A Perspectives Model Definition and Annotation

Version 0.1

(Work in progress)

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Chapter 1

Introduction

With the Internet having secured an increasingly prominent place in society, the current age is characterized by the ability of individuals to transfer and access information about the world. At the same time, people feel more and more encouraged to voice their opinion and debate with others about all kinds of topics on review sites, personal blogs, discussion boards and other social media platforms. In addition, even -or especially- news articles, which very function is to inform us about the world, inherently express conflict, resistance, engagement and political stance.[1] They reflect on-going debates in our society, stances on particular issues (e.g. abortion, vaccinations, etc.), and interpretative frames on events and their causes (e.g. conspiracy theories on 9/11). As such, the Internet is evolving into a continuously and rapidly increasing collection of unstructured data representing not only what is happening in the world, but also what people think about it.

In response, researchers in the fields of natural language processing (NLP), computational linguistics and information extraction (IE) have been developing text mining systems that are able to extract relevant pieces of information from natural language text, to filter the information for opinions, and possibly to classify them into different types of attitude and polarity. This field of research has been generally referred to as subjectivity analysis, sentiment analysis or opinion mining. It has, for example, been applied for automatic summarization of customer feedback in online product and service reviews. However, the complexity of the task greatly increases when the topic of interest is, for example, a contentious event or issue relating to politics and society (e.g. the Ferguson shooting, the European migrant crisis or health care reform). It is no surprise that the question "How do people feel about the European migrant crisis?" would lead to much more complicated answers than the question "How do people feel about the latest model of the iPhone?". The complexity of the task is inherent to the complexity of contentious text itself: each contentious event or issue involves a variety of (groups of) participants, and the arguments they put forward can be very complex and touch a range of distinct aspects of the debate (e.g. the insurance's costs in the health care reform debate). To understand one's opinion about a contentious event or issue is therefore to understand their *perspective*. That is, it is necessary to know which individuals or groups are involved in the debate and what they think is true, right and important.

Dealing with textual data, the only way to approximate an understanding of a person's perspective is to analyze *what* is said and *how* it is said. The selection of information plays an important role because it reflects what someone considers relevant. For example, an article may report on someone's ethnicity, or experts' political preferences when citing them on a societal matter. Therefore, the assumption is that *all* information presented in text is fundamentally subjective. The way in which this information then is presented (i.e. how sources choose to picture something) also indicates the sources' point of view. Their

[1] "*militia est vita hominis super terram*" Book of Job, 7,1. http://www.wumingfoundation.com/giap/?p=22200

judgment with regard to what is true, right or important may be expressed in an explicit way (e.g. *I'm against vaccinations*) but also in a more implicit way through choice of words (e.g. calling someone a thief instead of saying he stole something).

This document describes an annotation scheme that can be used to analyze perspectives through what is said and how it is said by linking statements to their source while incorporating any additional information on the statement. It includes different aspects of linguistic encoding of perspectives, which in the last decade have been targeted as separated phenomena through series of different annotation initiatives. Among these, the most relevant to our work are:

- **Penn Discourse TreeBank (PDTB) v2.0 (Prasad et al., 2007) and its extension, the Penn Attribution Relation Corpus (PARC) v3.0 (Pareti, 2015)**: News texts annotated with *Attribution Relations (ARs)*, a linguistic phenomenon that is used to ascribe to someone the ownership of an attitude expressed in a text;
- **FactBank (Saurí and Pustejovsky, 2009)**: News texts annotated with *event factuality* on top of event annotations in TimeBank (Pustejovsky et al., 2006), which is defined as "the level of information expressing the commitment of relevant sources towards the factual nature of events mentioned in discourse" (Saurí and Pustejovsky, 2009, p. 231);
- **The MPQA Opinion Corpus (Wiebe et al., 2005):** News texts annotated with different types of opinions or *private states*, including sentiment, speculation, arguing and agreement;
- **The Language Understanding (LU) Corpus (Diab et al., 2009) and its extension in the DARPA DEFT project (Prabhakaran et al., 2015)**: News texts, training manuals, correspondences, interviews and discussion forum threads annotated with the *Level of Committed Belief*, which definition corresponds to that of event factuality.

The annotations described in this document are compliant with these annotation initiatives.

The remainder of this document is structured as follows. Chapter 2 gives a short overview of related work that has been done in the annotation initiatives mentioned above. Chapter 3 clarifies why we make a distinction between *instances*, which represent unique things in a possible world, and *mentions*, which are tokens referring to instances. Chapter 4 explains the fundamental notions and approach; it describes the three main elements of perspectives (source, cue and target), justifies our multi-layered annotation approach, and introduces the notion of perspective scope. The remaining chapters are each devoted to the annotation guidelines for the separate perspective layers. So far, we have included the layers of event detection, attribution, belief/factuality, and sentiment/opinion. We are planning to extend the annotation layers to include: temporal and causal relations, discourse annotations, and entity and participants coreference. The addition of these layers will result an extensive annotation of a document which will allow also a better explorations of the interactions of the different types of information for a complex semantics task such as perspective identification and extraction.

Chapter 2

Related work

2.1 Penn Discourse TreeBank and Penn Attribution Relation Corpus

The Penn Discourse TreeBank (PDTB) (Prasad et al., 2006) and the Penn Attribution Relation Corpus (Pareti, 2012) provide annotation for perspectivazation of information to distinguish between factual and non-factual information, and to identify the source of the information. Main distinctions with respect to previous approaches concern: a.) the definition of the attribution phenomenon which encompasses approaches based on sentiment analysis; b.) an extension of the annotation which goes beyond the sentence boundary, as in the MPQA schema, with a focus on more analytic semantic units, i.e. Abstract Objects (AOs).
Both PDTB and PARC define an attribution relation as a relation ascribing the ownership of an attitude towards some linguistic material, thus suggesting that an attribution relations will always provide access to subjective information.

Any attribution relation is composed by three elements:

- the source: it signals WHO is providing the information content to a receiver;
- a cue: it is a lexical items which signals the presence of an attribution relation. Cue words can be further exploited to classify the different levels of factuality of an attribution relations and possibly to distinguish different sources; and
- the content: it corresponds to the span of text attributed to the source (i.e. information content, or WHAT the source is stating/thinking/believing/promising etc.)

The PARC annotation scheme is an extension of the PDTB scheme for attribution relations annotation. In particular, in the PDTB attribution relations are annotated only when overlapping with a relation conveyed by a discourse connective. On the contrary, the PARC annotation scheme extend the lexicalized approach proposed in for the annotation of Discourse Relations in the PDTB (D-LTAG), assume that the annotation is independent from other discourse relations, and any kind of attributed material is considered.

Provided that the PARC scheme is an extension of the PDTB one, we will provide a description of the former as it is more relevant to our work. The PARC scheme inherits the three markables for cue, source and content from the PDTB and introduces a new markable: supplement. The supplement is used annotate additional information of an attribution relation. As reported in the PARC 3.0 Annotation

guidelines, a supplements are elements "concurring to the identification of the source and the provenance or mean by which the information was acquired (e.g. said on the phone); providing further specification of the attitude this holds (e.g. said with anger); the recipient of a reportive verb of the assertion type (e.g. told the jury) or of an eventuality (e.g. Mary expects John to do the shopping); and event specifications (e.g. said last week) providing context indications determinant to the interpretation and comprehension of the content". (Pareti, 2015, 8). Each attribution relation is composed by at least one content markable, one cue, and none or more source and supplement markables.

The PARC annotation guidelines inherits and extends attributed for the markables from the PDTB such as type of relations, type of source, scopal change, and factuality, they are not present in the released version of the corpus (PARC 3.0) due to low inter-annotator agreement.

The annotation of attribution relations following the PARC 3.0 guidelines consists of five subtasks: a.) cue identification; b.) source identification and c.) content identification; d.) supplement identification; and e.) relation identification, i.e. connecting the markables which compose an attribution relation.

2.2 TimeBank/FactBank

FactBank (Saurí and Pustejovsky, 2009) is a corpus in which *factuality* has been annotated on top of event annotations in TimeBank (Pustejovsky et al., 2006). Event factuality is defined as "the level of information expressing the commitment of relevant sources towards the factual nature of events mentioned in discourse" (Saurí and Pustejovsky, 2009, p. 231), where an *event* as specified in the TimeML annotation scheme refers to any situation that happens or occurs and may be expressed by means of a tensed or untensed verb, nominalization, adjective, predicative clause, or prepositional phrase.

Event factuality is modeled as the combination of *polarity* and *epistemic modality*. Polarity is a binary system with the values POSITIVE and NEGATIVE, referring to whether or not the event is negated by means of, for example, a negative polarity marker (e.g. *not*, *none*, *nobody*). Epistemic modality (or *certainty*) expresses the degree of certainty of a source regarding what is asserted. It is conveyed by, for example, modality particles (e.g. *could*, *probably*, *impossible*). In contrast to polarity, epistemic modality logically constitutes a continuum ranging from uncertain to absolutely certain, but FactBank distinguishes among three categories: POSSIBLE, PROBABLE and CERTAIN. In addition, FactBank adds UNDERSPECIFIED values on both axes to account for cases in which the source is fully or partially uncommitted to the factual nature of the event. This results in a total of eight factuality values:

Committed Values:

CT+	According to the source, it is *certainly* the case that X.
PR+	According to the source, it is *probably* the case that X.
PS+	According to the source, it is *possibly* the case that X.
CT-	According to the source, it is *certainly not* the case that X.
PR-	According to the source it is *probably not* the case that X.
PS-	According to the source it is *possibly not* the case that X.

(Partially) Uncommitted Values:

CTu	The source knows whether it is the case that X or that not X.
Uu	The source does not know what is the factual status of the event, or does not commit to it.

The factuality values are always relative to at least one relevant source. By default, the author of a text is taken to be a relevant source for each of the events mentioned in the text. In addition, the author can introduce an additional source as a factuality evaluator by means of *source-introducing predicates*

(SIPs). SIPs select an argument denoting an event of some sort, contribute a new source to the discourse that plays a role in assessing the factuality of the embedded event, and indicate to what extent the source commits to its factuality. Examples of SIPs are predicates of report (*say*, *claim*, *argue*), predicates of knowledge (*know*, *remember*, *admit*) and predicates of perception (*see*, *feel*, *hear*). If an event is embedded in an SIP, separate factuality values are assigned to each of the relevant sources. For example, the event *reported* in sentence 1 is annotated with a factuality value for the author only, while *contain* is annotated with two separate factuality values (one for the author, and one for *CBS News*):

1. CBS News first **reported**$_{e1}$ last night that the tomb may **contain**$_{e2}$ the remains of Air Force pilot Michael Blassie.

Relevant sources:	author, news_author
Factual assignments:	f(e1,author) = CT+
	f(e2,news_author) = PS+
	f(e2,author) = Uu

To help annotators mentally structure and comprehend the different information layers involved, the annotation task for creating FactBank was divided into three consecutive subtasks: (a) the identification of SIPs, (b) the identification of sources, and (c) the assignment of factuality values.

