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A corpus based analysis on causal relations in European Portuguese

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Abstract

Although causal relations and their syntactic configurations are well described for Portuguese (Paiva, 1998; Lobo, 2003, 2013; Lopes, 2004; Peres and Mascarenhas, 2008; Mendes, 2013), there is overall a lack of corpus-based studies on the frequency of occurrence of syntactic structures in written or in oral texts, and on the influence of social variables, such as education level or gender.

Considering that causal relations can be conveyed by different syntactic structures, I propose an analysis of causal relations as a variable phenomenon (Weinreich, Labov, and Herzog, 1968) which occurrence is constrained by social factors. To verify if and how social factors influence the occurrence of causal relations and their syntactic expressions, two corpora of argumentative texts were gathered and analysed. Each token is encoded according to: type of causal relation (Sweetser, 1990), syntactic structure, connector used to establish the causal relation, and position of the causal clause (for adverbial clauses only). The social variables considered are: level of education, gender and age.

The results of the analysis indicate that the level of education influence the type of causal relations established and the syntactic mechanism used. For example, juxtaposition is more frequent in texts written by informants with more years of formal education. This seems to indicate that the acquisition (and production) of complex structures is also dependent, among other factors (Diessel, 2004), on the semantic nexus conveyed.

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1. Introduction

The objective of this article is to contribute to the study of causal relations in European Portuguese. Although causal relations have been explored in the literature in the past decades, there is still a lack of frequency studies based on a stratified corpus. In this paper, I adopted a sociolinguistic variationist approach to collect and analyse the data. Consequently, the notion of causality is taken as the abstract representation and the syntactic structures that convey it are the variants.

The paper is organized as it follows: the theoretical framework to encode causal relations is explained in section 2; in section 3 the methodology of analysis is presented (including the corpus of analysis, the variables considered and the statistic tests used); sections 4 and 5 present the results and the discussion of the results. The conclusions are exposed in section 6.

2. Causal Relations

The establishment of causal relations is central to human cognition (Noordman and Blijzer, 2000; Meyer, 2000; Sanders and Spooren, 2009). Thus, the notion of causality is always present, whether implicitly or explicitly, in the human communication (Paiva, 1996; Sanders and Stukker, 2012). From the linguistic point of view, causal relations have been studied by several theoretical approaches: some more focused on the cognitive aspects of causal relations and their role in the construction of textual coherence (Mann and Thompson, 1986, among others; Sanders, Spooren, and Noordman, 1992, among others); and others more focused of the semantic and pragmatic aspects of the relation between two propositions or units of information (Santos R  o, 1981, among others; Asher and Lascarides, 2003; Lopes, 2004).

In this paper, we will use the tripartite division proposed by Sweetser (1990), according to whom causal relations can be divided into: real cause, epistemic cause, and speech act modifier cause.

Consider the following examples:

(27) _AO Jo  o partiu a perna _Bporque caiu das escadas.
'John broke his leg because he fell from the stairs'

(28) _AO Jo  o n  o almo  ou, _Bpois a cozinha est   limpa.
'John didn't have lunch, for the kitchen is clean'

(29) _AVai almo  ar, _Bque retomamos os trabalhos   s 13h.
'Go lunch, as we start working at 1p.m.'

In example (27), the fact that John fell from the stairs is presented as the (real) cause for the fact that he broke his leg. In other words, it was because he fell from the stairs that he broke his leg (and not for any other reason). The causal relation between the information conveyed in A and the information conveyed in B is asserted, and there is no hidden presupposition between A and B.

On the other hand, in the example (28) the causal relation between the information in A (John didn't have lunch) and the information in B (the kitchen is clean) is presupposed (Lopes, 2004). In this case, the reader/hearer infers from B that A happened. The establishment of a (explicative) cause is only possible because there is a hidden premise (Lopes, 2009) that the hearer/reader activates in order to establish the causal relation: according to the knowledge that the person has of the world, normally when John has lunch, he leaves the kitchen dirty. Therefore, if the kitchen is clean, I deduce that probably John didn't have lunch.

In order to balance the sample of texts under analysis, each informant wrote two texts. Also, the themes and the number of words per texts were controlled. At this respect, some studies (Tannen, 1990; Herring and Paolillo, 2006; among many others) indicate that texts written by women tend to be mainly about relations and feelings whereas texts written by men are mainly about objects, politics or technology. To overcome this possible bias, it was necessary to restrict the themes informants wrote about. In the case of the argumentative texts written upon request, informants had to selected two topics to develop from the following themes: school regulations, government decisions, justice and laws, education and health. Each theme was introduced with a news extract. In the case of the blog entries, the selection of texts was based on the themes already defined.

