

Michiel van Lambalgen and Fritz Hamm, *The Proper Treatment of Events (= Explorations in Semantics, Vol. 4)*, Blackwell, Oxford, 2005, x + 251 pp., ISBN 1-4051-1212-3, GBP 24.99 (paper).

Michiel van Lambalgen and Fritz Hamm have written a magnificent book on the semantics of temporal discourse in natural languages. Even though the book is written from a cognitive science perspective and is aimed primarily at linguists and cognitive scientists rather than at philosophers, it provides a wealth of insights and new techniques that can be fruitfully applied in the philosophy of time, the philosophy of language, philosophical logic, and philosophy of action.

As befits a title in the series *Explorations in Semantics*, the bulk of this book (Part III) is concerned with in-depth analyses of the semantical structure of natural language discourse; most examples illustrate the uses of tenses and aspect in English and French. From a philosophical point of view, the examples mostly serve to give support to the completely novel approach towards elucidating temporality that drives the analyses. That approach itself proves to be the philosophically most interesting aspect of the book, spanning Parts I and II.

The authors start Part I, “Time, Events, and Cognition” (Chapters 1–3), by giving one last nod to the traditional philosophy of time before embarking on their own study of temporality, which takes a cognitive turn. Thus, instead of asking, “What must the world be like in order for tensed talk to make sense?”, their question is, “What must our minds be like in order for tensed talk to make sense?” (p. 3). Why do we experience and conceptualise time? The answer given is based on results from studies in psychology and cognitive science, including studies of the development of temporality in children. In a nutshell, the authors’ hypothesis is that “our sense of time derives from being goal-oriented agents” (p. 13), and that goal orientation is the key to our linguistic coding of time as well. *En passant*, their discussion provides (in a footnote on p. 5) an elegant argument for the cognitive primacy of McTaggart’s (tensed) A-series grounded in temporal perspective over the (tenseless) B-series of temporal

succession but this is not a philosophy book, so the authors move on to analyse the notion of an event.

The short Chapter 2 on events gives a multi-faceted view on the interrelation of time and events. Cognitive science sets the scene when the authors cite Zacks's and Tversky's observation that "event" isn't used as a homogeneous metaphysical category tied to physical change. Rather, "*as the time scale increases, events become less physically characterized and more defined by the goals, plans, intentions, and traits of their participants*" (pp. 16f.). Planning is centre stage once more. A formal interlude then pulls together the currently available literature on the question of how a temporal ordering may be derived from an underlying event structure. Backed by linguistic examples, it is argued that the most promising formal model is Walker's, who introduces directed temporal instants, a formal analogue of James's "specious present", within an event structure. The upshot of that discussion is that event structures provide a rich resource for understanding temporality but they are not rich enough to account for our temporal discourse: nontemporal relations connected with agency will be needed as well. That point is strengthened, in Chapter 3, by additional linguistic data suggesting that tense cannot be understood at the single sentence level, that event ordering can only be determined using extra-temporal causal knowledge, and that overall, in order to understand temporal discourse, "one must have a formal theory whose central notions are planning and causality" (p. 31). This calls for a new formal paradigm departing from the relational semantics for the modal and temporal logics that are so well entrenched in philosophical logic.

In Part II, "The Formal Apparatus" (Chapters 4–6 together with an Appendix), the authors embark on their task to find a formalism for planning that could be used to elucidate the temporal characteristics of natural languages. Over and above the cognitive turn subscribed to in Part I, the authors suggest taking a computational turn as well: any successful theory of temporality that can be cognitively relevant must also be computationally effective. The authors thus subscribe to a computational theory of meaning as suggested by Moschovakis: the idea is to "identify the *sense* of an expression with the algorithm that computes the expression's denotation" (p. 49). The authors do not hide the fact that in Part II, much needs to be learned. As an incentive, their motto promises greatest happiness for those who go through the labours, and in fact, after one has worked through a number of exercises, in a four-page diagram on pp. 64–67

halfway through Part II, the happy reader is shown how to prove that if Jones is crossing the street, he will normally get to the other side.