2.3 MPQA Opinion Corpus

The MPQA Opinion Corpus (Wiebe et al., 2005) is organized around the notion of *private states*, which in terms of their functional components are described as "(internal) states of *experiencers* holding *attitudes*, optionally towards *targets*" (Wiebe et al., 2005, p. 4). A distinction is made between DIRECT SUBJECTIVE FRAMES, which represent explicit mentions of private states as well as speech events expressing private states, and EXPRESSIVE SUBJECTIVE ELEMENT FRAMES, which represent so-called expressive subjective elements (i.e. expressions that indirectly express private states through the way something is described or through a particular wording). For example, in sentence 2 there is a (negative attitude) of *Morgan Tsvangirai* expressed by *rejected*, which is an explicit mention of a private state. Sentence 3 is an example of a private state expressed by the subjective speech event *said* and the expressive subjective element *"illegimate"*, expressing a negative attitude of *he* towards *the result*. For this sentence, two private states would be created: a DIRECT SUBJECTIVE FRAME for *said* and an EXPRESSIVE SUBJECTIVE ELEMENT FRAME for *illegitimate*.

2. *Morgan Tsvangirai* has **rejected** [the outcome of the presidential poll].

3. *He* **said** [the result] was **"illegitimate"**.

Other frames that have been defined in MPQA are the OBJECTIVE SPEECH EVENT FRAME to distinguish opinion-oriented material from material presented as 'factual' and the AGENT FRAME for representing the source of the attitude or speech event. An important property of sources in the annotation scheme is that they are *nested*. That is, one private state (or speech event) may be embedded in another. As such, the nested source of the private state expressed by *fears* in sentence 4 is represented as *<writer, Xirao-Nima, U.S.>* (Wiebe et al., 2005, p. 9). The notion of nested sources has been adopted in FactBank (Saurí and Pustejovsky, 2009) and will also be applied in future belief annotations of the DARPA DEFT project (Prabhakaran et al., 2015).

4. "The U.S. fears a spill-over," said Xirao-Nima.

For version 2.0 of the MPQA Corpus, Wilson (2008) extended the annotation scheme by adding two more frames (annotated in around 73% of the articles in this version of the corpus) to better model attitudes and their targets: the TARGET FRAME and the ATTITUDE FRAME (Wilson, 2008, p. 118-121). For the ATTITUDE FRAME, Wilson (2008) defined a new set of attitude types, which is represented in Table 2.1. The frame is further characterized by the intensity of the attitude type being expressed (*low, low-medium, medium, medium-high, high, high-extreme*) and by four additional properties that are used to mark particular characteristics of attitudes when they are relevant (*inferred, contrast, repetition, sarcasm*). TARGET FRAMES are linked to ATTITUDE FRAMES, which in turn are linked to DIRECT SUBJECTIVE FRAMES. Targets and attitudes are thus not annotated for EXPRESSIVE SUBJECTIVE ELEMENT FRAMES.

Sentiment	**Agreement**
Positive Sentiment	Positive Agreement
Negative Sentiment	Negative Agreement
Arguing	**Intention**
Positive Arguing	Positive Intention
Negative Arguing	Negative Intention
Speculation	**Other Attitude**

Table 2.1: The set of attitude types in MPQA 2.0 (Wilson, 2008, p. 116)

In MPQA 2.0, the annotations are entirely span-based. However, in a yet unreleased version of the corpus, MPQA 3.0, so-called *eTarget* annotations are being added to the MPQA 2.0 annotations in order to obtain a more accurate representation of *what* or *whom* an opinion is directed towards (Deng and Wiebe, 2015). An eTarget is an entity or event that is the target of an opinion; its annotation is anchored to the head word of the NP or VP that refers to the entity or event. For example, in sentence 5 the part between brackets is annotated as the target of the negative sentiment of *the Imam* in MPQA 2.0; in the new version, two eTargets are annotated within this target span: *Rushdie* himself and his act of *insulting*. This example also shows that there may be entities within a target span which the attitude is not directed towards, in this case, *the Prophet*.

5. When *the Imam* **issued the fatwa against** [Salman Rushdie for insulting the Prophet]...

2.4 Language Understanding Corpus and the DARPA DEFT project

The Language Understanding (LU) Corpus (Diab et al., 2009; Werner et al., 2015) aims at capturing the Level of Committed Belief (LCB), which is described as "a linguistic modality expressing a speaker or writer's (SW) level of commitment to a given proposition, which could be their own or a reported proposition." (Werner et al., 2015, p. 32). Initial work on LCB was undertaken by Diab et al. (2009), who used a 3-way distinction of belief tags to annotate the (original) LU-3 corpus: Committed Belief (CB), reflecting a strong belief of the SW towards the proposition, Non-committed Belief (NCB), reflecting a weak belief of the SW towards the proposition, and Non Attributable Belief (NA), reflecting another type of attitude of the SW towards the proposition (such as desire). However, the NCB category of the original LU tagging scheme in fact captured two different notions: that of uncertainty of the SW and that of belief being attributed to someone other than the SW. Recently, this category has been manually relabeled with the NCB tag (for uncertainty of the SW) and the Reported Belief tag (ROB), resulting in the LU-4 corpus (Werner et al., 2015).

Belief tags in LU-4 Corpus:	
Committed Belief (CB)	The writer strongly believes that the proposition is true.
Non-committed Belief (NCB)	The writer believes that the proposition is possibly or probably true, but is not certain.
Reported Belief (ROB)	The writer attributes belief to another person or group.
Non-belief propositions (NA)	The writer expresses some other cognitive attitude toward the proposition, such as desire or intention, or expressly states that s/he has no belief about the proposition.

Although the term *belief* in this framework essentially refers to the same phenomenon as *factuality* as defined by Saurí and Pustejovsky (2009), the annotations are quite different. In contrast to FactBank, which has fully annotated nested sources, the LU Corpus so far has only addressed the problem from the perspective of the speaker/writer. Furthermore, the LU corpus ignores negation and does not distinguish between possible and probable. Finally, there is a subtle difference in the targets of the belief/factuality annotations. Whereas FactBank has assigned factuality values to *events*, the LU corpus has assigned belief tags to the head words of *propositions*, leaving event-denoting noun phrases (e.g. *the **collapse** of the building*) out of consideration.

The 4-way distinction of belief tags as described above is currently being used in an ongoing annotation effort at the Linguistic Data Consortium (LDC) that has grown out of the DARPA DEFT project (Prabhakaran et al., 2015). Whereas the LU corpus covers different domains and genres (including news wire, blog data, email and letter correspondence, and transcribed dialogue data), this annotation project focuses on texts from discussion forum threads. While the current annotations only include beliefs of the writer, there are several plans to extend the annotations. These include: (1) the annotation of nested beliefs in a similar way as was done in FactBank, (2) the extension of the definition of target propositions by using semantic representations (as opposed to using the propositional head) and including the heads of noun phrases, (3) the identification of entities as targets of beliefs (referred to as the notion of belief "aboutness"), (4) combining belief with sentiment annotations, and (5) extending the annotations to Spanish and Chinese.

Chapter 3

The Source Perspective Model

The annotations presented in this document can all be integrated in one model called the Grounded Representations and Source Perspective (GRaSP) model. This model provides a representation of things in the (real or assumed) world and allows us to indicate the perspective of different sources on them. At the same time, it serves as a representation for coreference relations. The annotations covered in these guidelines currently do not include coreference and it is possible to make use of the annotations without using GRaSP. GRaSP is thus not the main focus of this document. We provide a brief explanation nevertheless, because SPM is a fundamental aspect of how our annotations ultimately contribute to a representation of perspectives.

We make a fundamental distinction between *instances* and *mentions*. Instances represent unique things in a possible world such as persons, locations, time expressions, events or concepts. Mentions are tokens that refer to these things.[1] SPM can be seen as an extension to the Grounded Annotation Framework (Fokkens et al., 2013, GAF). Both GRaSP and GAF formally model the relations between instances and mentions, but GAF is centered around events and their participants, whereas SPM can be used to model any kind of information. An instance in GRaSP can be `denotedBy` one or more references. When more than one mention refers to the same instance, these mentions corefer. As such, SPM provides a natural way to represent coreferential relations. Because the instance representations exist completely independently from text (i.e. no anchor term is needed to represent a coreference chain), the approach is particularly suitable for cross-document coreference (Fokkens et al., 2013).

The annotations we describe cover information about sentiment analysis and opinions, factuality and sources of statements. In other words, we aim to annotate the perspective that a specific utterance displays on a specific entity. We achieve this by adding information about factuality, sentiment, opinions and the (quoted) source to individual mentions. The links from instances to their mentions provided by SPM also link instances to the perspective-related information attached to these individual mentions. By investigating what sentiment, factuality and sources are associated with various mentions of an entity or an event, we can directly compare the different visions that are displayed about it in various texts. The following chapters describe the annotation guidelines we apply to mentions.

[1] Mentions can also be pictures, symbols, audio signals, etc. Only textual references are relevant for this document.

Chapter 4

Fundamental notions and approach

4.1 Source, cue, target

Conceptually, we take perspectives to consist of three main elements: a *source* (an entity, such as a person or organization) having an *attitude* towards some *target*. The default source of a textual statement is its author (or the document in which it occurs, or its publisher), since all statements in a text can be attributed to the author. In many cases, this source will be implicitly present in the text, although it can be lexicalized through the first-person singular pronoun or expressions like *in **my** opinion*. Other possible sources are specific entities that are introduced in the text (e.g. ***John** believes that...*) or arbitrary sources expressed by non-specific references in the text (e.g. *it is believed that...*).

The attitude of the source is expressed by some cue, which is the lexical anchor that links the source to the target. The most typical perspective cues are verbs that in an active sentence take the source as their subject and the target as their direct object. These include, for example, verbs of reporting (e.g. *say, write, claim*), verbs of cognition (e.g. *think, wish, forget*), and verbs of perception (e.g. *see, hear, feel*). However, there is a range of linguistic expressions that can function as a perspective cue. For example, uncertainty can be expressed by, among others, modal auxiliaries (e.g. *might*, *may*) and modal adverbs (e.g. *perhaps*, *maybe*). In turn, one cue can express a range of different attitudes. For example, a verb like *hope* expresses a positive sentiment and uncertainty towards what is stated at the same time.

The last element of a perspective is the target. In general, the semantic target can be either an (abstract) entity or an event. Entities are usually expressed as (proper) nouns or pronouns (e.g. *I don't like **John/dogs/it***), while events may be expressed as verbs (e.g. *I think he will **come***), nouns (e.g. *the **attack** was scary*), pronouns (e.g. ***it** was scary*), adjectives (e.g. he seemed ***angry***) and prepositional phrases (e.g. I think John is ***at home***). In addition, a perspective may target specific aspects of events or entities, which may be expressed as propositions. For example, in *I hope John was killed fast*, the positive sentiment is most likely directed towards the Arg-MNR (*fast*) of the killing event only. In this document, we use the term *perspective scope* to refer to those specific aspects of an event or entity that are the target of a perspective (see Section 4.3). Finally, not all types of attitudes can have the same types of targets; while sentiment (see Chapter 8) may target both events and entities, factuality (see Chapter 7) can only target events.