3.2. *The social variables*

The social variables considered for analysis are: gender, age, and level of education.

Gender has been always considered an important variable (Eckert, 1989; Labov, 2001; Coates, 2004; Cheshire, 2005; among many others) and many studies reveal that men and women do not express themselves in the same way. Besides the distinct lexical choices - for example, the range of lexical items to distinguish colours is broader in women's discourse, as well as the use of empty adjectives (Lakoff, 1975), - there seem to be many linguistic strategies used differently by men and women: women tend to integrate more apologies, and empathy expressions, such as you know or sort of (Holmes, 1995); and girls are likely to integrate more personal and affective information in the discourse, whereas boys tend to interpret the questions literally, giving factual answers (Cheshire, 2005). Also Mulac (1998) refers that men use more references to quality, as well as judgmental adjectives and elliptical sentences when describing a picture, whereas women use more intensive adverbs, references to emotions, uncertainty verbs, such as see and sentence initial adverbs.

Moreover, there is also evidence from syntax. In the specific case of adverbial clauses, the work by Mondorf (2004) on oral samples collected from the London-Lund Corpus shows that, when establishing causal relations, women tend to place adverbial clauses at the end of the sentence. Men, on the other hand, place them at the beginning more often. According to Mondorf (2004), the initial position of the adverbials signals more commitment to the truth of what is being said. Also, placing adverbial clauses in the initial position require more planning and a higher cognitive effort and often work as guides and shifters of the discourse (Ford, 1993). For these reasons, the preposition of adverbial clauses is associated both with a higher commitment and a higher control of the discourse.

The other two social variables considered for analysis, age and the level of education, are sometimes analysed as cohorts, mainly in younger groups of informants. In this paper, we consider six age intervals: [<10], [10-12], [13-15], [16-19], [20-45], [> 45], and five levels of education, divided according to the Portuguese education system: 4th grade, 6th grade, 9th grade, 12th grade, and Bachelor/Master. As illustrated in Table 1, some age intervals coincide with some levels of education.

The relevance of the variables age and level of education in the analysis of syntactic structures is unquestionable. It is known that syntactic structures are not acquired (and mastered) at the same time (Diessel, 2004; Costa, 2010). Also, formal education tends to 'correct' syntactic structures that are more stigmatized (Mollica, 2003). Studies on oral samples in English (Macaulay, 2005) reveal gender and age differences in the distribution of coordination: the percentage of occurrence of these constructions is higher in adult women and middle-class boys. Also, the percentage of occurrence of coordinate structures is different in adolescent/adult and men/women speech: adults use more *but*, and the values for *and* and *so* are higher in men when compared to women's. Bearing in mind that Macaulay's study was carried out on oral data and considering that written and oral registers may have distinct functional and linguistic features, an analysis of written texts may reveal a different organization of ideas with more recurrence of complex clauses and probably a different distribution of coordinate structures.

In the specific case of the causal relations, the observation of the variable level of education will permit to verify how formal education influences the use of connectors and syntactic structures. At this respect, it is expected to have

a higher percentage of *porque* ‘because’ clauses in the texts written by younger informants and informants with less years of schooling. On one hand, *porque* is a high-frequency word (Paiva, 1998). On the other hand, clauses introduced by *porque* are common in child speech and in school context (Diessel, 2004; Lopes, 2004). Whereas the literacy and linguistic competences are still under development in the early stages of formal education, older informants and informants with a higher level of education may have access to other elements of connection and may know how to use them in order to avoid repetition.

Finally, the type of causal relation established may be related to the level of education and age of the informant. We foresee that younger informants establish real cause relations more often, as this type of causality is easier to process (Noordman and Blijzer, 2000).

3.3. Methodology of analysis

Each causal relation is encoded according to: type of causal relation (real world causality and explicative causality), type of syntactic structure, item of connection, and position (for adverbial clauses only). The social variables (level of education, age, and gender) are also encoded. The tokens were run in the SPSS programme using the Qui-square test.

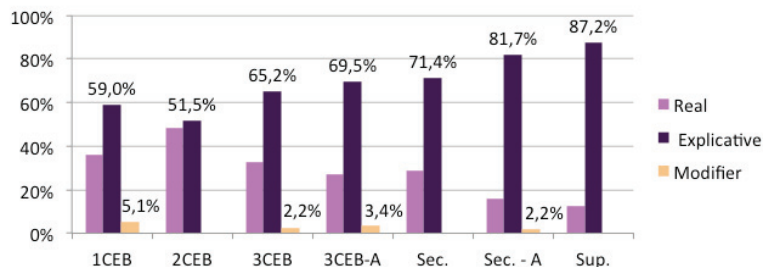
4. Results

In total, 554 tokens of causal relations were extracted from the corpus under analysis. From these, 28,2% were real cause relations, 67,1% from explicative cause, and only 4,7% from speech modifier cause. At this respect, it is important to mention that the percentage of occurrence of speech act modifiers is higher in the texts collected from blogs, which clearly shows that blogs are more dialogic than texts written upon request.

