Discourse Linking by Bridging Anaphora: Clitic Left Dislocation

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1 Introduction

Interpreting a discourse involves the interaction of various sources of information. In addition to the linguistic knowledge given by the semantic content of an utterance, succesful interpretation requires contextual knowledge of various sorts. Roughly, one can distinguish discourse context, situational context and general world knowledge. The discourse context consists of previous utterances in the ongoing discourse and coherence relations between them. The situational context gives information about the discourse particpants as well as the temporal and spatial location of utterances. The main question adressed in this paper is how these sources of information interact while interpreting a discourse.

2 Framework

In this section we will introduce the underlying theoretical framework used in the rest of the paper. We assume that discourse interpretation consists of at least two levels. From the semantic content given by the linguistic data, an underspecified semantic representation can be constructed. We will use a notation following the developments of dynamic semantics as exemplified by DRT [10]. These semantic representations are further enriched by pragmatic inferences. These inferences must be nonmonotonic as they can be withdrawn by additional information that eventually shows up later in the discourse. To represent them we will use the standard notation of default logic [9]. [1] Interpretation means then to find a minimal model for

[1] A default rule of the form $\frac{A : B}{C}$, with precondition A, consistence assumptions B, and consequence C, has an intuitive interpretation as follows: If A is derivable and $\neg B$ is

the discourse. As byproducts, discourse relations will be established and the reference of anaphora will be resolved.

As a basic principle it will be assumed that discourses must be coherent. Coherence will be mainly achieved by two things. Firstly, an utterance is attached to the previous discourse by one ore more discourse relations. Secondly, coherence can by augmented by coreferring discourse anaphoras.

3 Bridging by clitic left dislocation

Discourse anaphora express a semantic relationship between two entities in a discourse. If this relationship is *identity* then the anaphora is coreferent to its antecedent. In other cases this relation is more indirect, in that the particular relation, e.g. *part-of* or *element-of*, must be inferred. These relations are called bridging references, a notion first introduced by Clark [3], and exhaustively described by Asher and Lascarides [2].

Some languages, especially romance languages like spanish and italian, have a special device that is often used to express bridging relations, called clitic left dislocation (CLLD), like the spanish example in (1).

(1) a. Juan preparó la comida.
Juan prepare-PAST DEF meal

b. La carne, la quemó.
DEF meat CL he-burn-PAST

This construction imposes certain constraints on the structure of the ongoing discourse. As López [7] shows, CLLD requires a subordinating discourse relation with an antecedent in the superordinated constituent.

Among the pragmatic properties that can be attributed to CLLD, two are particularly important: they are *contrastive* and *anaphoric*. Following López [7] and Arregi [1], the property [+contrastive] means that the construction evokes a set of alternatives. The dislocated constituent is that element of this set, which makes the predication of the sentence true. The property [+anaphoric] requires the discourse referent a for the set of alternatives to be already introduced in the preceding discourse. There is a bridging relation between a and the referent of the dislocated expression.

In Russelian tradition, the meaning of a definite noun phrase can be characterized as in (2) (Asher and Lascarides [2]). The entity referred by N is related by a bridging relation B to some antecedent a.

not derivable, then C can be derived.

(2) $\lambda Q.Q(\iota x(B(x,a) \wedge N(x)))$

Utterance (1b) can be formalized as given in (3).

(3) $\exists e \lambda z.burn(e,z,\iota x(B(x,a) \wedge meat(x)))$

To be able to interpret the discourse (1), the references of the underspecified variables B, z, and a must be resolved. To do so, in addition to the semantics explicitly expressed by the linguistic input, some general knowledge about the world is necessary, formalized in (4).

(4) a. $$\frac{meat(x) \wedge meal(y) : part-of(x,y)}{part-of(x,y)}$$

b. $$\begin{array}{c} \forall e, e', x, y, z.prepare(e', x, y) \wedge burn(e, x, z) \\ \wedge R(y, z) \rightarrow part-of(e, e') \end{array}$$

The default rule in (a) says that meat can be part of a meal, possibly but not necessarily. The fact (b) states that if something is burned that stands in a relation R to something being cooked then this event is part of a cooking event. The relation R can be instantiated by *part-of* or *identity*. By means of this additional knowledge, the underspecifications in (3) can be resolved. Because of space restrictions we refrain here from a complete representation as DRS.

Interpretation of a discourse consists of finding a minimal model for the discourse [6]. Here minimality means to minimize the number of different discourse referents, unifying them whenever possible. At the same time the number of applied defaults is maximized. The basic principle of discourse coherence makes sure that the numbers of discourse relations and anaphoric links are maximized. This mechanism makes use of redundant information in the discourse, as described by Hobbs et al. [5]. In our approach, interpretation of a discourse can be formalized by weighted abduction, but is not restricted to it. Instead, interpretation can also be achieved by a suitable ranking of defaults (see Poesio and Traum [8], or Cohen [4]).

4 Comparison to different approaches

In contrast to the approach taken by Hobbs et al. [5], our representation ensures keeping different information sources apart from each other. Additionally we can distinguish the situation described by the discourse and the discourse situation itself. In contrast to Asher and Lascarides [2] we assume

a uniform inference mechanism for the entire interpretation. These authors use distinct logics for information packaging and information representation. We don't think that discourse interpretation should be decidable.

5 Conclusion

We have shown how the processes of establishing discourse relations and resolving bridging anaphora interact in discourse interpretation. We have spelled out how linguistic information, world knowledge and discourse structure can be integrated for the use of interpretation. We used underspecified semantic representations and pragmatic enrichment by nonmonotonically inferring discourse relations and reference of anaphora. Further work should include closer inspection of other types of left dislocation. Possibly it can be shown that discourse subordination is a general precondition for left dislocation.

References

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