In sum, we annotate the following three elements in perspective relations:

- **Source:** The lexical elements that refer to the entity which the perspective is attributed to (optional).

- **Cue:** The lexical elements that signal the presence of a perspective (non-optional).
- **Target:** The lexical elements that refer to the specific entity or event that the perspective is about, or those semantic elements that comprise the perspective scope (optional).

Note that both the source and the target are optional; this is because we take a lexicalized approach to annotation. That is, although we assume that all three elements are always conceptually present in a perspective relation, we only annotate them if we can anchor them to lexical elements in the text. The cue is the only element that is required to know that there is some perspective expressed; the source and target may very well not be lexicalized. In addition, we adhere to the surface form of the document, excluding any information that may be retrieved from other sources (e.g. world knowledge) from the annotation.

4.2 Multi-layered annotation

An important property of the annotation approach presented in this document is that it is *multi-layered*. Perspective annotation involves capturing a variety of semantic and pragmatic phenomena, such as attribution, factuality and sentiment. However, through previous experience we have found that asking even experienced annotators to analyze texts for various dimensions of information constitutes a high risk for information overload and confusion. By splitting the annotations in subtasks, we avoid the problem of overloading annotators with the complex interactions between the different information layers involved. Instead, annotators can focus on one information layer at a time, while still being able to use the annotations in the previous layers. In addition, it enables us to better monitor the interactions between the layers.

We consider *events* to be the most basic semantic units that may give rise to or be involved in perspectives. In a text, events function as hubs of information: they inform on the participants, are associated with a time and location, express the attitude of the source, and are building blocks for more complex representations such as TimeLines or Storylines. Therefore, our first layer of annotation corresponds to *event detection*. The annotation of events is described in detail in Chapter 5.

The second layer of annotation corresponds to the identification of *attribution relations* (ARs), which indicate who has expressed a particular stance towards some information. In this layer, we identify the three elements of ARs (source, cue, target) *without* further characterizing it. Chapter 6 gives a detailed description of the annotation of ARs.

The actual characterization of ARs in terms of stance or attitude is done in separate layers. One of them is the layer of event factuality. The guidelines for the annotation of event factuality are provided in Chapter 7. Another layer that is used to characterize the relation between source and target is that of sentiment. Chapter 8 is devoted to the annotation of this fourth layer of perspectives.

4.3 Perspective scope

Section 4.1 briefly introduced the phenomenon of perspective scope, where only specific semantic aspects of an event (or entity) are the target of a perspective. To clarify, first consider Sentence 6 below. In this sentence, *thinks* expresses uncertainty of *Sally* towards the *killing* event. We can interpret this sentence in two ways: either Sally is uncertain about what happened to John (killed or not), or she is

uncertain whether it was John who was killed or someone else. Either way, we can be more specific by stating that the uncertainty is directed towards the semantic relation between *John* and *killed*, comprising the whole proposition expressed by *John was killed*.

6. Sally thinks that John was killed.

Now consider Sentence 7. The event targeted by *thinks* is still *killed*, but it does not seem to be the case that Sally questions whether it was John who was killed (or that someone was killed at all); rather, she is uncertain whether he was killed by Kim or by someone else, which interpretation is strengthened by the contrasting perspective of Harry. In other words, the uncertainty only targets a specific participant of the event, namely the KILLER (the Arg0).

7. Sally thinks that John was killed by Kim, but Harry thinks that he was killed by Tom.

Perspective scope is relevant for both factuality and sentiment; for example, in Sentence 8 the positive sentiment (and uncertainty) expressed by *hope* is most likely directed towards *fast* only as the MANNER (or Arg-MNR) of the killing event.

8. Sally hopes that John was killed fast.

It can be a matter of interpretation which aspects of an event or entity are affected by a perspective cue; although less likely, it is also possible to interpret Sentence 8 as if Sally hopes that it was *John* who was killed fast (as opposed to someone else). It is assumed that there are default or preferred interpretations for sentences in isolation; for sentences in context, it is assumed that readers can derive the correct interpretation from that (global) context.

Only when needed, we represent the perspective scope in the annotations. The details of how this should be done for factuality and sentiment can be found in Chapters 7 and 8 respectively.

Chapter 5

Event detection

[*status: under development*]

5.1 Event: A Definition

This section describes the annotation guidelines for marking up all mentions of events in documents. The guidelines are based on the TimeML Annotation Guidelines (Pustejovsky et al., 2006), the NewsReader Annotation Guidelines (Tonelli et al., 2014), the ECB+ Annotation Guidelines (Cybulska and Vossen, 2014), the ISO-TimeML Framework (ISO, 2008), and the Richer Event Description (RED) Guidelines v1.7[1] (Styler et al., 2014). The guidelines applies to English and at document and mention levels (see Chapter 3 for details on the distinction between mentions and instances).

TimeML (and ISO-TimeML) defines events as "situations that happen or occur" (Pustejovsky et al., 2006). In TimeML, *events* is used as a cover term for describing both dynamic, static, durative and non-durative situations. States are additionally defined as "circumstances in which something obtains or holds true" (ibid.). In RED an event is defined as "any occurrence, action, process or event state which deserves a place upon a timeline, and could have any syntactic realization". This latter definition, based on semantics considerations and independent of syntactic considerations, will be adopted in the remainder of the guidelines as our definition of what is an event.

Following the ECB+ and the NewsReader guidelines, we include in the event annotation task also the annotation of the participants. The access to this type of information will play a major role in the perspective scope annotation (see Section 4.3).

5.2 Event Annotation Guidelines

The tag <EVENT> is used to annotate all linguistic realizations of (temporally relevant) event mentions[2].

[1] https://github.com/timjogorman/RicherEventDescription/blob/master/guidelines.md

[2] Note that in the (ISO, 2008) the term "instance" is used to refer to event mentions.

5.2.1 What is an event?

Following the RED guidelines, the first task is to distinguish between real event mentions and mentions which encode relationships (e.g. casusal or aspectual, among others) or correspond to purely grammatical elements (e.g. auxiliaries, modals, light verbs, and support verbs, among others). The key questions to be asked is whether a certain group of lexical items or a single one is expressing something that happen/happened/will/may happen, if it constitutes the description of a change of state, a process or of a set of processes, a situation, or a temporally bounded property. To clarify this issue, consider the following examples:

1. *People are buzzing about the release of the new iPhone.*
2. *I might come with you if you don't mind.*
3. *You seem to be happy.*
4. *The earthquake hit the coast*
5. *The party started at 10 oclock.*

Following our definition of event, we will have:

- in example 1 two event mentions: *buzzing* and *release*;
- in example 2 two event mentions: *come* and *mind*
- in example 3 one event: *(to be) happy*
- in example 4 one event mention: *earthquake*;
- in example 5 one event mention: *(the) party*

Things are more complicated when taking into account the eventivity of states. As reported in the RED guidelines, "all states **exist** on a timeline", thus this criterion is only necessary but not sufficient to decide which states are event or not. We have already restricted the annotation of states to temporally bounded states, thus excluding permanent properties (e.g. being tall or short in a person). In addition to this, we will adopt a further criterion: a state is considered as an event when "its use implies actual occurrences such as the events leading up to its own existence."[3]; e.g.:

6. *I came home and the door was **open**.* $\rightarrow$ it implies an event of opening the door.
7. *He walked through the open door.* $\rightarrow$ it does not imply an event of opening the door

Furthermore, adjectives used as specifiers or mere modifiers of entities (i.e. to restrict the description of an object or person) should not be annotated as event (e.g. "the *tall* boy", "the *yellow* canary", "the *retracted* study").

Some occurrences of event mentions may be complicated to be identified as they may correspond/denote or seem to denote more than one entity at the same time[4]:

[3] `https://github.com/timjogorman/RicherEventDescription/blob/master/guidelines.md#what-is-an-event`

[4] The following examples are taken from the RED Guidelines v1.7

8. *Remember to eat before the **vitamins**.*
9. *I recommend **Tylenol** three times a day.*
10. *He was sentenced to five years of **prison**.*
11. *A **bomb** disrupted the parade.*

These examples illustrates cases where the linguistic elements in bold assume an implicit event reading: something that happens in a location (the state of being implied by "*prison*"), a typical action (consumig/taking pills implied by "vitamins"; explosion implied by "*bomb*"), or a coreference relation with a "prototypical" event mention. Cases of implicit events must be always annotated.

5.2.2 <EVENT>: tag extent

Following the surface-oriented TimeML annotation philosophy, event annotation is based on the notion of *minimal chunks*, because higher constituents may contain more than one event expression. This means that only the head of the event denoting chunk will be marked up with the tag. Auxiliaries, polarity markers, particles, modifiers, complements and specifiers are not part of the extent of the tag. Nevertheless, to be more informative at the semantic layer, the minimal chunk rule is applied in a more flexible manner. **Multitoken event mentions** are allowed though restricted to: a) idioms, b) proper nouns, and c) prepositional phrases. Multitokens events are always annotated with a unique <EVENT> tag even when their surface realization is discontinuous. In the following paragraphs, we will specify for each part of speech which may realize an event mentions the corresponding annotation guidelines. In the examples, which will be used to clarify and illustrate the use of the markable, the target linguistic element realizing an event mention is underlined.

Events realized by VERBS All verbal predicates, including those that denote a state, give rise to events. Both finite and non-finite verb forms are annotated. The event token corresponds to the verbal head of the VP. Auxiliaries (both temporal and modal) are excluded from the tag extent;

12. *People are buzzing about the release of the new iPhone.*
13. *I might come with you if you don't mind.*

Mentions of aspectual verbs (e.g. start, begin, continue, stop, finish, initiate, re-initiate, complete, etc.) when contributes to signaling grammatical information concerning the BOUNDEDNESS of an event are not to be annotated; e.g.:

14. *We completed treatment today.* → "completed" is an aspectual event, no annotation.
15. *We completed the form.* → "completed" is a proper event

As for phrasal verbs, only the verbal head is annotated:

16. *He switched the light off.*

Events realized by NOUNS Events realized by nouns can correspond to:

- nominalizations;
- event nouns;
- contextual event readings or implicit events.

With "contextual event reading" of nouns we refer to a set of well know semantic phenomenons, such as type-coercion (e.g. *beginning a book*), metonymy (e.g. *The bomb ended the manifestation.*) and similar, which elicits an eventive reading of a noun which would normally refer to an entity (either concrete or abstract) or imply the occurrence of an event.

17. *The flight was scheduled at 08.00 p.m.*
18. *The meeting lasted 3 hours.*
19. *A panic attack can be dangerous.*
20. *A bomb disrupted the parade.*

An extension with respect to TimeML and ISO-TimeML is the annotation of events realized by proper nouns (e.g. *World War II*). For this kind of events, the entire noun phrase realizing the event description must be annotated with a single <EVENT> tag, including temporal or other kinds of modifiers both in pre-nominal and post-nominal positions.

