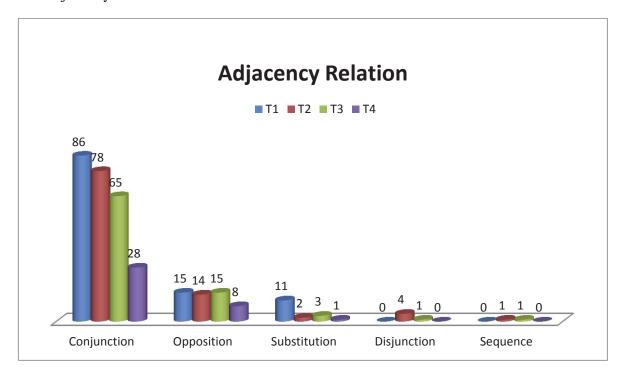








2. Adjacency Relations



3. Causal relations