In relation to the syntactic structure that conveys causality, the majority of causal relations found in the corpus are established through subordination (34,5%) and supplementation (36,1%). A significant percentage of causal relations are established through juxtaposition (25,3%) and only 4,1% of the causal relations are conveyed through coordination.

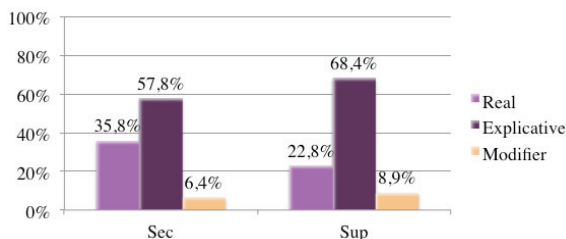
The overall frequencies according to the social variables show an even distribution according to gender: 49% of the examples were found in texts written by male informants and 51% in texts written by female informants. The distribution according to level of education and age shows a concentration of causal relations (more than 40%) in the texts written by older informants and by informants with a higher level of education.

Regarding the influence of the social variables on the frequency of occurrence of coordinate and subordinate structures, our study shows that explicative causality is more frequent in texts written by informants with more years of schooling (Graph 1).



Graph 1. Argumentative sub-corpus - Crosstab causal relation * level of education ($\chi^2(12)=26.550$, $p= .009$)

The same tendency is observed in the sub-corpus of blog entries (Graph 2).



Graph 2. Blog subcorpus - Crosstab causal relation * level of education. ($\chi^2(3)=11.869$, $p=.008$)

The level of education is also important to explain the distribution of the syntactic structures. The percentage of occurrence of juxtaposition increases with the level of education, whereas the percentage of occurrence of subordination and coordination is lower in texts written by informants with more years of formal education ($\chi^2(3)=27.532$, $p=.070$). The same tendency is observed in the texts collected from blogs ($\chi^2(3)=11.869$, $p=.008$).

In relation to the connector used to establish the connection, children and younger informants use more adverbial clauses introduced by *porque* 'because'. On the other hand, other connectors, such as *pelo que* 'therefore', *logo* 'thus', *uma vez que* 'once', and *já que* 'since' only occur in the texts written by informants older than sixteen. Similar results were found by Lopes (2004) in a corpus of narrative texts.

Finally, the analysis of the position of adverbial clauses (Table 3) shows that final position is the default position in European Portuguese, corroborating previous studies (Paiva, 1998, among others).

Table 3. Position of adverbial clauses according to the sub-corpus

	Corpus				
	Argumentative		Blogs		Total
Initial	21	16,7%	8	12,3%	29 (15,2%)
Final	105	83,3%	57	87,7%	162 (84,8%)
Total	126		65		191

The correlation between the position of the adverbial clause and the social variables shows that the percentage of occurrence of initial position is higher in the texts written by informants with more years of schooling. Differences were also found in the distribution according to gender: initial position is higher in argumentative texts written by female informants, between 20–40 years old, and with 12 years of schooling, unlike predictions (Mondorf, 2004).

5. Discussion

The results indicate a clear influence of the level of education on the frequency of occurrence of causal relations. More specifically, explicative cause relations are more common in texts written by informants with more years of formal education. In fact, there is a growing trend in the percentage of occurrence of this type of causal relation: in the informants who are in the elementary school, the percentage of occurrence of explicative cause is only 59%, whereas in the graduate informants the percentage of occurrence is 87%. These results reflect the fact that real cause relations are easier to process (and to establish), as Noordman & Blijzer (2000) indicate. On the other hand, explicative cause relations require a bigger cognitive effort, as they necessarily demand the activation of an implicit proposition that is not expressed in the text (Lopes, 2009).

