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Towards a Unified Approach to Modality Annotation in Portuguese

Luciana Beatriz Ávila*†
Amália Mendes†
Iris Hendrickx **†

*Universidade Federal de Viçosa / Fapemig, Brazil

†Centro de Linguística da Universidade de Lisboa, Portugal

** Centre for Language Studies, Radboud University Nijmegen, The Netherlands

Abstract: This paper introduces the first efforts towards a common ground for modality annotation for Portuguese. We take into account two existing schemes for European and Brazilian Portuguese, already implemented to written texts, and to spontaneous speech data, respectively. We compare the two schemes, discuss their strengths and weaknesses, and, then, introduce our unifying proposal, pointing out the issues which seem to be already pacified and points that should be considered when the scheme starts to be implemented.

1. Introduction

The literature on the characterization of modality shows that there is no consensus on how to define and characterize this concept: modality can be taken as the expression of subjectivity, or as a distinction between realis and irrealis, or even as quantification over possible worlds, restricted by an accessibility relation. From a speaker's evaluation approach, Lyons (1977, p. 452) defines modality as “the speaker's opinion or attitude towards the proposition that the sentence expresses or the situation that the proposition describes”. Modality involves thus “elements of meaning whose common denominator is the addition of a supplement or overlay of meaning to the most neutral semantic value of the proposition of an utterance, namely factual and declarative” (Bybee and Fleischman 1995, p. 2).

Logical tradition establishes three basic modal meanings: alethic, epistemic and deontic, related, respectively, to the notions of truth, knowledge and conduct. Following this tradition, linguistics takes into account the notions of necessity, possibility and obligation to define modal types. However, as well as there is no unanimously adopted definition of modality, there is also no consensus of which categories should be encompassed under the label “modal”. In linguistic classical literature, studies organize in diverse ways the dimensions concerned to this phenomenon, depending on the theoretical frame. Among different approaches, the opposition epistemic and non-epistemic holds, and the values contrasted with the first vary considerably. For instance, Van der Auwera and Plungian (1998) distinguish participant-internal and participant-external modality and volition, evaluation, ability and capacity are other values considered (Palmer, 1986). Although most of the literature is centered on verbal expressions of modality (mostly semi-auxiliary verbs like may/might, should, can/could), studies on adverbs and modality have also been carried out for English. Several schemes for the annotation of modality have been proposed, mainly for English, and vary according to their objectives: some are strictly focused on modality while others are concerned with the identification of belief, subjectivity, factuality, as a source of data for applications in computational linguistics.

Our objective in this paper is to make a contrastive analysis of two modality schemes that have recently been developed and implemented for Portuguese, and to go a little further, by suggesting a standardization of these two proposals, to be soon implemented. We also consider that this proposal could be applied to other languages than Portuguese (regarding their particularities), given its broad scope to written and oral data. Indeed, although more modality schemes have become available in the recent years, their contrastive study is hampered by the diversity of modal values that are included, and so is the evaluation of tools for the automatic annotation of modality. The two schemes for Portuguese differ mainly in what concerns the text type that they apply to: the scheme proposed for European Portuguese (Hendrickx et al., 2012a; 2012b) has been designed and applied over written texts, while the scheme for Brazilian Portuguese targets spontaneous speech data (Ávila and Mello, 2013; Ávila, 2014). We will revise and compare the two schemes in section 3, report on their application to corpora in section 4 and attempt a unified perspective in section 5.

2. Related work

The growing interest on separating facts from speculations results from the importance of this task to NLP applications, as information extraction (Kartunnen and Zaennen, 2005); uncertainty modelling of clinical texts (Mowery et al., 2012); question answering (Saurí et al., 2006); classification of hedges (Medlock and Briscoe, 2007; Morante and Daelemans, 2009); and sentiment analysis (Wiebe et al., 2005).

Annotating modality, in order to allow its automatic recognition, includes identifying modal indexes, classifying them in a given typology (e.g. in epistemic and non-epistemic meanings), defining its source and its semantic scope. Many projects that have been developed for the annotation of modal expressions focus mostly on English and on modal auxiliaries. Some highlight the relationship between modality and negation (Morante and Sporleder, 2012; Baker et al., 2012), the annotation of modal verbs meanings (Ruppenhofer and Rehbein, 2012), or the construction of automatic taggers (Baker et al., 2010). There are also annotation efforts undertaken for other languages, such as the work on Chinese (Cui and Chi, 2013), European Portuguese (Hendrickx et al., 2012; Mendes et al., 2013), and Brazilian Portuguese spoken data (Ávila and Mello, 2013; Ávila, 2014).