21. *The 1972 Summer Olympics ended in tragedy.*

Event-denoting nouns in pre-modifier position are never to be annotated as event mentions:

22. *The election defeat was annoying.*
23. *The panic attack was scaring.*
24. *That recision biopsy analysis of the sigmoid colon today.*

The same applies for present participles:

25. *knitting needle*[5]
26. *drinking problem*

Nouns occurring in constructions of the kind "N_1 *of* N_2": the following cases can occur:

- both nouns refer to entities: no element must be annotated;

    27. *The* cat_{N1} *of my* $mother_{N2}$.

[5] "needle" is an entity, therefore it will never be annotated as an event.

- N_1 functions as an aspectualizer of N_2 (i.e. it makes explicit grammatical information related to BOUNDEDNESS, ABRUPTNESS and DURATION (Simone and Masini, 2007)), then N_1 must NOT be marked with the <EVENT> tag; only N_2 must be annotated if an event;

  28. *the begin of the plague*$_{N2}$.
  29. *a burst of* *enthusiasm*$_{N2}$.
  30. *the outbreak* *measles*$_{N2}$.

- N_1 denotes an event and N_2 but N_2 does not, then only N_1 be marked with the <EVENT> tag;

  31. *the* *shot*$_{N1}$ *of the gun*$_{N2}$.

Similarly to verbs, aspectual nouns are not annotated (as already stated above) as events. Nevertheless, some nouns which may functions as an aspectualizer of an event (e.g. 'outbreak") must be annotated if subsequently in the text they are (coreferentially) referred to as proper events. Consider this example:

27. *The outbreak of the measles was unexpected.*
28. *The outbreak of the measles was unexpected. The outbreak occurred yesterday in a school downtown.*

Events realized by ADJECTIVES Adjectives normally denote stative events. Adjectives are to be annotated only when they denoted temporally bounded properties or when their presence implies the actual occurrence of another event. When in predicative position, only the adjectival head of the predicative construction must be annotated. What follows are examples of adjectives as predicative complement of verbal constructions:

- copular constructions (*be*, *seem*, etc.);

  29. *The crowd seems angry.*

- inchoative predicates;

  30. *The crowd became angry.*

- aspectual predicates;

  31. *The crowd keeps angry.*

- causative predicates;

  32. *The police made the crowd angry.*

- perception predicates;

  33. *The crowd looked angry.*

- evaluative and descriptive predicates.

  34. *The crowd is often described as angry.*

The list above is not exhaustive. Please remember that:

- all adjectives in predicative position must be annotated as events even if they are NOT the complement of a verbal predicate but temporally bounded;
- in case of doubt DO NOT mark the adjective.

As for adjectives in attributive position, they can be marked as events only when their occurrence "implies actual occurrences such as the events leading up to its own existence". In addition to this, in case of a clear coreference relations or SET/MEMBER relationships with other adjectives marked as event, adjectives must be marked as event event if they fail the implied event test.

Events realized by PREPOSITIONAL PHRASES Prepositional Phrases (PPs) denote an event only when in predicative constructions, i.e. predicative complements (e.g. copular constructions, inchoative predicates, aspectual predicates, and causative predicates). Only the head of the prepositional phrase (i.e. the preposition) is to be annotated[6].
However a few exception to this rule apply:

- in case the PP is an entry in the in the British or American version of the Collins English Dictionary online,[7] the minimal chunk rule does not apply and the extent of the tag corresponds to the whole expression.

  29. *According to the president you must resign.*
  30. *All people on board died.*

- if the verb, noun, adjective head of the PP denote an event itself, then the verb, noun, adjective head must be annotated;

  31. *The program started with an interview.*
  32. *He is characterized as eccentric.*

Multitokens verbal events: Strict application of the minimal chunk rule is not always functional from a semantic point of view. The same rule as for prepositional phrases is applied: the extent of idioms is to be annotated as the whole expression when they appear as an entry in the British or American version of the Collins English Dictionary online.[8] In case the components of the multitoken events are discontinuous, they must all be annotated with a unique tag:

29. *My computer has kicked the bucket.* (idiom)

Complex Event Constructions: Special rules apply to complex event constructions.

- Light verb constructions: they are predicates involving a verb with a null or very low semantic content (e.g. *make, get, take, put, have,* etc.) and a noun as its argument. We annotate only the the noun:

  30. *He took a shower.*

[6] Good examples to be found.
[7] http://www.collinsdictionary.com/dictionary/english/
[8] http://www.collinsdictionary.com/dictionary/english/

31. *I got more support from my boss*.

- Copulative constructions: they are predicate realized by a copular verb (*be, seem* etc.) followed by an NP, AP or PP. Only the predicative complement will be annotated following the rules for NP, PP or AP, annotation:

    32. *Hillary Clinton is the most successful candidate for the 2016 election. - the most successful candidate for the 2016 election* is an entity, not an event[9].
    33. *There will be deaths*.
    34. *The crowd looked angry. - looked* is a perception predicate
    35. *A disease that is highly contagious may kill people*.

5.2.3 BNF description of the <EVENT>: tag

```
attributes ::= id [comment]
id ::= <integer>
comment ::= CDATA
```

[9] Sortal states are not annotated.

Chapter 6

Attribution relations

[*status: under evaluation*]

6.1 Attribution Relations: A Definition

The Penn Discourse TreeBank (PDTB) (Prasad et al., 2006) and the Penn Attribution Relation Corpus (PARC) (Pareti, 2012) are the two reference corpora for Attribution Relations (ARs). The following sections report on the annotation guidelines for ARs. These guidelines have been developed on top of and are compliant with the PARC v.30 annotation guidelines (Pareti, 2015).

An AR signals an ownership relation between a third party (i.e. the owner) expressing an attitude and some text. Following the PARC v.30 annotation guidelines, the text towards which an attitude is expressed can be:

- an utterance or an assertion (i.e. either reported speech, or indirect reported speech, or mixed reported speech);
- a belief;
- a knowledge;
- an intention (either an agent influences someone to perform - or not - an action; or an agent commits to performing - or not - an action; or an agent expresses an (mental) orientation towards some state of affairs).

An AR is typically expressed by three components:

- a SOURCE: the owner of the attitude. A SOURCE is typically an agent (animate or inanimate). It can be realized by Named Entities (of types PERSON, ORGANIZATION or COUNTRY); Proper Nouns; Noun Phrases (indefinite NPs, full definite NPs, or pronouns). In the following examples all sources are marked in bold; e.g.:
  1. **It** is said that people are scared about vaccines.
  2. **John** ordered the children to go away.

3. **China** claimed the possession of the Senkaku islands.
4. **People** blame the park for the measles outbreak.
5. **He** said he would come.

- a CUE: it is a lexical item (a verb, a noun or a Prepositional Phrase) which explicitly signals the ownership relationship between a SOURCE and a CONTENT. It can also signal the type of AR (e.g. assertion or belief). In the following examples all cues are marked in bold; e.g.:

6. It is **said** that people are scared about vaccines.
7. John **ordered** the children to go away.
8. China **claimed** the possession of the Senkaku islands.
9. People **blame** the park for the measle outbreak.
10. He **said** he would come.

- a CONTENT: it is a text portion which "is perceived as meant to be attributed to the SOURCE." (add ref). The CONTENT contains the linguistic material which the SOURCE makes "public". The CONTENT should be understood as that portion of a text which can express/realize a discourse on its own, not simply a description of what is expressed. In the following examples all contents are marked in bold; e.g.:

1. It is said **that people are scared about vaccines**.
2. John ordered **the children to go away**.
3. China claimed **the possession of the Senkaku islands**.
4. People blame **the park for the measles outbreak**.
5. He said **he would come**.

Elements which may signal additional relevant information, such as the recipient of an order or of an assertion, information concurring to the identification of the provenance of a content (e.g. [said] on the phone), event specifications of time and place, or further specification of an attitude of the source, and similar are NOT annotated. We depart from the PARC v30 guidelines with respect to this points[1].

6.2 Annotation Approach

We follow the approach reported in the PARC v.30 guidelines as far as avoiding to split the annotation in separate subtasks (e.g. annotate all sources, then annotated all cues etc.).

The annotator will first have to read the entire text and then every time that a AR is spotted in the text, s/he will have to annotated all relevant markables and relations (i.e. the entire AR) at once.

6.3 Attribution Relation Markables Annotation

An AR is expressed by at most 3 markables:

[1] In PARC these elements are annotated with the `<SUPPLEMENT>` tag

- <AttrSource>: this markable is used to annotate all mentions of sources in an AR as defined above. It corresponds to the PARC v.30 <Source> markable;
- <AttrCue>: this markable is used to annotate all mentions of cues in an AR. t corresponds to the PARC v.30 <Cue> markable;
- <AttrContent>: : this markable is used to annotate all mentions of contents in an AR as defined above. t corresponds to the PARC v.30 <Content> markable;

An AR link (non-text consuming tag), realized by the markable <Attribution_link>, is used to connect the three components of an AR. With respect to the PARC v.30 annotation, we do not create a link between the CUE and the SOURCE and another between the CUE and the CONTENT. The <Attribution_link> connects directly the SOURCE and the CONTENT, the CUE is annotated by means of an attribute of the link in a similar way to the presence of a signal in a temporal relation annotation as proposed in TimeML (Pustejovsky et al., 2006).

6.3.1 The <AttrSource> tag

The <AttrSource> tag is the markable used to annotated sources in an AR. The annotation of the <AttrSource> follows the instructions reported in the PARC v.30 guidelines concerning the span extent.

The source of an AR is any entity (animate or inanimate) which has the role of an agent and owns a specific attitude towards a certain linguistic material expressed by the content.

The span of the <AttrSource> tag corresponds to the maximal Noun Phrase realizing the source in the text. Appositions and relative clauses which contributes to the characterization of the source must be included in the tag span (including the punctuation marks like commas which can visually characterize these text spans.) e.g.:

30. He said he would come.
    <AttrSource>He</AttrSource> said he would come.
31. Mr Potts, the owner of Pottery Inc., refused to pay his debts.
    <AttrSource>Mr Potts, the owner of Pottery Inc.,</AttrSource> refused to pay his debts
32. ”Unbelievable!” said John Harris, a university official who is working on gravitational waves.
    ”Unbelievable!” said <AttrSource>John Harris, a university official who is working on gravitational waves</AttrSource>.

In case the source element is realized by an adjective, i.e. a premodifier of a NP with an (coreferential or associative) anaphoric link to a source previously expressed in the text or which makes the source implicit in the text available among the entities in the Universe of the Discourse, the maximal NP must be annotated as well. Exceptions to this rule applies for possessive adjectives: in case a possessive adjective modifies a potential noun which can function as a cue, then only the possessive adjectives must be marked with the <AttrSource> tag. In the examples below, we have underlined the adjectival pre-modifiers which indirectly refer to a source e.g.:

33. The presidential report shows that the amount of digitized data has increased a lot.
    <AttrSource>The presidential report</AttrSource> shows that the amount of digitized data has increased a lot.

34. His advice: ”Run!”
    <AttrSource>His<AttrSource> advice: ”Run!”

35. According to his report the figures are expected to increase.
    According to <AttrSource>his report<AttrSource> the figures are expected to increase.

