

Some considerations on the use of main verbs to express rhetorical relations

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Rhetorical relations are typically expressed by discourse structuring devices that ensure textual cohesion and coherence¹. Resources such as the PDTB² target specifically the annotation of these devices, while describing alternative lexicalizations of such relations (AltLex).

Our preparatory work to develop a discourse treebank for Portuguese in the PDTB framework has provided ground for some considerations regarding the status, in intra-sentential coherence, of main verbs that internally carry a causative meaning. We have first focused on the annotation of the rhetorical senses Reason, Result, Pragmatic_justification as expressed explicitly by discourse structuring devices (conjunctions, adverbs, phrases and prepositions), taken as elements that express a two-place semantic relation filled by propositional arguments. However, these relations are also frequently marked by other devices (AltLex).

The introduction of the annotation manual mentions that the PDTB “has annotated the argument structure, senses and attribution of discourse connectives” which “are treated as discourse-level predicates that take two abstract objects such as events, states, and propositions”³. Recently, PDTB’s authors have come to the conclusion that “DRMs [Discourse Relational Markers] are a lexically open-ended class of elements which may or may not belong to well-defined syntactic classes”⁴. They specify that one condition for instances of AltLex to be annotated is that “A discourse relation can be inferred between adjacent sentences”, which means that a condition – being inter-sentential - is imposed on AltLex that is not imposed generally on connectives (which include subordinating and coordinating conjunctions with Arg1 and Arg2 in the same sentence). Under a “related work” heading, the authors mention a few articles⁵ that analyze the verbalization of discourse relations at the intra-clausal level, but it is not clear whether they envisage at all the possibility of annotating instances of the verbs involved as AltLex. One could argue that verbs that

¹ M.A.K Halliday – Ruqaiya Hasan, *Cohesion in English*. London, Longman, 1976.

² Rashmi Prasad *et al.*, *The Penn Discourse Treebank 2.0 Annotation Manual*, The PDTB Research Group, 2007; Rashmi Prasad *et al.*, *The Penn Discourse Treebank 2.0.*, in *Proceedings of the 6th International Conference on Language Resources and Evaluation*, Marrakech, 2008, 2961-2968; Rashmi, Prasad *et al.*, Reflections on the Penn Discourse TreeBank, Comparable Corpora and Complementary Annotation, *Computational Linguistics*, 40-4 (2014), 921-950.

³ Prasad *et al.*, *PDTB Annotation Manual*, 6.

⁴ Rashmi Prasad *et al.*, Realization of Discourse Relations by Other Means: Alternative Lexicalizations, in *Proceedings of the 23rd International Conference on Computational Linguistics: Posters*, Beijing, 2010, 1024.

⁵ Laurence Danlos, “Discourse Verbs” and Discourse Periphrastic Links, in C. Sidner – J. Harpur – A. Benz – P. Kühnlein (eds), *Proceedings of the Second Workshop on Constraints in Discourse*, Maynooth, Ireland, 2006., 59–65; Rodger Kibble, Nominalisation and rhetorical structure, in G-J. M. Kruijff – R. T. Oehrle (ed.), *Proceedings of ESSLLI Formal Grammar conference*, Utrecht, 1999, 49-60; Richard Power, Abstract verbs, in *ENLG '07: Proceedings of the Eleventh European Workshop on Natural Language Generation*, Morristown, USA, Association for Computational Linguistics, 2007, 93-96.

mark discourse relations (discourse verbs⁶) should be included, provided they link “events, states and propositions”, whatever the grammatical realization of the arguments (nominalization, non-finite clause, etc.) is.

We will focus on causal discourse verbs such as *provocar* ‘to cause’, *obrigar* ‘to force’ and *reduzir* ‘to reduce’. We will discuss to what extent these verbs have a cohesive function in texts, taking into account their semantic content and the nature of their arguments, based on contexts extracted from the corpus CINTIL⁷, a 1M word corpus annotated for part-of-speech and manually revised.

We illustrate the question at hand with examples of the verbs *provocar* and *reduzir*. When considering proposals that decompose lexical meaning into semantic primitives expressed by a conceptual structure⁸ or a lexical conceptual structure⁹, the verb *provocar* ‘to provoke’ may be expressed as an internally complex event formed by a causative and an existential meaning [CAUSE [TO BE]]. The two arguments of the verb *provocar* are frequently nominalizations, (“a by-product of explicit realization of the relations as verbs and propositions”; “Typically, nominalized forms denote a property, an event or process, or the state resulting from an event”¹⁰). In (1), where the two arguments are underlined, the verb establishes a causal coherence relation between the event *the refusal of France and Germany (...)* and the event *the recent collapse (...)*: [the refusal [CAUSE [the recent collapse TO BE]]. Sentence (1a) could be paraphrased by two clauses linked by a connective, as illustrated in (1b) in English.