Opposed to classical linguistic typologies of modality, these schemes describe in detail which elements in the text are actually involved in the expression of modality and their roles. These are the subject of the modality (source) and the elements in its scope (target/scope/focus). Other schemes (Baker et al., 2010; Matsuyoshi et al., 2010; Sauri et al., 2006) also determine the relation between sentences in text, identifying temporal and conditional relations between events or the evaluation of the degree of relevance of some information within a text, rather than classifying modal values. For more contrastive information on the existing annotation schemes, see an overview in Nissim et al. (2013).

3. Annotation schemes for Portuguese

While the modal scheme for EP has been designed and applied to written texts, the modal scheme for BP is designed for spontaneous speech, and it is more theoretically-oriented. Modality is taken in enunciative terms (Bally, 1932), that is, it stands for the point of view of a subject who evaluates the locutory material in a given utterance in a communicative act. The scheme follows the Language Into Act Theory (Cresti, 2000), which takes the utterance as its reference unit, and considers the scope of the modality to be the information unit (Tucci, 2007).

Both schemes converge in what concerns the elements that are not marked in the modal scheme, namely mood and tense. Nor do these schemes address factuality or a larger category of subjectivity and emotion. Due to their work on speech, Ávila and Mello (2013) and Ávila (2014) also distinguish modality, which is marked lexically and grammatically, from the pragmatic categories of illocution and attitude, which are carried by prosodic cues. As the three categories are often confused in their definition in the linguistic studies tradition, Mello and Raso (2011), through experimental investigation and observation of empirical data, suggest that modality is restricted to the semantic domain, although interrelated and projected into the pragmatic one. The same illocution can be modalized in different ways and performed with different attitudes, without affecting the illocutionary level.

EP (Hendrickx et al., 2012) combines a practical annotation with a theoretically-oriented perspective mainly based on the work of Van der Auwera and Plungian (1998). The scheme includes the values Epistemic, Deontic and Participant-internal, but differs in two fundamental aspects from the proposals of these two authors: Participant-external modality is not considered as an independent type, but rather as a subtype of deontic modality; and several other values are considered, namely Evaluation, Volition, and, following Baker et al. (2010), Effort and Success. The sub-values for Epistemic express the conceptualizer's perspective regarding the truth of the state of affair that is reported: Possibility, Knowledge, Belief, Doubt, Interrogative; the sub-values for Deontic modality express Obligation and Permission. The participant-internal modality has the sub-values Necessity and Capacity (internal necessity or internal capacity of the speaker, subject or other participant in the situation). Commissives and Evidentials are not annotated as a separate value but instead tagged, respectively, as a type of Deontic_obligation and Epistemic_belief (supported by evidence).

Declaratives are not included, and this is justified by the fact that they represent the unmarked level of modality (Oliveira, 1988), just as in the BP scheme.

The BP scheme (based on the latest revision of the guidelines in Ávila, 2014) considers a three-category scheme of Epistemic, Deontic and Dynamic modality, inspired by Palmer (1986). Epistemic modality carries seven sub-values: knowledge, belief, possibility, probability, necessity (here the conceptualizer presents what is said as a necessity, based on previous knowledge (*só pode ser doido* ‘he can only be crazy, he has to be crazy)) and verification (the conceptualizer regards a state of affair as uncertain (*olha aí se não tem ninguém* ‘check over there if there is no one’). Deontic modality encompasses four sub-values: obligation, permission, prohibition and necessity (the conceptualizer expresses his or someone else’s needs). Finally, dynamic modality comprises the sub-values ability and volition/intention.

Table 1 presents a comparison of the modal values that are considered in the EP and the BP modal schemes: equivalent modal values (or sub-values) are presented in the same row, regardless of their designation. Both schemes are organized in terms of main and secondary modal values. The table also provides frequency of modal values in each corpus (see discussion in section 4). Most of the modal values are included in both schemes: it is the case of Epistemic_possibility, Epistemic_Knowledge, Epistemic_belief, Deontic_obligation, Deontic_Permission, Capacity/Ability, Volition. There are some cases of mismatch: the contexts tagged with the sub-value Epistemic_necessity in BP seem to be close to the value Deontic_obligation in EP; the Deontic_prohibition value in BP is most probably annotated as a Deontic_permission with negative polarity in EP; and Participant_internal_necessity in EP is covered by Deontic_necessity in BP (see arrows in Table 1). Two sub-values seem to have no equivalent: Epistemic_probability only occurs in BP and Epistemic_interrogative only occurs in EP. Besides those sub-values, three main values in the EP scheme are absent in BP: Evaluation, Effort and Success (there is however a partial equivalence for Success: when success is related to an internal capacity (e.g. verb *conseguir* ‘achieve’) it is tagged as Dynamic_ability in BP).