In case the source element is realized by a relative pronoun and the AR is realized in a relative clause, then only the relative pronoun must be annotated as source. Anaphoric relations are out of the scope of this task; e.g.:

36. The bank, which said it could not be able to repay all of its debt, has lost 10% of its value on Wall Street.
    The bank, <AttrSource>which<AttrSource> said it could not be able to repay all of its debt, has lost 10% of its value on Wall Street.

Underspecified sources When a source of an AR is explicitly realized by an NP or other lexical items or it expresses a referent (e.g. “some people”; “rumors” etc) which cannot be associated with any external referent in the world; they have a linguistic expression signaling their presence:

37. **Rumors** say that . . .

38. **Some people** report . . .

39. **Officials** from the Pentagon deny . . .

Implicit sources Sources which have a linguistic realization in the text (e.g. a pronoun), which cannot be associated with any specific referents or be resolved with any previously mentioned entities. In other cases, the presence of use of particular syntactic construction (e.g. passive) and a cue is used to signal the presence of this implicit sources. We assume that these sources corresponding to the author. The annotation of implicit sources is conducted as follows:

- In case there is a lexical item realized in the text, the lexical item must be annotated with a <AttrSource> tag and type Author; e.g.:

  40. It is stated that . . .
      <AttrSource>It</AttrSource> is stated that . . . .

- In case there is no lexical item realized in the text, then the source will be annotated with an empty <AttrSource> tag and type Author; e.g.:

  41. Prices are expected to rise.
      <AttrSource type="Author"/>

Notice: attribution relation are NOT evidential relations. The source (animate or inanimate) MUST express an intention or a volition. Special cases of sources are to be considered news reports, documents, reports and similar which implies the presence of a human being which have intentionally created them. Bare evidences (e.g. figures from a statistics) should not be considered or annotated as sources: there is no intention or volition in ”making them available, the intention is normally to use them to support some line of reasoning. Compare the two examples (taken from PARC v30 guidelines):

40. The report shows that deaths on urban interstate highways rose 7% between 1986 and ...
    <AttrSource>The report</AttrSource> shows that deaths on urban interstate highways rose 7% between 1986 and ...
41. The figures from the past years show that deaths on urban interstate highways rose 7% between 1986 and ...

The <AttrSource> Attributes

The <AttrSource> tag one attribute:

- Source_type

Source_type: non-optional attribute. Every time a source is annotated, the type of the source must be specified. By type of the source, we are not referring to entity typing like in Named Entities tasks (e.g. PERSON, ORGANIZATION etc.) but rather to the semantic transparency of the source in the document. The values of the attributes are the following:

- **Explicit**: this value is used every time a third party source is introduced in the text. An explicit source is a source whose identity can be easily retrieved and identified as unique. Explicit sources do not necessarily corresponds to entities linked to structured knowledge repository like DPpedia or Wikipedia. An explicit source corresponds to a lexical items or an NP whose referent in *any possible worlds* can be identify. In other terms, the source can be identified as a *Character*; e.g.:

  42. **The note** states that ...
  43. **The president of the U.S.A** claimed ...
  44. **He**[2] wanted to go ...
  45. **A spokesperson of the White House** ...

- **Generic**: this value must be assigned to underspecified and generic sources; e.g.:

  46. **Rumors** say that ...
  47. **Some people** report ...
  48. **Officials from the Pentagon** deny

- **Author**: this value is to be used anytime that the author of the document is expressing an AR. Author as a source is normally realized by means of syntactic constructions (e.g. passives of cues) and not lexically realized:

  49. The Senate[3] is expected to reach an agreement today.
      <AttrSource Source_Type="Author"/>

[2]The pronoun can be resolved to a unique explicit entity.
[3]In PARC "The Senate" is annotated with the <SUPPLEMENT> tag.

6.3.2 The <AttrCue> tag

The <AttrCue> tag is used to annotate all mentions of a lexical items which explicitly introduces an AR.

In terms of parts-of-speech, cues can be realized by (for examples on possible AR cues see the lists of Attribution Verbs and (potential) Attribution Nouns from (Pareti, 2015):

- Verbs
- Nouns
- Adjectives
- Graphic markers
- Prepositional groups/Prepositions (*according to*; *in the eyes of* ...)

Following the PARC v.30 guidelines, **one cue can be associated to only one AR**. A cue cannot be involved in more than one AR. Cues could also be NOT realized in an AR: in these cases we will deal with ARs composed by only CONTENT (and possibly SOURCE of type Author) or a pair of SOURCE and CONTENT. Multiple cues in coordination relation must be annotated as separate mentions and will give rise to separate ARs although the source and content may be the same.

A cue normally realizes an event. In compliance with other annotation layers provided in this scheme, cues' annotation is performed following the event annotation guidelines 5. In particular:

- In case the cue is realized by a verb, noun or adjective, follow the minimal chunk approach: annotate the phrase head, excluding all pre- and post-modifiers, articles, auxiliaries (including modals), negative particles, adverbials and similar; e.g.:

  42. The report shows that deaths on urban interstate highways rose 7% between 1986 and ...
      The report has <AttrCue>shown</AttrCue> that deaths on urban interstate highways rose 7% between 1986 and ...
  43. Our hope is that the Senator will leave office.
      Our <AttrCue>hope</AttrCue> is that the Senator will leave office.
  44. He did not say he will ...
      He did not <AttrCue>say</AttrCue> he will ..
  45. I am hopeful that I will get a promotion.
      I am <AttrCue>hopeful</AttrCue> that I will get a promotion.
  46. The Senate is expected to reach an agreement today.
      The Senate is <AttrCue>expected</AttrCue> to reach an agreement today

  check if compliant with event annotation for copula

- In case the cue is realized by a prepositional group or a preposition, always annotate the full prepositional group; e.g.:

  47. According to Mary John must leave now.
      <AttrCue>According to</AttrCue> Mary John must leave now.

- Punctuation markers such as semicolons, commas, and similar MUST be annotated only when NO OTHER LEXICAL CUE is available. Quotation marks are NOT part of the cue span, but they are part of the content, as proposed in the PARC v.30 guidelines; e.g.:

  48. His advice: "Run!"
      His <AttrCue>advice</AttrCue>: "Run!"
  49. The MP was delusional: "I will rule the world!"
      The MP was delusional <AttrCue>:</AttrCue> "I will rule the world!"

Cases in which the cue is not present It some cases the cue could be implicitly stated or not lexically realized. Textual genres may influence such cases. In news articles, a general case of missing cue in an AR is represented by isolated sentences which report a direct quotation. To clarify, consider the annotation of the following two sentences from PARC v.30:

42. As the crowd [...] shouted "ANC, ANC" the old man shot his fists into the air.
    "I am inspired by the mood of the people". (PARC v.30 annotation - wsj_2454.xml)

In this short excerpt, we are facing two attribution relations, which must be annotated as follows (notice the rule: once cue, one AR):

AR1:
<AttrSource> - the crowd
<AttrCue> - shouted
<AttrContent> - "ANC, ANC"

AR2:
<AttrSource> - the old man
<AttrContent> - "I am inspired by the mood of the people"

Attributional status of verbs : As we have previously stated, cues can be realized by verbs. The following cases illustrates when a verb functions/may function as a cue of an AR (Pareti, 2015):

- ATTRIBUTIONAL VERBS (e.g.: verbs of reporting, knowledge, beliefs, verbs of influence, verbs of commitment, verbs of orientation);
- ATTRIBUTIONAL VERBS ENTAILING MANNER (e.g.: *quip, grouse, brag* etc.)
- MANNER VERBS ENTAILING REPORTING VERB (e.g.: *fume*)
- VERBS ENTAILING THE MANNER OF AN IMPLICIT CO-TEMPORAL REPORTING VERB (e.g.: *smile, sigh*, etc.)

6.3.3 The <AttrContent> tag

The <AttrContent> tag is used to annotated all mentions of content. Following the PARC v.30 guidelines, as a general principle the annotation of the content should be limited to that portion of the text that is confidentially perceived as meant to be attribute to a source.

Uncertain attribution due to syntactic ambiguities must NOT be annotated as contents; e.g.:

43. People are blaming the popular park the happiest park on earth for the outbreak.
    People are blaming texttt¡AttrContent¿ id=”001”¿the popular park</AttrContent> the happiest park on earth <AttrContent> id="001">for the outbreak</AttrContent>.
44. The Senate is expected to reach an agreement today.
    The Senate is expected ¡AttrContent¿to reach an agreement today¡/AttrContent¿.

General rules for the <AttrContent> tag annotation:

- Quotation marks, when present, must be included in the tag span;
- Content span may be discontinuous and span over sentence boundary;
- The complementizer “that” must always be included in the content span;
- Punctuation marks at the end of a content span must be included only if part of the content, otherwise it can be excluded; e.g.:
    45. The Senate is expected **to reach an agreement today.** [punctuation mark excluded]
    46. He said: **“I will rule the world!”** [quotation marks and punctuation mark included]
    47. I am wondering **how is that possible?** [punctuation mark included]

Content can be realized also by means of anaphoric relations with previously stated/asserted/believed etc. clauses or sentences in the text. In this case, only the anaphoric element must be annotated as content. The connection with the antecedent will be performed as part of an anaphora resolution task - out of the scope of this task; e.g:

45. But in the developed world it’s an artifact of the anti-vaccination movement, which has associated the vaccine with autism. **That connection**, promoted by the discredited British physician Andrew Wakefield and the starlet Jenny McCarthy, has been thoroughly debunked.
    <AttrContent>That connection</AttrContent>, promoted by the discredited British physician Andrew Wakefield and the starlet Jenny McCarthy, has been thoroughly debunked.

6.3.4 The <Attribution_link> tag

The <Attribution_link> is a link tag (e.g. non-text consuming) tag which connects together CONTENT and SOURCE. In our annotation guidelines these two elements will always be annotated: implicit source will be marked with empty <AttrSource> tags and the content is the only compulsory lexically realized element in an ARs.

The link annotation is a one-to-one relation connecting an <AttrSource> tag and an <AttrContent> tag. The directionality of the link is from <AttrSource> to <AttrContent>. Two nested tags, <source> and <target>, are part of the <Attribution_link> and are used to identify the SOURCE and CONTENT markables which compose an AR.

Cues are available in the annotation via the attribute Attributional_cue of the <Attribution_link>. In the CAT annotation tool, the cue annotation in an <Attribution_link> link is done by dragging

the cue elements over the Attributional_cue attribute. What follows are some examples to illustrate <Attribution_link> annotation and the full AR annotation. Each <Attribution_link> corresponds to a complete AR.

46. People are blaming the popular park the happiest park on earth for the outbreak.

    <AttrSource m_id="001" Source_type="Generic">People</AttrCue>
    are
    <AttrCue m_id="002">blaming </AttrCue>
    <AttrContent m_id="003">the popular park</AttrContent>
    the happiest park on earth
    <AttrContent m_id="003">for the outbreak<AttrContent>.

    <Attribution_link r_id="001" Attributional_cue="002">
    </source m_id="001">
    </target m_id="003">
    </Attribution_link>

47. The Senate is expected to reach an agreement today.
    The Senate is
    <AttrCue m_id="005">expected</AttrCue>
    <AttrContent m_id="006">to reach an agreement today</AttrContent>.