(1) a. A força do euro é tal que nem pestanejou com o recente colapso do pacto de estabilidade e crescimento (PEC) PROVOCADO pela recusa da França e Alemanha em se submeterem às suas regras de disciplina orçamental. (Público, 2.12.2004) ‘The strength of the euro is such that it didn’t even flinch with the recent collapse of the Pact for Stability and Growth caused by the refusal of France and Germany to submit themselves to the rules of budget discipline.’

b. The Pact for Stability and Growth recently collapsed because France and Germany refused to submit to its rules.

A different verb type is illustrated by *reduzir* ‘to reduce’, whose conceptual structure may be expressed as [CAUSE [TO DECREASE]]. The meaning of the verb expresses both a

⁶ Danlos, “Discourse Verbs”, 6.

⁷ Florbela Barreto *et al.*, Open Resources and Tools for the Shallow Processing of Portuguese: the TagShare project, *Proceedings of the V International Conference on Language Resources and Evaluation - LREC 2006*, Genova, 2006, 1438-1443.

⁸ Ray Jackendoff, *Semantics and Cognition*. Cambridge, The MIT Press, 1983; Ray Jackendoff, *Semantics structures*, Cambridge, The MIT Press, 1990.

⁹ Malka Rappaport & Beth Levin, What to do with θ -roles, in W. Wilkins (ed.), *Syntax and Semantics 21: Thematic relations*, New York, Academic Press, 1988, 7-36; James, Pustejovsky, The geometry of events, in C. Tenny (ed.), *Studies in Generative Approaches to Aspect*, Cambridge, The MIT Press, 1988, 19-39.

¹⁰ Rodger Kibble, Nominalisation and rhetorical structure, in G-J. M. Kruijff – R. T. Oehrle (ed.), *Proceedings of ESSLLI Formal Grammar conference*, Utrecht, 1999, 49.

causative value and the variation of a variable's attribute, and consequently the verb is marked both as an alternative lexicalization and part of the second argument¹¹ in (2).

- (2) De acordo com especialistas, uma subida de 10 por cento do dólar REDUZ o crescimento da eurolândia em um ponto. (Público, 2.12.2004) 'According to specialists, a 10% increase of the dollar reduces the growth of euroland in one point.'

In order to annotate verbs like *reduzir* in the PTDB framework, we could rely on Framenet. In Frame Semantics, a frame is constituted by a lexical unit called the target and by frame elements that combine with it. Typically, but not necessarily, the target is a verb and the core frame elements are complements or adjuncts. Some frames semantically encapsulate discourse relations and, quite naturally, their expression through verbs (e. g. for contingency relations: [causation], [cause to X], [concessive], [conditional occurrence], [creating], [evidence]). A system of annotation layers allows lexical units to be annotated at the same time as targets and frame elements. A similar technique might be used for annotating Altlex verbs twice: as DRMs (discourse relation markers) and as part of the Arg 2 (in the case of *reduzir*, this method would account for both the semantic elements *to cause* and the predicate *to decrease* applicable to Arg 2).

Contexts such as those illustrated in (1) and (2) are at the crossroad between syntax and discourse and consequently challenge the limits of the annotation performed in the framework of the PDTB, namely the concepts that we explore in this paper of Alternative Lexicalization (taking into account the fact that they “convey more than just the meaning of the relation”¹²) and nominalization.

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¹¹ Danlos, (Discourse verbs) makes a similar distinction between two categories of causal verbs: “Besides cause, there exists a number of causal verbs. On the one hand, there exist other verbs such as provoke, launch, trigger, etc., which are quite similar to cause. On the other hand, there exist causative verbs which lexically encode the effect.” She gives *to irritate*, *to break* and *to give a headache* as examples of the second category.

¹² Prasad *et al.*, Alternative Lexicalizations, 1027. One important element conveyed by causal verbs, if we compare them to the corresponding connectives, is modality (epistemic, axiological and deontic). For a discussion on modality with notions such as *letting*, *hindering*, *helping*, cf. Philip Wolff, Models of causation and causal verbs, in M. Andronis, C. Ball, H. Elston and S. Neuval (eds.), *Papers from the 37th Meeting of the Chicago Linguistics Society, Main Session*, Vol. 1., Chicago, Chicago Linguistics Society, 2002, 607-622.

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