The EP and BP schemes share the same components and their approach is described as very similar to the OntoSem (McShane et al., 2005) annotation scheme for modality (Nirenburg and McShane, 2008). These are the main components: the **Trigger** is the lexical item that carries modality; the **Source of the modality** is the conceptualizer, i.e., the individual whose perspective and view point is being reported (this might be the speaker, the addressee, or another entity in the discourse); **Source of the event mention** is the producer of the text or the speaker; the **Target** is the expression in the scope of the trigger. The BP scheme also considers a Target-dependent component to encompass the cases in which the target, in a given utterance, is not explicit, but it can be recoverable in the referential chain of the text. The two different types of sources are marked up to capture cases where the conceptualizer of the modality is not the producer of the text or speech.

While the components of both schemes are practically the same, their conceptualization and application differ according to options in the delimitation of Trigger and Target and, mainly, to the text type which is annotated. For instance, the EP scheme follows a “min-max strategy” (Farkas et al., 2010) in which the Trigger is tagged as a single element whenever possible and the Target is tagged maximally (covering possible discontinuous sequences), while the BP scheme frequently selects multiword triggers. But the most significant difference falls on the Target component. The identification of the limits of the target is always a challenge, especially in what concerns consistency between annotators. In written texts the scope of the target is of a syntactic nature and the EP scheme specifies that syntactic boundaries should be respected. In spoken data, the target is in the scope of an information unit (IU) which may assume different functions: Comment (expresses the illocutionary force of the utterance), Topic (specifies the *locus* of application of the illocutionary force of the Comment), Parenthetical (expresses metalinguistic integration of the utterance) or Locutive Introducer (signals pragmatic suspension of the *hic et nunc* and introduces a meta-illocution). The BP scheme takes into account, for the annotation of the trigger and the target, the information unit in which they occur: Comment (COM), Topic (TOP), Parenthetical (PAR) or Locutive Introducer (INT). Example (1), taken from Ávila and Mello (2013), illustrates the differences in terms of target delimitation (for an explanation of the transcription symbols, refer to the authors’ paper). The utterance in (1) comprises three different tone units, and the target of the trigger *tem que* ‘has to/must’, in the second unit, is *restringir também*. It leaves out the direct object of the verb *isso* because it is outside this

information unit (defined prosodically). The same sequence in the EP scheme would take as target *restringir também isso*.

(1) é / [a <gente] [tem que]> <[restringir também] / isso> //
Yeah / we have to restrict too / this //

The EP scheme includes a polarity feature on the trigger and on the target that describes the polarity of both components and allows to deal with dual negation (Quaresma et al., 2014), and also a feature Ambiguity on the trigger component to describe cases where two or more modal values are valid in the context. The authors are conscious of the importance of dealing with negation and of the possibility to create an independent markup scheme for polarity, that interacts with the modality scheme (e.g. Morante, 2010) or to deal with both in a unified scheme (e.g. Baker et al., 2012). The approach taken leans towards the second option, although very tentatively. A specific study in the interaction between modal triggers and focus (the exclusive particle *só* ‘only’) was also addressed by the EP scheme (Mendes et al., 2013).

4. Application to corpora

The EP scheme has been applied to a corpus of 158.553 tokens, composed of 2000 sentences of written texts extracted from the written subpart of the Reference Corpus of Contemporary Portuguese (Généreux et al., 2012), a highly diverse corpus of 312 million words covering a large variety of textual genres and Portuguese varieties. A list of 40 Portuguese lemma verbs covering each modal value was the starting point for the extraction of the corpus sample and equal sets of single sentences for each modal type were randomly selected. Subsequently, the annotation covered all modal triggers found in the sentences. The BP scheme was applied to a sample from the C-ORAL-BRASIL I, an informal corpus of 139 texts, already published (Raso and Mello, 2012). The sample for modality annotation covers a sub-corpus of 20 texts with an average of 1,500 words each, thereby totally 31,318 words; 5,484 utterances and 9,825 tone units, divided into monologues, dialogues and conversations, distributed in familiar/private and public interactional contexts. The modal cues in both schemes are not restricted to modal auxiliaries, but rather take into consideration a large set of cues, such as propositional verbs, adverbs, adjectives, periphrastic forms and conditionals, and also nouns and interrogative clauses, in EP.