    </AttrSource m_id="007" Source_type="Author">

    <Attribution_link r_id="002" Attributional_cue ="005">
    </source m_id="007">
    </target m_id="006">
    </Attribution_link>

6.3.5 Additional AR Examples

In this section we report additional examples of annotation of attribution relations. To facilitate the reading of the examples we will mark in separate lines all markables, no link annotation will be provided.

48. The court found him guilty.
    SOURCE: The Court
    CUE: found
    CONTENT: him guilty

49. She told John to follow her.
    SOURCE: She
    CUE: told
    CONTENT: John to follow her

50. Marc wants to go home.
    SOURCE: Marc
    CUE: wants
    CONTENT: to go home

51. He seeks fame and fortune.
    SOURCE: He
    CUE: seeks
    CONTENT: fame and fortune

52. He spoke the truth.
    SOURCE: He
    CUE: spoke
    CONTENT: the truth

53. He said three words.
    No AR.

54. “I am sorry”. He said these three words.
    SOURCE AR1: He
    CUE AR1: said
    CONTENT AR1: these three words
    SOURCE AR2: He
    CONTENT AR2: “I am sorry”

55. She is seeking for clues to solve the case.
    NO AR.

56. He wants an ice-cream.
    NO AR.

57. John heard from Mary that he won the elections.
    SOURCE: Mary
    CONTENT: that he won the elections

58. John heard that he won the elections
    NO AR.

add list of verb cues classified per AR type

6.4 BNF descriptions

6.4.1 BNF description of the <AttrSource>: tag

```
attributes ::= id source_type [comment]
id ::= <integer>
source_type ::= [EXPLICIT | GENERIC | AUTHOR]
comment ::= CDATA
```

6.4.2 BNF description of the <AttrCue>: tag

```
attributes ::= id [comment]
id ::= <integer>
comment ::= CDATA
```

6.4.3 BNF description of the <AttrContent>: tag

```
attributes ::= id [comment]
id ::= <integer>
comment ::= CDATA
```

6.4.4 BNF description of the <Attribution_link>: tag

```
attributes ::= id source target cue [comment]
id ::= <integer>
source ::= IDREF
{source ::= AttrSourceID}
target ::= IDREF
{target ::= AttrContentID}
cue ::= IDREF
{cue ::= AttrCueID}
```

6.5 Annotation in CAT

Three distinct markables, <AttrSource>, <AttrCue>, and <AttrContent>, have been created with their corresponding attributes. The <AttrSource> markbale requires the value of the following attribute to be filled:

- source_type: with values EXPLICT, GENERIC, AUTHOR.

Once an AR is identified, the annotator has to mark all components of the AR. In addition to this, the single components must be linked by means of the <Attribution_link> relation. The link tag must be annotated as followed:

- the <AttrSource> tag will be the source of the link;
- the <AttrContent> tag will be the target of the link;
- the <AttrCue> tag will be the cue of the link;

Chapter 7

Belief/factuality

[*status: under evaluation*]

7.1 Factuality: A definition

The current chapter provides a definition of event factuality and describes the guidelines for its annotation, which are based on the FactBank Annotation Guidelines (Saurí, 2008) and the NewsReader Annotation Guidelines (Tonelli et al., 2014).

In FactBank, factuality is defined as "the level of information expressing the commitment of relevant sources towards the factual nature of events mentioned in discourse" (Saurí and Pustejovsky, 2009, p. 231). In other words, it expresses "whether events in discourse refer to real situations in the world (facts), have no real counterpart (counterfacts), or are of an uncertain nature (possibilities)" (Saurí, 2008, p. 2). The events to be annotated with factuality are defined in Chapter 5.

The three main elements that form the basis of all perspective relations have the following meaning with respect to factuality:

- **Source:** The lexical elements that refer to the entity committing to the factual nature of the event;
- **Cue:** The lexical elements that express the commitment of the source towards the factual nature of the event;
- **Target:** The lexical elements that refer to the event which factual status is evaluated by the source. It has three attributes:
  - CERTAINTY: expresses the degree of certainty of the source (certain, probable or possible);
  - POLARITY: expresses whether the event is affirmed or negated;
  - TIME: expresses the actual temporal anchoring of the event (future or non-future).

In the examples we use to illustrate factuality annotations, target events are underlined, cues are represented in bold face, and sources are italicized.

7.2 Factuality target

The target of a factuality relation is an event as defined in Chapter 5. Events have already been identified in the event layer. The factual nature of events, which is annotated in this layer, is annotated by using three attributes: certainty, polarity and time (van Son et al., 2014; Tonelli et al., 2014).[1] For all these attributes counts that the annotators should base their assessment uniquely on the knowledge available in the sentence expressing the event without using world knowledge or other knowledge taken from the text. In *Obama will be re-elected as president in 2016*, for example, *re-elected* is presented as a CERTAIN, AFFIRMATIVE, FUTURE event and should be annotated as such, even though the annotators know from their world knowledge that this is not true.

7.2.1 Certainty

The certainty attribute is used to express the degree of certainty of the source regarding the factuality of the event. The possible values are:

- CERTAIN; the source is certain that the event did or will (not) take place.
- PROBABLE; the source thinks it is probable that the event did or will (not) take place.
- POSSIBLE; the source thinks it is possible that the event did or will (not) take place.
- UNDERSPECIFIED; the source does not know whether the event did or will take place, or it is not expressed.

The default value is CERTAIN; events can only be POSSIBLE or PROBABLE if they are affected by some factuality cue in the text (e.g. *likely, hope, maybe, might*). Factuality cues are discussed in more detail in Section 7.3.

59. Harry will come to the party.
    come = CERTAIN
60. Harry will probably come to the party.
    come = PROBABLE
61. Harry might come to the party.
    come = POSSIBLE
62. Mary does not know whether Harry will come to the party.
    come = UNDERSPECIFIED

POSSIBLE vs. PROBABLE
We follow the guidelines from FactBank (Saurí, 2008) to distinguish between POSSIBLE and PROBABLE events. The idea behind the distinction is that while an event can be *possibly true* or *possibly not true* at the same time, it cannot be *probably true* and *probably not true* at the same time. Whether an event is possible or probable can be tested by denying the original statement using a marker of probability in a context of opposite polarity. If the resulting statement is logical or semantically valid, the correct certainty is POSSIBLE. If it is not, the certainty should be annotated as PROBABLE.

[1] The combination of the certainty and polarity attributes corresponds to factuality values defined in FactBank. For example, the combination CERTAIN/AFFIRMATIVE corresponds to CT+ in FactBank.

63. Harry might come to the party.
    TEST: *Harry might come to the party, but he probably will not.*
    come = POSSIBLE

64. I think that Harry will come to the party.
    TEST: **I think Harry will come to the party, but he probably will not.*
    come = POSSIBLE

7.2.2 Polarity

The polarity attribute is used to distinguish between events that are affirmed and events that are negated. There are three possible values:

- AFFIRMATIVE; the source thinks/knows that the event did or will take place.
- NEGATIVE; the source thinks/knows that the event did or will **not** take place.
- UNDERSPECIFIED; it is not possible to deduce whether the event is affirmed or negated.

The default value is AFFIRMATIVE; the NEGATIVE value can only be assigned if the event is affected by a polarity cue (e.g. *not, never*) or an attributional cue with negative meaning (e.g. *forget, deny*).

65. Harry will come to the party.
    come = POSITIVE

66. Harry will **not** come to the party.
    come = NEGATIVE

67. Harry **forgot** to come to the party.
    come = NEGATIVE

68. Mary **does not know whether** Harry will come to the party.
    come = UNDERSPECIFIED

7.2.3 Time

The time attribute is used to express the temporal interpretation of the event. Its possible values are:

- NON-FUTURE; according to the source, the event did (not) take place in the past or present.
- FUTURE; according to the source, the event will (not) take place in the future.
- UNDERSPECIFIED; it is not possible to deduce the temporal interpretation of the event.

Please note that the time attribute does **not** make explicit the surface tense form value. However, in many cases it is possible to *deduce* the value of a verbal event from the tense of the verb.

69. Harry came to the party.
    came = NON-FUTURE

70. Harry will come to the party.
    come = FUTURE

In other cases, the value of the time attribute cannot be deduced from the syntactic tense of the event. This is the case for: (a) infinitive verbs, (b) verbs preceded by a modal word (e.g. *would*, *may*), and (c) nouns. For these type of events, the annotator should use the context to decide whether the event is NON-FUTURE or FUTURE.

71. Harry might forget to come to the party.
    come = FUTURE

72. Harry would come to the party.
    come = NON-FUTURE

73. Harry came to the party.
    party = NON-FUTURE

Remember that the value of the time attribute is always relative to the relevant source. In the previous examples, the relevant source was the author of the text; in these cases, the value of the time attribute is relative to the time of writing. However, when the event is embedded in an attribution relation, its time should be interpreted in relation to the time of the attribution cue. For example, in Sentence 74 the event *come* is embedded in the attribution relation signaled by *said*. Even though the *coming* event might already have taken place, it should be annotated as FUTURE because, at the time, Sally made a statement about the future.

74. Sally **said** that Harry would come to the party.
    said = NON-FUTURE
    come = FUTURE

75. Harry **decided** to come to the party.
    decided = NON-FUTURE
    come = FUTURE

76. Harry **wants** to come to the party.
    wants = NON-FUTURE
    come = FUTURE

7.2.4 Special cases

Section following soon.

- General statement (GEN);
- Main clause of a conditional construction (COND_MAIN_CLAUSE);
- If-clause of a conditional construction (COND_IF_CLAUSE).

7.3 Factuality cue

We distinguish between two types of factuality cues: attributional cues and non-attributional cues. Attributional cues have two functions: first, they qualify the factual nature of the embedded event; second, they introduce the sources that commit to that factual nature of the event (therefore, they are also known as source-introducing predicates (SIPs) in the framework of FactBank). For example, the verb *expect* always expresses some degree of uncertainty towards the event according to a specific source (the subject of *expect*). In contrast, non-attributional cues influence the factual nature of the event without introducing an additional source to the text. For example, modal auxiliaries (e.g. *might, may*) express uncertainty about an event, but do not explicitly attribute the uncertainty to a source. All factuality cues have an effect on the event within their immediate local scope, but may contribute as well to characterizing the factuality of events expressed at a non-local level of embedding.

7.3.1 Attributional cues

Attributional cues are factuality cues that contribute an additional source to the text relative to which the factuality of the embedded event is assessed. For example, in the sentences below, both *say* and *suspect* introduce *Western countries* as a relevant source for assessing the factual nature of the event *rigged*. Whereas *suspect* depicts the event as merely a possibility according to Western countries, *say* presents it as a fact.

77. *Western countries* **say** that the election was rigged.
78. *Western countries* **suspect** that the election was rigged.

Per definition, each cue identified in the attribution layer (where statements are linked to their sources through the lexical items that signal the presence of an attribution relation, see Chapter 6) is an attributional factuality cue. Therefore, we do not need to identify them in the factuality layer again.

