Computing Hamblin Alternatives

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In the last decades, a variety of linguistic phenomena have been argued to have an alternative-based semantics (Hamblin 1973). These include interrogatives (Karttunen 1977), focus/topic (Rooth 1985, 1992, Krifka 1993, Buring 1997, Beck 2006), scalar implicatures (Chierchia 2001, Fox 2006, Keshet 2006, Spector 2006, Katzir 2008), disjunction and conjunction (Geurts 2003, Simons 2004, Alonso-Ovalle 2006, 2008, Coppock, 2001), comparatives (Morzycki 2009), and quantifiers and indefinites (Krifka 1995, Lahiri 1998, Giannakidou 2001, Kratzer & Shimoyama 2002). In the paper I engineer a formal grammar for disjunction within a grammar formalism known as Minimalist Grammars (Stabler 1997, Stabler and Keenan 2001), and show that Hamblin alternatives might be formalized in terms of stored denotations implemented with the help of the Geach combinator. The proposed formalism is of far-reaching importance. For instance, it can be used as a basis for computational psycholinguistic modeling of processing in coordination.

One of the key problems in computational linguistics is resolving ambiguities of all kinds such as lexical ambiguity, structural ambiguity, and attachment ambiguity. Ambiguity in natural language causes exponential growth of alternative readings. One way to deal with ambiguities in natural language, when processed by a human or a machine, is to enumerate all possible interpretations first and test their acceptability afterwards. However, the exponential growth of alternative readings makes such an approach inefficient and, to some extent, unfeasible. Recently, other formalisms have been introduced to deal with ambiguities in natural language (Muskens 1999, Egg and Niehren 2001, Erk 2002, Bunt 2003). Common to all these formalisms is the use of underspecification techniques, which avoid the problem of exponential alternatives. The main idea underlying underspecification is to derive a single (constrained) description of all readings instead of generating all possible readings. One of the underspecification formalisms, a store technique (Cooper 1983, Keller 1998, Kobele 2006), is adopted in the paper to solve the ambiguity puzzle in disjunction. Its idea is to temporarily store semantic objects, whose place in the representation is not yet fully determined, and subsequently retrieve these objects.

In English, coordinate structures with disjunction such as (1) are ambiguous between the wide (1a) and narrow (1b) scope reading of a modal with respect to disjunction (Hulsey 2008).

(1) Mary must outweigh John or John outweigh Mary by next Thursday.
    a. Mary and John must not weigh the same. (must > or)
    b. . . . , but I don’t remember which. (or > must)

Current syntactic analyses of coordinate constructions suggest that in coordination smaller rather than bigger conjuncts are conjoined. This small conjunct approach to coordination (Johnson 1996, 2006, Lin 2002) predicts modals to always take wide scope with respect to the disjunction, as shown in (2).

(2) Mary$_t$ must [[VP t$_t$ outweigh John] or [VP John outweigh Mary]]
The distributed modal reading in (1b) is not predicted under the representation in (2). Adopting a store technique for minimalist grammars (Kobele 2006), we can derive the sentence (1) and its readings (1a) and (1b). The wide scope reading of the modal is calculated by storing the disjunction phrase and retrieving it later. The narrow scope reading of the modal is calculated by not storing the disjunction phrase. By function application of the modal to each disjunct we get distributed reading of the modal. The later step is only possible if a Hamblin semantics for disjunction is assumed.

In sum, the proposed formalism avoids the problem of exponential growth in the number of alternatives. It provides an explanation for the scope effects in disjunction. Finally, it suggests that Hamblin alternatives might be formalized in terms of stored denotations.

Selected references
Rooth, Mats, and Barbara Partee. 1982. Conjunction, type ambiguity and wide scope or. 353362.