In both projects, the annotation was performed with the MMAX2 annotation software tool (Müller and Strube, 2006), which is free, platform-independent, written in java and produces stand-off annotation¹. In the BP annotation, the identification of modal markers was manually undertaken by three annotators working independently and qualitatively validated through group discussions, and the files were later annotated in the MMAX2 tool with the full scheme by one single annotator. In EP, the annotation was done by one annotator and all difficult cases were discussed with a second annotator. A small inter-annotator agreement (IAA) using Kappa-statistic (Cohen, 1960) was conducted over the EP corpus, with 50 sentences and two annotators, resulted in a kappa value of 0.65 for the trigger and 0.85 for modal value (Hendrickx et al., 2012). A follow-up study on the identification of modal triggers in the context of an exclusive adverb was also the subject of an IAA that reported a higher score for trigger identification (0.85), a similar score for modal value (0.83) and included the target component, which attained a score of 0.64. These results are considered in line with those reported for English (Matsuyoshi et al., 2010).

In the set of 1946 sentences (158.553 tokens) of the EP corpus, 2377 triggers were tagged, while in the 20 texts sample of the BP corpus (31,318 words), 781 triggers were tagged with modality. The triggers of the EP corpus cover 2511 modal values due to 135 ambiguous cases, marked with more than one modal value.

The frequency of each modal value in both corpora is provided in Table 1. The comparison of the data is not straightforward. Several factors hinder frequency comparisons: first of all, the EP corpus was selected from a list of 40 modal verbs and even if the list tried to balance the verbs per modal value, the corpus is to a certain extent biased, as assumed by the authors; the set of modal

¹ <http://mmax2.sourceforge.net/>

values is not equivalent; the EP corpus is composed of written sentences, while the BP corpus includes speech transcriptions.

If nevertheless one attempts some initial comparison of these results, the most striking aspect is the significantly higher percentage of occurrence of the Epistemic main value in the BP corpus (not explained by the number of sub-values, but Mello et al., 2013, in a quantitative analysis, have demonstrated the tendency to the use of epistemic meaning in BP and pointed out that this value has a much higher association rate to different modal markers than the other two types, deontic and dynamic). If one excludes the three values that are not covered in the BP corpus, there would then be a total of 2123 occurrences of modal values in the EP corpus and the percentage of Epistemic value would then be 34,8%, still far from the percentage in the BP corpus. The analysis of this data would require a comparison of the list of lexical triggers considered in both corpora.

EP modal scheme	Freq.	%	BP modal scheme	Freq.	%
Epistemic	739	29,4	Epistemic	506	64,7
Possibility	279	11,1	Possibility	120	15,3
			Probability	24	3
[->Deontic]			Necessity	15	1,9
Knowledge	183	7,2	Knowledge	100	12,8
Belief	161	6,4	Belief	228	29,1
Doubt	29	1,1	Verification	14	1,7
Interrogative	87	3,4			
Deontic	740	29,4	Deontic	189	24,1
Obligation	581	23,1	Obligation	96	12,2
Permission	159	6,3	Permission	70	8,9
[-> Deontic perm., neg. polarity]			Prohibition	6	0,7
[->Internal necessity]			Necessity	17	2,1
Participant-internal	248	9,8	Dynamic	86	11
Necessity	126	5	[-> Deontic necessity]		
Capacity	122	4,8	Ability	17	2,1
Volition	396	15,7	Volition/Intention	69	8,8
Evaluation	159	6,3			
Effort	110	4,3	[-> Dynamic ability]		
Success	119	4,7	[-> Dynamic ability]		
Total	2511	100		781	100

Table 1: Modal values in the EP and the BP modal schemes and their frequency

5. A unifying proposal

The proliferation of annotation schemes for modality is certainly inevitable and the results of specific objectives of the different teams working on the topic. However, some attempt of standardization would certainly be of interest to the field, making contrastive studies an attainable goal. In the case of the EP and BP schemes, the objectives are quite similar and the properties of both varieties do not differ in what concerns the components of the schemes, although the list of lexical triggers might be variety-specific to a certain extent. However, any such approach should not ignore the specificities of each approach, related mostly to text type.