What's the point of all this? Even in wondering why the chicken crossed the road, *that* much can be taken for granted, can't it? But in fact, the example highlights a problem that is as well known to linguists as it is much neglected by philosophers of action, and which goes by the name of "the imperfective paradox". The paradoxical fact is that even in situations in which it later turns out that a process such as one of building a house will not be completed, it is correct to say that the process *is going on*. It is grammatically perfectly in order to say, "Carlos was building a house, but then he broke his leg, and he never finished building the house" (cf. pp. 156f.). This scenario points out a form of nonmonotonicity that has proved to be a great obstacle for the formal analysis of the imperfective aspect as exhibited, e.g., through the English progressive. Prior, who invented tense logic as a form of modal logic, was quite certain that he had not been able to capture the progressive correctly. Later, in *Word Meaning and Montague Grammar* (1979), Dowty tried to capture the progressive in a possible worlds framework: for each continuing process such as crossing a street, there were to be designated "inertia worlds" in which the process would be completed, and a sentence in the progressive was to be true if and only if the corresponding process was completed in all inertia worlds. One notices that circularity threatens at this point, since inertia worlds are not characterised independently of their function as truthmakers for sentences in the progressive.

Van Lambalgen and Hamm take the intuitive notion of inertia that, some way or other, certainly *does* stand behind truth conditions for the progressive, directly at face value. Their formal calculus, a derivative of the event calculus employed in robotics, starts with a number of simple axioms that describe a certain kind of inertial dynamics in which two types of causal interactions take place: there is instantaneous change, and there is continuous change, and these two types of causation interact, e.g., by an instantaneous change *releasing* a continuous dynamics. The details (especially in the really detailed description given in Chapter 6) are somewhat intricate and merit careful study, but the outline is as follows: one starts with a typed language allowing for objects, real numbers, time-dependent properties, variable quantities, and event types. Properties are reified via nominalisation. Formulae like *Happens*(e , t) describe the fact that event e happens at t (think of the first type of causality, instantaneous change). Continuous change is described by more complicated formulae like *Trajectory*(f_1 , t , f_2 , d), where f_1 and f_2 are so-called

“fluents” (variable quantities that mostly come with a real-valued parameter): *Trajectory*(f_1, t, f_2, d) means that force f_1 is in effect from t until $t + d$, and at $t + d$, f_2 holds (cf. pp. 38f.). In a concrete application, one will have the general theory of causality given by the background axioms of the event calculus plus concrete microtheories of specific causal interactions. E.g., in describing John’s crossing the street, the microtheory will contain a fluent (variable quantity) describing John’s position, a fluent describing his activity of crossing, and an event (reaching the other side) whose occurrence is triggered by a certain value of the position-fluent: you reach the other side once you have traversed the whole width of the street.

Now what about nonmonotonicity? Here a further, very important idea kicks in. The event calculus expresses the “*commonsense principle of inertia*”, viz., that “all change must be due to a cause” (p. 36). That principle is made semantically potent by evaluating the axiomatic system for a given application *not*, like classical logic would require, in *all* of its models, but only in a class of so-called *minimal* models. In these models, so to speak, nothing happens unless it is forced to happen by the given axiomatic description. The idea may be familiar through the paradigm of “negation as failure” in logic programming; the book provides many exercises that greatly facilitate coming to grips with the formalism. The outcome of the authors’ approach is a fully computational theory of meaning, and that is the point of the long diagram proving that John normally gets across the road. In the given description of the situation, no outside influences are present, so the semantics does not consider models in which, e.g., John is hit by a passing bus. John’s plan for road-crossing is *provably* adequate; it *will* get him to the other side. Enrich the situation description, and the plan may become inadequate. This, so van Lambalgen and Hamms’ suggestion, is how human planning works.

In the book, the authors employ their theory, in Part III, for an analysis of many puzzling features of temporal discourse. The theory, however, also throws some light on a number of questions in the philosophy of action. Consider the debate about basic actions. Some actions are constituted by other actions: you turn on the light *by* pressing the switch, which in turn you do *by* stretching your index finger. Thus it seems that on pain of infinite regress, there must be basic actions that are not themselves constituted by other actions and that would answer to the question what the agent is *really* doing. What are these basic actions? The orthodox, causal approach takes actions to be events in a narrow sense and reads the “by” relation causally. Thus, basic actions would turn out to be basic physical

