Representing Time in Natural Language: The Dynamic Interpretation of Tense and Aspect

Alice G. B. ter Meulen
(Indiana University)

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This slim text in linguistic semantics addresses a topic of wide relevance for the semantics of natural language understanding: the interpretation of past-tense expressions. The book's title is perhaps overly general, in that neither present-tense nor adverbial reference to present time is handled (nor is future, or other modal auxiliaries). What is addressed is the fundamental problem of integrating a compositional approach to the computation of temporal aspect with that of computing temporal relations of inclusion and precedence among the situations described in a discourse. The treatment of aspect includes lexical aspect of verbs, perfect and progressive grammatical markers of aspect, and the effects of certain semantic properties of verb arguments—such as definiteness or generic reference.

A fundamental characteristic of the author's approach is to handle interpretation of tense and aspect in distinct modules. Though this is not a novel idea, an unusually broad range of issues is treated. Ter Meulen integrates a situation-semantics-based treatment of the situations that clauses describe with a dynamic method for computing temporal relation **trees**; immediate dominance represents temporal inclusion and precedence represents temporal precedence. Nodes in the tree representing situations are open or closed, thus allowing or blocking information flow, depending on the aspect of the associated clause.

Ter Meulen refers to the method for constructing the temporal trees (Dynamic Aspect Trees, or DATs), as an algorithm. However, parts of the "algorithm" depend on computations that are not dealt with in any detail. For example, where a new node is added to a DAT can depend on enforcing consistency of rather general types of lexical and commonsense inference. Rather than focusing on a specific unsolved problem or set of problems, the book presents a general approach to a wide range of data, and does so very concisely. As a result, there are too few examples and too little discussion of background literature for the book to serve as an introduction to the complex issues of aspect and tense. For readers who do not need such an introduction, examples are worked through in sufficient detail to indicate clearly how situation types are represented, how these representations are composed from the semantic representations of linguistic constituents, and how these type differences affect DAT construction.

Chapter 1, on the aspectual classes, relies on Vendler's (1967) classic categorization of events, but adopts terminology borrowed from Karttunen (1973): what Vendler calls achievements are plugs, accomplishments are filters, and activities are holes. The motivation for this terminology reflects the author's concern with what she refers to as the flow of information, meaning essentially how to determine what components

of the current context representation are updated by each subsequent utterance. Reference to one of the three event categories dynamically updates the current DAT with a new node, whereas states, which are discussed later (especially in Chapter 4), add information to existing nodes. Overall, this introductory chapter suffers from an attempt to introduce an abstract representation and reasoning mechanism by means of relatively few examples, and prior to clear definitions of terminology (for example, the term *perspective*, which has many different uses in the literature but is not clarified until Chapter 5).

Chapter 2 is devoted to a detailed analysis of aspectual verbs (e.g., *start, stop, keep*) and along the way introduces the representation of the semantic types of complete clauses, or parametric types in the case of partial information. However, it is not entirely clear why a chapter is devoted to aspectual verbs at this point, as opposed to a general chapter on the semantic composition of aspectual types. Much of the chapter is an interesting discussion drawing a parallel between existential versus quantificational NPs, and two classes of aspectual verbs having existential versus quantificational force. This discussion is primarily descriptive, despite a hint in Chapter 6 that it might provide a basis for explaining certain semantic curiosities.

Chapters 3 through 5 are the intellectual as well as literal heart of the book, providing a comprehensive overview of DATs. Chapter 3 works through numerous examples to show how DAT updating varies, depending on whether the current clause describes an achievement (plug), accomplishment (filter), activity (hole), or state (sticker). It is the strongest chapter in its expository style, content, and relation to the rest of the book. An activity, by definition homogeneous, is a hole in that the current state of information flow is updated by continuing rather than altering the current branch in the tree. That is, a new daughter node (representing temporal inclusion, a partial order) is added to the tree. An achievement is a plug, meaning an instantaneous event with no internal structure, and thus updates a DAT with a new sister node (representing temporal precedence, a strict partial order) to the current node. Accomplishments are filters, which in terms of information flow are plugs or holes, depending on further unspecified inference. Filters are ter Meulen's means of representing the lack of homogeneity in the internal structure of accomplishments; an accomplishment is a non-homogeneous event consisting of some (perhaps) homogeneous region after which the flow of information might shift (or make a transition [Passonneau 1988], or culminate [Moens and Steedman 1988]).

Chapter 4 is an important complement to Chapter 3, dealing with various types of states (e.g., transient states, such as generally indicated by the progressive, as opposed to descriptions of more permanent properties, such as generic statements) and how different kinds of stative information percolate differently through a DAT. Chapter 5 completes the overview of DATs by defining the author's notion of perspective, but the issues raised here are not as fully developed. Briefly, holes preserve perspective, plugs trigger perspective shifts. Flashbacks, also treated in this chapter, involve temporarily converting an existing plug to a hole and then back again.

Chapter 6 presents a detailed fragment of English with formal definitions of operations such as the various types of DAT updates that are described in the three preceding chapters. At the end of the chapter, the author introduces a puzzle presumably related to some of the issues discussed in Chapter 2: an unexplained semantic asymmetry of verbs with or without a goal argument, and the difference in acceptability of existential arguments (compare *A tree grew out of every acorn* with **An acorn grew into every tree*), but this is not expanded upon. Chapter 7 is a very brief discussion of the relation between the type of semantic investigation pursued here and cognitive science.

In sum, despite a book where the flow of information seems on occasion to be interrupted, it is a useful resource giving an interesting and comprehensive framework for readers familiar with the topic.

References

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