As mentioned in section 4, the set of components is practically identical in each scheme. The differences arise essentially in the list of modal values, the Target_dependent component and the trigger and target attributes. Let us start with the mismatches in modal values. We present in Table 2 our proposal for a unifying set of categories. Although the percentage of occurrence of the Epistemic_probability value is relatively low in the BP corpus, this value is nevertheless important in the modality typology and quite easily distinguishable from Epistemic_possibility. These two sub-

values of Epistemic modality are covered by the lexical items *poder* ‘might’/ *dever* ‘should’, *possível* ‘possible’ / *provável* ‘probable’, *possibilidade* ‘possibility’ / *probabilidade* ‘probability’. Consequently, we keep this value in the final set. The uncertainty meaning conveyed by the Epistemic_verification value (BP) is in fact covered by the more general Epistemic_possibility value. The same is valid for Epistemic_doubt (EP), which translates into an Epistemic_possibility value with negative polarity (I doubt that this will happen \approx maybe it is not possible that this will happen). Direct interrogative sentences are syntactically marked as such and their annotation as modal instances in the EP scheme involved marking the entire sentence as trigger and target, what seems unnecessary. Indirect interrogative sentences express a possibility value that can be captured as such in the scheme. Necessity is a concept that required further revision in both schemes: the EP scheme doesn’t capture contexts where necessity is the result of circumstances (Circumstantial modality or Participant_external modality). In spite of the difficulty in establishing whether a necessity is external or instead is an obligation established by the entities involved in the state of affairs, it is by no doubt important to be able to distinguish the clear-cut cases. With this in mind, we keep the value Deontic_necessity (*é necessário que* ‘it is necessary that’). We also keep the Participant-internal value instead of the equivalent Dynamic one (BP). However, we enlarge the sub-values of the Participant-internal category, so as to include several categories related to the expression of a subjective attitude of the subject. It is the case of Necessity, Ability and Volition, which is best captured as a subcategory. Since Effort and Success are types associated to the Participant-internal_ability sub-value, we decided to leave them out. Finally, we keep the category Evaluation, because it is interesting for studies of belief and opinion, although for this value we need more input and it should be revised in the future.

In what concerns the Target component, the difference lies in the type of segment which is tagged in the corpus: a syntactic phrase or any locutory material in the scope of an information unit. We consider that the functions of the information unit are the subject of a separate layer of annotation: the information structure. Also, the Target_dependent component is to be addressed in the co-reference level of annotation. Therefore, we keep the single Target component in the unified scheme.

The common core of the scheme is the list of components, the attributes of the trigger and the list of modal values. For studies in subjectivity and factuality, a special module would trigger a larger set of modal values such as Factual, Non Factual, Counterfactual.

Components	Attributes	
Trigger	Polarity	
	Ambiguity	
	Modal type	
	<i>Modal values</i>	<i>Modal sub-values</i>
	Epistemic	Possibility; Probability; Knowledge; Belief
	Deontic	Obligation; Permission; Necessity
	Participant-internal	Necessity; Ability; Volition
	Evaluation	
Target	Polarity	
Source of the modality		
Source of the event mention		

Table 2: Proposal of a unified scheme.

6. Conclusion

We have presented a contrastive study of two annotation schemes recently developed for two varieties of Portuguese: the European and the Brazilian ones. These two schemes have been applied to a written corpus of 2000 sentences in the case of European Portuguese, and to a sample of 20 texts from a corpus of spontaneous informal speech, in the case of the Brazilian scheme. Although they share the

set of components to mark, they do differ in terms of the modal values that are included and the textual units over which to apply the scheme. It is important to stress out these two varieties do not differ significantly in terms of the system of modality, although differences are sure to appear in what concerns the list of lexical cues for modality, or the quantitative expression of the modal elements.

In this paper, we assessed to what extent the two schemes differ and what motivates these differences: we make a detailed comparison of the modal values that are considered by both schemes, explore mismatches, overlaps and inconsistencies, and propose a common ground that is rooted in a common concern in the field for some attempt to standardization. We suggest a common core for modality that would cover the list of components and a restricted list of modal values and specific modules that would apply according to the specific objectives of each task. We believe that such attempt is essential to conduct future contrastive studies between varieties of Portuguese.

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