7.3.2 Modality cues

Modality cues affect the *certainty* of an event. Following (Saurí, 2008), we distinguish between the following modality cues:

- **Modal auxiliaries:** They introduce modality at the local context of a verbal event expression. They include: *can, could, may, might, must,* and *should*.
- **Clausal and sentential modal adverbs:** They introduce modality at a non-local level. Examples are: *apparently, certainly, necessarily, presumably, probably, possibly, reportedly, supposedly*.
- **Modal adjectives:** They are able to introduce modality both at a local level and at a non-local level, since they include both adjectives that function as predicative complements and take a clausal complement (e.g. *it is **possible/probable/likely** that...*), and attributive noun modifiers (e.g. *the **supposed** decline*).
  Examples are: *apparent, certain, hypothetical, improbable, impossible, likely, necessary, presumed, probable, possible, reported, supposed, sure, uncertain, unlikely, unsure*.

7.3.3 Polarity cues

Polarity cues (or negation cues) affect the *polarity* of an event. In general, unmarked contexts are associated with affirmative statements with a positive polarity (e.g. Sentence 79), and polarity cues shift the polarity into negative (e.g. Sentence 80). However, when the polarity of an event is set to negative by another polarity cue or an event-selecting predicate with negative meaning, such as *denied* in Sentence 81, polarity cues can also shift the polarity back to positive.

79. Mary won the game.
80. Mary did **not** win the game.
81. Paul **denied** that Mary did **not** win the game.

Following (Saurí, 2008), we distinguish between the following polarity cues:

- **Polarity adverbs.** Examples are: *no, nor, neither, never, almost, too*.
- **Polarity determiners.** Examples are: *no, non, neither, little*.
- **Polarity pronouns.** Examples are: *none, nobody, nothing, nowhere*.
- **Polarity affixes.** Examples are: *in-, un-, non-, de-, dis-, a-, anti-, im-, il-,* and *ir-*.

These polarity cues can be introduced at different structural levels: at the clausal level of the event (immediately scoping over the event-referring expression), at the subclausal level (affecting one of the arguments of the event), or at the lexical level (by means of affixes such as *un-* in *unable*) (Saurí, 2008, p. 44-45).

Negating the predicate expressing the event. X

82. Mary did **not** win the game.

Negating one of the arguments of the event. This can be done using polarity pronouns (e.g. *nothing, nobody*) in the head position of the argument, or by means of *no* or *neither* as determiners in the NP expressing the argument. The following examples illustrate negation of the subject:

83. **Nobody** listened to the teacher.
84. **Neither** option was acceptable.

The same applies to the direct or indirect object:

85. The waiter received **no** tips.
86. The teacher gave **nobody** a second change.

Adverbial modification. Certain adverbial constructions negate the event as well. For example, time or place negative adverbials, infinitival constructions dependent on the degree adverb *too*, or adverbs such as *almost* directly modifying the event denoting expression.

87. The children **never** listen to the teacher.
88. The key was **nowhere** to be found.
89. He was **too** proud to even try.
90. Mary **almost** won the game.

7.4 Factuality source

The factual status of a event in text is always relative to a specific source committing to that status. By default, event mentions have an implicit source that corresponds to the author of the text. For example, if the following sentence occurs in a news article, the source that commits to the factual status of the *release* event is the journalist that wrote the article:

82. Apple will release a new version of its iPhone next week.

    Factuality annotations:

source	**cue(s)**	**target**	**certainty**	**polarity**	**time**
author	-	release	CERTAIN	AFFIRMATIVE	FUTURE

Except when the author is lexicalized through the first personal pronoun (*I*, *in **my** opinion*), we do not annotate this source since we cannot anchor it to a lexical item in the text. Instead, by default we take the author to be the source, unless otherwise specified. The latter is the case when the author uses an attributional factuality cue (Section 7.3) to introduce another source to the text that has a stance towards the factual nature of the event. In Sentences 83 and 84, for example, *said* and *fears* introduce *the children* and *Naomi* respectively as relevant sources relative to which the factuality of *ran* and *come* should be evaluated.

83. *The children* **said** that the dog ran away.

    Factuality annotations:

source	**cue(s)**	**target**	**certainty**	**polarity**	**time**
the children	said	ran	CERTAIN	AFFIRMATIVE	NON-FUTURE

84. *Naomi* **fears** that Harry may not come anymore.

    Factuality annotations:

source	**cue(s)**	**target**	**certainty**	**polarity**	**time**
Naomi	fears, may, not	come	POSSIBLE	NEGATIVE	FUTURE

There is a natural *nesting* of sources in texts. For example, the reader of Sentence 84 above only learns the stance of *Naomi* towards the *come* event according to what the author of this sentence asserts. Therefore, strictly speaking, we should say that the relevant source for evaluating the factual status of *come* is *Naomi according to the author*, which we could represent as $\{author\_Naomi\}$. The author himself remains uncommitted to the factual status of *come*. Similarly, in Sentence 85 below, where one attributional cue (*fears*) is embedded in another (*said*), the correct nested source of the *come* event is $\{author\_Paul\_Naomi\}$. In contrast to FactBank, in principal we only annotate factuality values of events according to their most nested source (e.g. *Naomi* for *come*). The reason for this is that we can assume that in most cases nesting sources will remain uncommitted to the factual status of the event.

85. *Paul* **said** that *Naomi* **fears** that Harry **may not** come anymore.

Factuality annotations:

source	cue(s)	target	certainty	polarity	time
author	-	said	CERTAIN	AFFIRMATIVE	NON-FUTURE
Paul	said	fears	CERTAIN	AFFIRMATIVE	NON-FUTURE
~~author~~	-	~~fears~~	~~UNDERSP.~~	~~UNDERSP.~~	~~UNDERSP.~~
Naomi	fears, may, not	come	POSSIBLE	NEGATIVE	FUTURE
~~Paul~~	~~said~~	~~come~~	~~UNDERSP.~~	~~UNDERSP.~~	~~UNDERSP.~~
~~author~~	-	~~come~~	~~UNDERSP.~~	~~UNDERSP.~~	~~UNDERSP.~~

An exception to this rule is when there is an explicit disagreement expressed between the nested source and the nesting source. For example, *unnecessarily* in Sentence 86 expresses that Paul disagrees with Naomi about the factual status of *come*. In these cases, we also annotate the factuality values according to the nesting source (in this case, *Paul*).

86. *Paul* **said** that *Naomi* unnecessarily **fears** that Harry **may not** come anymore.

Factuality annotations:

source	cue(s)	target	certainty	polarity	time
author	-	said	CERTAIN	AFFIRMATIVE	NON-FUTURE
Paul	said	fears	CERTAIN	AFFIRMATIVE	NON-FUTURE
Naomi	fears, may, not	come	POSSIBLE	NEGATIVE	FUTURE
Paul	said, fears, may, not, unnecessarily	come	CERTAIN	AFFIRMATIVE	FUTURE

7.5 Perspective scope

The notion of perspective scope was introduced in Section 4.3, where it was defined as the phenomenon where only specific semantic aspects of an event (or entity) are affected by a perspective cue. In the case of factuality, it means that the identified factuality cues (see Section 7.3) affect only certain aspects of events. In most cases, these aspects are expressed as arguments of an event predicate.

The perspective scope of factuality is only annotated when it is needed. More specifically; we annotate it only when there are multiple predicate-argument relations expressed in the sentence that are candidates for the target of a factuality cue and only one or some of them are affected by this cue. Consider Sentence 87 below; semantically, the uncertainty of *Sally* expressed by *thinks* is directed towards the specific relation between *kill* and its Arg1, *John*. However, it is not needed to annotate this specific relation as the target of the uncertainty expressed by *think*, since there is no other argument expressed in the sentence that is a candidate target as well. Instead, it suffices to directly annotate *kill* (representing the whole proposition) as the target of factuality. This target is represented as f(e2) below.

87. *Sally* thinks$_{e1}$ that John was killed$_{e2}$.

Factuality annotations:

source	target	certainty	polarity	time
author	f(e1)	CERTAIN	AFFIRMATIVE	NON-FUTURE
Sally	f(e2)	PROBABLE	AFFIRMATIVE	NON-FUTURE

In contrast, in Sentence 88 the predicate *killed* has two arguments. The most likely interpretation of the sentence is that it has been established by Sally that John was killed, but that there is uncertainty about

who was the killer. So although there are two candidate arguments in the sentence, the factuality cue *thinks* only affects the certainty of the argument that fulfills the Arg0 role of the predicate *kill*. Therefore, we need to assign different factuality values for each of the target predicate-argument relations, which are represented as f(e2,Arg0) and f(e2,Arg1) below.

88. *Sally* **thinks**$_{e1}$ that John was killed$_{e2}$ by Kim. (But Harry thinks that he was killed by Tom.)

Factuality annotations:

source	target	certainty	polarity	time
author	f(e1)	CERTAIN	AFFIRMATIVE	NON-FUTURE
Sally	f(e2,Arg0)	PROBABLE	AFFIRMATIVE	NON-FUTURE
Sally	f(e2,Arg1)	CERTAIN	AFFIRMATIVE	NON-FUTURE

More examples are shown below; we illustrate the factuality annotations of only those events that require specification on the perspective scope.

89. *I* **think**$_{e1}$ that the mood is fairly gloomy$_{e2}$, and *I* **think**$_{e3}$ it's not going to change$_{e4}$ for a couple of years.

Factuality annotations:

source	target	certainty	polarity	time
I (author)	f(e4,Arg1)	UNDERSP.	NEGATIVE	FUTURE
I (author)	f(e4,ArgM-TMP)	PROBABLE	NEGATIVE	FUTURE

90. By mid afternoon, *official Serb sources* were **saying**$_{e1}$ the operation$_{e2}$ was over$_{e3}$, but that has not yet been **confirmed**$_{e4}$ from *Belgrade*, the capital of Serbia, which is where the whole attack$_{e5}$ is **thought**$_{e6}$ to have been planned$_{e7}$.

Factuality annotations:

source	target	certainty	polarity	time
gen_author	f(e7,Arg1)	CERTAIN	AFFIRMATIVE	NON-FUTURE
gen_author	f(e7,ArgM-LOC)	PROBABLE	AFFIRMATIVE	NON-FUTURE

91. *Nhek Bunchhay* **said**$_{e3}$ *he* now **believed**$_{e3}$ Howes had been killed$_{e3}$ within a week of his capture$_{e3}$ by a Khmer Rouge faction loyal to Pol Pot.

Factuality annotations:

source	target	certainty	polarity	time
he/Nhek Bunchhay	f(e3,Arg1)	CERTAIN	AFFIRMATIVE	NON-FUTURE
he/Nhek Bunchhay	f(e3,Arg0)	PROBABLE	AFFIRMATIVE	NON-FUTURE
he/Nhek Bunchhay	f(e3,ArgM-TMP)	PROBABLE	AFFIRMATIVE	NON-FUTURE

92. The World Court Friday rejected$_{e1}$ *U.S. and British* **objections**$_{e2}$ to a Libyan World Court case$_{e3}$ that has blocked$_{e4}$ the trial$_{e5}$ of two Libyans **suspected**$_{e6}$ of blowing$_{e7}$ up a Pan Am jumbo jet over Scotland in 1988.