events of some kind. Which kind? That seems difficult to say: bodily motions? activations in the motor cortex? The category of an action threatens to dissolve. In van Lambalgen and Hamm's approach, the wider notion of an event and the broader understanding of causality offer a better picture, and with a solid formal background too. Actions may be events, but the category of events itself refers to plans and intentions (cf. the quote from Zacks and Tversky above). The "by" relation can also be understood in terms of planning: an agent is ϕ -ing by ψ -ing if ψ -ing is a subgoal in the overall plan for ϕ -ing. No regress threatens: relative to a given scenario (read: axiomatic theory in the event calculus), what an agent is doing can be spelled out exactly in terms of what goes on in all minimal models of the scenario. Thus the scenario, which is built up from discursive context, specifies the level of granularity corresponding to basic actions. Relative to one context, Mary is stretching her index finger; relative to another, she is switching on the light. Informal discussions of the problem of basic actions have often arrived at the same commonsensical verdict. The strength of the current approach is that it makes possible a solid foundation for the commonsensical response, and one that is more formally rigid than anything offered by causal theories of action so far.

As already mentioned, the authors exhibit the strength of their approach via applications, not to agency, but to semantics. Thus, in Part III, comprising Chapters 7–12, they take the reader through a variety of richly structured and sometimes puzzling linguistic phenomena, each time with the explicit aim of showing how their computational theory exhibited in Part II can give a satisfactory analysis. The individual chapters are concerned, in that order, with *Aktionsart* (Chap. 7, Vendler's famous states/activities/accomplishments/achievements distinction), English Tenses (Chap. 8, especially on the varieties of reference to the future), Tense in French (Chap. 9, centring on the bewildering varieties of past tenses), Grammatical Aspect (Chap. 10, the perfect/imperfect distinction as exhibited by the simple/progressive "tenses" of English), Coercion (Chap. 11, showing how *Aktionsart* is not a lexical property of a verb, but can only be determined at the sentence level), and Nominalisation (Chap. 12, the process by which verb phrases are turned into nouns, exhibited by two rather different forms of gerunds in English). Apart from discussing linguistic material, Chap. 10 on aspect is special in that it gives an in-depth overview of the literature on the "imperfective paradox" referred to above, and Chap. 12 on nominalisation

contains an instructive overview of the history of the English gerundive system.

Each chapter brings forth an impressive array of linguistic data that corroborates the authors' formal approach. To pick out one example, the future in English is a vexing business, as any non-native speaker (such as the reviewer) can attest – and yet, van Lambalgen and Hamm's theory can make good sense of most of the fine distinctions that one finds in that area. Grammatically, there seems not to be a pure future tense in English, but a number of constructions are employed to refer to things to come: (1) the plain present tense ("The train leaves at 5.27 p.m."), (2) the auxiliary "will" plus infinitive ("Bill will throw himself off the cliff"), (3) the auxiliary "be going to" plus infinitive ("Bill is going to throw himself off the cliff"), and (4) the futurate progressive ("John is flying to Chicago tomorrow"). Just focussing on the distinction between (2) and (3), one can observe that the example for (3) can be appropriate even in a situation in which Bill later on changes his mind, whereas the example for (2) cannot be so used. The authors' theory explains this by giving definitions of the semantic contribution of "will" vs. "be going to" that highlight the fact that in both cases, some preparatory activity must be present, but that "will" additionally requires an integrity constraint (i.e., a certain additional element in the algorithm giving the sense of the verbal phrase) that rules out termination of the preparation by the agent (cf. pp. 118–127).

To sum up, philosophers with very different interests can benefit greatly from the wealth of material contained in this book. Part I gives some fresh ideas towards both a cognitive turn in the philosophy of time and towards the formal modelling of time/event-structures. The details of the formal models proposed in Part II should be of interest to technically oriented philosophers of language and action and to philosophical logicians, pointing out a new paradigm for modelling temporality that is not confined to the standard possible worlds approaches that have proved to be unsuccessful in many areas. Finally and most importantly, philosophers of language and philosophers of action can gain new insights both from the formalism proposed in the book and from the detailed applications to real linguistic data given in Part III. Our natural languages are rich in temporal structures, and one would do well not to ignore that structure in favour of a simplistic view that only acknowledges a simple linear temporal ordering as relevant for semantics, and finds *Färbung und Beleuchtung* everywhere else. Natural languages are not like that, as van Lambalgen and Hamm have shown in impressive

detail. Their book introduces and applies an important new tool of philosophical analysis, and thus should be available in any good, analytically oriented philosophical library.

Universität Bonn
Institut für Philosophie,
Lennéstr. 39,
53113, Bonn,
Germany
e mail: Thomas.Mueller@uni-bonn.de

THOMAS MÜLLER