There is also variation in the percentage of occurrence of the syntactic structure used to convey causal relations. Both in the texts written upon request and in the blog entries, there is a gradient pattern in the percentage of occurrence of some syntactic structures. Thus, the percentage of occurrence of subordination and supplementation is higher in informants with less years of schooling. Informants with more years of formal education tend to establish causal relations through juxtaposition more often. At this respect, it is known that the syntactic strategies to express causal relations are under development until the 9th grade (Lopes, 2004). Informants at this level of education are still experimenting the use of connectors to avoid repetition, and seem to rely more on the use of connectors to establish a causal relation than on the use of juxtaposed sentences. In fact, another aspect that should be explored is the frequency of occurrence of the connectors. It was found that *porque* (because) is more frequent in informants with less years of schooling (whether in subordination structures or in supplements). These results may be due to the fact that *porque* is presented as the prototypical conjunction to establish causality (Lopes, 2004) in school contexts, and it is also acquired first than other causal /explicative connectors (Costa, 2010). Furthermore, it is common in school communication contexts (Diessel, 2004; Diessel and Hetterle, 2011), and in question-answer pairs (Diessel, 2004), structure very frequent in dialogues with children.

Considering these results, we should question the pattern of acquisition and production of complex structures. It is known that paratactic structures are acquired first (Mithun, 1988; Hopper and Traugott 2003; Lust, Foley, and Dye, 2009). Nonetheless, when used to establish causal relations, and-clauses are more frequent in the texts written by educated adults. This seems to indicate that the production (and probably the acquisition) of complex structures depends, among other factors (Diessel, 2004), on the semantic nexus conveyed.

The distribution of juxtaposed structures according to the age interval supports this affirmation. Juxtaposition is used to establish causal relations only in 7,7% of the cases in the texts written by informants in elementary school. Adult informants with a degree use juxtaposition to convey causal relations in 42,6% of the cases. These results show that, when conveying semantic nexus, juxtaposition should not be seen as the most basic syntactic structure. In fact, when the causality is conveyed by juxtaposition, the relation needs to be inferred. On the other hand, structures that are introduced by a connector guide the reader in the interpretation of the relation established. For that reason, syntactic structures that unequivocally indicate the type of relation established are easier to process (Noordman and Blijzer, 2000), as opposed to syntactic connections whose semantic relation established is inferred. The notion that “syntactically complex authors (...) use longer sentences and more subordinate clauses that reveal more complex structural relationships ” (Beaman, 1984: 45) does not take into consideration the fact that subordinated clauses are in fact easier to process than juxtaposed sentences when conveying a semantic nexus.

Another relevant aspect of the distribution of the connector is the occurrence of locutions considered to be non-standard (Lopes, 2004), such as *por causa que* ‘because that’ and *devido que* ‘due that’. Both items occur in texts written by 12 year-old students. The non-occurrence of these items in texts written by older informants may be explained by the fact that formal education tends to ‘correct’ syntactic structures that are more stigmatized (Mollica, 2003).

Finally, the analysis of the position of adverbial clauses corroborates the results stated in previous works (Paiva, 1998). There is an overall tendency for the final position, which reflects the iconic order consequence-cause/affirmation-explanation.

In the corpus under analysis, adverbial clauses in initial position are normally introduced by *porque* ‘because’ and *por* ‘for’. In addition to these elements, *como* ‘as’ forces the initial position (31) and thus it never occurs in final position:

- (31) a Como não te vi, fui-me embora
 ‘As I didn’t see you, I left ’

b *fui-me embora, como não te vi.
 ‘I left, as I didn’t see you’

Considering that adverbial causal clauses in initial position require more planning and a higher cognitive effort (Ford, 1993), it was expected that they occurred more often in texts written by adults with more years of formal education.

Mondorf (2004) explores the distribution of adverbial clauses in initial position according to the gender of the informant and concludes that men tend to use adverbial clauses in initial position in order to emphasize their “commitment toward the truth of the proposition expressed” (Mondorf 2004: 186). On the other hand, adverbial clauses in final position, preponderant in the oral samples of female informants, are interpreted as downtoners or mitigators of what was previously mentioned.

The results of our analysis also show significant differences in the distribution of adverbial clauses in initial position according to gender. Nonetheless, these differences are circumscribed to a very specific type of informants. Initial position is higher in argumentative texts written by female informants, between 20-40 years old, and with 12 years of schooling, unlike predictions (Mondorf, 2004). These results indicate that adult female informants with no university degree tend to commit more towards what is being expressed than male informants from the same age group and education level.

6. Conclusions

This work shows that social variables (age, level of education, and, to a less extent, gender) influence the frequency of occurrence of the syntactic structures. More specifically, the level of education influences the type of causal relation established and the type of syntactic structure used to convey it. Informants with more years of formal education tend to establish explicative cause relations more often than informants with less years of schooling. Also, these informants use juxtaposition more often. The fact that the tendencies observed in the texts written upon request are replicated in the texts collected from blogs is revealing of the influence of the level of education (over age, at least in adult informants). Finally, in Portuguese the majority of the adverbial clauses that convey causality are postposed. The default position is more frequent in younger informants (also with less years of formal education).

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