Factuality annotations:

source	target	certainty	polarity	time
gen_author	f(e7,Arg0)	POSSIBLE	AFFIRMATIVE	NON-FUTURE
gen_author	f(e7,Arg1)	CERTAIN	AFFIRMATIVE	NON-FUTURE
gen_author	f(e7,ArgM-TMP)	CERTAIN	AFFIRMATIVE	NON-FUTURE
gen_author	f(e7,ArgM-LOC)	CERTAIN	AFFIRMATIVE	NON-FUTURE

93. I don't remember$_{e1}$, maybe Obama was born$_{e2}$ in 1961.

Factuality annotations:

source	target	certainty	polarity	time
I (author)	f(e7,Arg0)	CERTAIN	AFFIRMATIVE	NON-FUTURE
I (author)	f(e7,ArgM-TMP)	POSSIBLE	AFFIRMATIVE	NON-FUTURE

7.6 BNF descriptions

7.6.1 BNF description of the <SOURCE>: tag

```
attributes ::= id [comment]
id ::= <integer>
comment ::= CDATA
```

7.6.2 BNF description of the <CUE>: tag

```
attributes ::= id attributional modifies_modality modifies_polarity [comment]
id ::= <integer>
attributional ::= ATTRIBUTIONAL | NON-ATTRIBUTIONAL
modifies_modality ::= YES | NO
modifies_polarity ::= YES | NO
comment ::= CDATA
```

7.6.3 BNF description of the <TARGET>: tag

```
attributes ::= id certainty polarity time special_cases [comment]
id ::= <integer>
certainty ::= CERTAIN | POSSIBLE | PROBABLE | UNDERSPECIFIED
polarity ::= AFFIRMATIVE | NEGATIVE | UNDERSPECIFIED
time ::= NON_FUTURE | FUTURE | UNDERSPECIFIED
special_cases ::= NONE | GEN | COND_MAIN_CLAUSE | COND_IF_CLAUSE
comment ::= CDATA
```

7.7 Annotation in CAT

A <Factuality> markable has been created with several attributes:

- Certainty_value, with values CERTAIN, PROBABLE, POSSIBLE, UNDERSPECIFIED.
- Polarity_value, with values POSITIVE, NEGATIVE, UNDERSPECIFIED.
- Certainty_cue: reference link to the cue that expresses certainty.

- Negation_cue: reference link to the cue that expresses negation.
- Factuality_source: reference link to the source from whose perspective the factuality value is assigned. Some sources will already have been marked in the attribution layer. If no markable is linked, the source is by default the author.
- Attributional_cue: reference link to the word(s) that attribute content to a source.
- Source_type, with values AUTHOR, EMBEDDED. To be decided whether the Source_type attribute is necessary.

If an event is assigned factuality values by different sources, a factuality annotation will be created for each of the sources.

Chapter 8

Sentiment/opinion

[*status: work in progress*]

8.1 Opinion: A Definition

This section describes the annotation guidelines for marking up opinions in text. The guidelines are based on the MPQA guidelines (Wiebe et al., 2005), and the OpeNER guidelines for touristic reviews (REF) and opinions in news (REF). Wiebe's definition of *private state*, widely used in opinion mining, describes an opinion as a kind of inner state that is not open to verification (REF Quirck). This notion includes beliefs, thoughts, feelings, emotions, goals, evaluations and jugdments. We adopt a narrower definition and consider only private states that express a **negative** or **positive** attitude as an opinion. These opinions include both the attitudes of the speaker or writer as the attitude attributed to some agent in the text.

8.2 Opinion triplet

Following many others (Wiebe et al., 2005; Toprak et al., 2010), we regard the opinion as consisting of 3 elements:

- holder (who): an entity (person or organisation) who holds the opinion (optional)
- target (about what): the object the opinion is targeted at (optional)
- opinion: a positive or negative attitude

8.2.1 Opinion

The opinion expressions annotations label the words in the sentence that express the opinion. They can be verbs, nouns, adverbs , adjectives, interjections, as illustrated by the following examples. Moreover, opinion expressions may consist of constituents or other pieces of text such as, for example, *the high volume of interest* in ex. (97) and (98).

94. Angela Merkel's immigration policy is **insane**, Donald Trump says.
95. According to Elton John Pope Francis is a **hero**
96. I **thank** him for his work.
97. Due **to the high volume of interest** in the Elton John tickets we have **unfortunately** sold out of tickets.
98. Despite just two albums to her name Amy Winehouse is **one of the biggest music icons** in British history.

Also from a semantic point of view, opinions can be lexicalized by words of different categories, such as emotions (*She **hates** John)*, stance taking expressions (I will **support** you) , agreeing expressions (*They **fulfilled** her wishes*), evaluating expressions (*An **amazing** house*) and others.
Opinion expressions have the following attributes:

semantic orientation/polarity

The opinion expression refers to the span of words that indicate a positive or negative attitude of the holder towards the target. The positiveness or negativeness of the opinion is called semantic orientation. The semantic orientation is identified while taking into consideration negation (cf. ex. 101) and polarity shifters (cf. ex. 102).

99. He is a **hero** - positive
100. I **like** this house - positive
101. I **don't like** this house - negative
102. I think they are **too kind** -negative

strength

The strength of an opinion is indicated by two values: average(default) and strong. It is identified while taking into consideration intensifiers and weakeners

103. He is a **real hero** - strong positive
104. I **adore** this house - strong positive

direct and indirect expressions Following Wiebe Wiebe et al. (2005), we distinguish between two types of opinion expressions direct opinion expressions and indirect opinion expressions[1]

Direct opinion expression denote the opinion of some agent in the text and simultanuously attribute this opinion to him. Indirect opinion are merely connoted or elicited by the way something is described or by a particular wording.

The difference between these two types of expressions is illustrated in the following examples:

[1] similar to Wiebeś direct subjective expressions and expressive subject elements

105. Amnesty International has *criticized* the sentencing of 13 Catholic activists to up to 13 years in prison. (direct)

106. Amnesty International called the punishment *part of an escalating government crackdown on freedom of expression.*(indirect)

In both sentences there is a negative attitude expressed of the opinion holder Amnesty International. In ex. 105 the negative attitude towards the target is expressed by the verb *criticized*, which directly denotes and expresses the type of attitude held by the opinion holder. Also, these kind of attitude expressions often attribute to the opinion holder by means of their syntactic properties: there needs to be someone that *is criticizing*. These kind of expressions are called direct expressions. In ex. 106 on the other hand, the negative attitude is expressed by the words between quotation marks: *part of an escalating government crackdown on freedom of expression*. In this case, the negative attitude can be inferred from the content of the words. The inferred attitude would be something like disapproval. We will call these kind of opinion expressions indirect expressions.
Direct expressions can be verbs (e.g.*blame*), nouns (*refusal*) or adjectives(*willing*) but they must refer to a cognitive process.

107. they demolish archeological sites
Opinion annotations:

holder	**opinion**	**target**
SW	indirect-negative (demolish)	archeological sites

108. the radio station slanders the prime minister
Opinion annotations:

holder	**opinion**	**target**
radio station	direct-negative (slander)	prime minister
SW	indirect-negative (slander)	radio station

8.2.2 Holder/Source

The holder of an opinion is the entity whose opinion is expressed. It can be, for example, a person or group of persons (cf. ex.109, 111, 112:*Mbeki*), an organisation (cf. ex.110) and their metonomical counterparts (cf. ex.(112:*newspaper report*, 113). Holders are often realised as the subject of the opinion verb, but they can also be found in other syntactic constructions (cf. ex. 111:*his* and ex.112:*newspaper report*).

109. **He** does not like this house.

110. **The school** refused to admit pupils with special needs.

111. **They** were happy with **his** refusal to join the army.

112. **Mbeki** questions the spendings on HIV/AIDS , according to **a newspaper report**

113. Gay rights is EU entry criterion, **Brussels** says

114. Unfortunately, the concert is cancelled. (**SW**)

The holder may be an agent in the discourse as in examples (109) to (113), but it can also be the speaker or writer(SW) who expresses his opinion (cf. ex. 114). Moreover, people may express opinions about other people's opinions leading to nested sources in one sentence. For example, sentence 111 includes two holders: *they* being happy and *his* who is refusing. The second source is nested as it is only according to *they* that 'he' is refusing. Likewise ex. (113) presents the two holders *newspaper report* and *Mbeki*. The following examples show in more detail how these cases are annotated:

115. Mbeki questions the spendings on HIV/AIDS , according to a newspaper report

Opinion annotations:

holder	**opinion**	**target**
Mbeki, newspaper report	direct-negative (questions)	spendings

116. They were happy with his refusal to join the army.

Opinion annotations:

holder	**opinion**	**target**
they	direct-positive (happy)	to join
his,they	direct-negative(refusal)	army

A special kind of holder is the 'anybody*'. This label used for holders that cannot be identified as a specific agent in the text nor as the SW (cf. ex.), but still seem to express an opinion.

117. I don't like this so-called beautiful house

Opinion annotations:

holder	**opinion**	**target**
I	direct-negative (don't like)	house
I	indirect-negative (so-called)	house
anybody*, I	indirect-positive (beautiful)	house

8.2.3 Target

The target of an opinion can vary from a one word entity to a whole sentence as illustrated by the following sentences. Semantically speaking, the target may be an entity (ex.118) or an event with or without participants (ex.119).

118. I like **John**.

119. I definitely support that **John will be part of the organisation of this meeting**.

A sentence may contain different opinions directed at the same target (120:*Internet Service*).

120. One of the most annoying things is the poor Internet Service.

Opinion annotations:

holder	**opinion**	**target**
SW	indirect-strong negative (One of the most annoying things)	Internet Service
SW	indirect-negative (poor)	Internet Service

8.3 Lexical elements with multiple functions

Lexical elements may have more than one function. Consider, for example, ex. (121) where the expression *boasting* is the opinion in two separate opinions with different holders and targets. Moreover, the semantic orientation of the verb *boasting* changes according to who is the holder. Example (122) shows that the target and opinion may be lexicalised by the same cue, i.e. *idiot*.

121. Damilola's killers were boasting about his murder..
Opinion annotations:

holder	**opinion**	**target**
SW	indirect-negative (boasting)	killers
killers	direct-positive (boasting)	murder

122. What an idiot!
Opinion annotations:

holder	**opinion**	**target**
SW	indirect-strong-negative (**idiot**)	**idiot**

8.4 Some examples

123. When the Imam issued the fatwa against Salman Rushdie for insulting the Prophet
Opinion annotations:

holder	**opinion**	**target**
Imam	issued the fatwa against	Salman Rushdie
Imam	negative (insulting)	Salman Rushdie
Salman Rushdie, Imam	negative (insulting)	the prophet

8.5 Description of the opinion tags

```
holder::=SW|anybody|CDATA
target::=CDATA
expression::=CDATA
expression attributes::=strength orientation expressionType1 expressionType2
strength::=STRONG|AVERAGE(default)
orientation::=POSITIVE|NEGATIVE
expressionType1::=DIRECT|INDIRECT
```

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