

Cyclic Interaction of Event Structure and A' Locality¹

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1 Introduction

Davidson (1967) introduced the hypothesis that sentences correspond to descriptions of events, much as noun phrases correspond to descriptions of individuals. This provides the basis for accounts of many natural language phenomena. For example, pronouns in English can refer anaphorically to events as well as ordinary individuals, as in (1).

- (1) a. It happened last night [*It* = event]
b. It went thataway [*It* = individual]

Research building on Davidson's original insight (particularly Higginbotham 1985 and Parsons 1990) has taken this to indicate that events are just another variety of first-order discourse referent, treated by the compositional semantics in much the same way as ordinary individuals. More specifically, a verbal head generally denotes a property of events, just as a nominal head generally denotes a property of individuals. Regular semantic composition normally then leads to a semantic representation of a sentence as an assertion of the existence of a particular event: just as a determiner typically binds the individual variable introduced by a noun, the tense head binds, and existentially quantifies, the event variable introduced by a verb.

This analysis is complemented by a line of research, stemming ultimately from the Generative Semantics program (see Lakoff 1970 and McCawley 1968, as well as later seminal work by Dowty 1979), into *lexical decomposition*. Particularly within the verbal domain, this aimed to break verb meanings down into combinations of

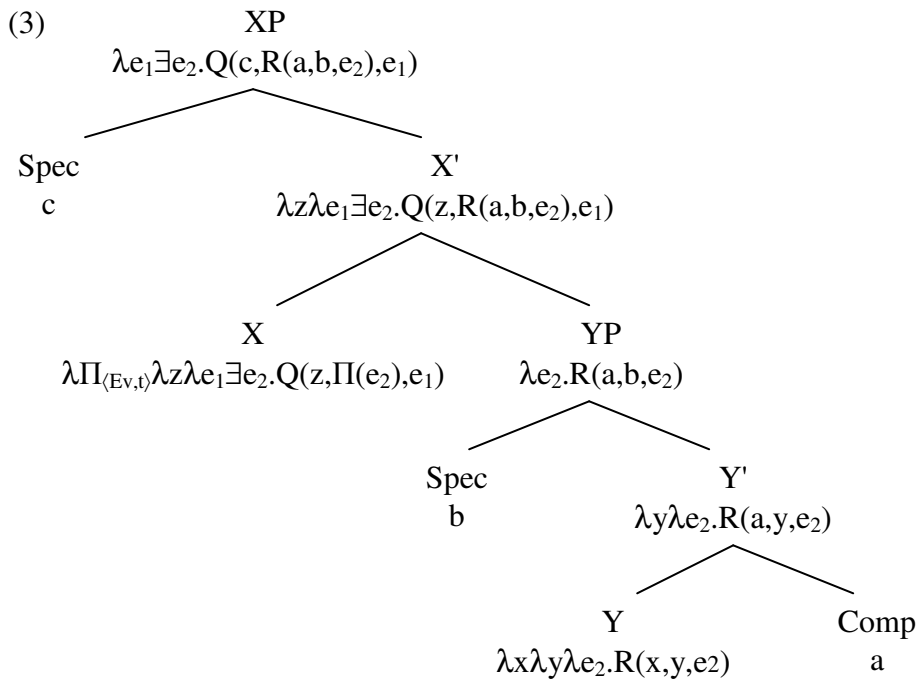
recurring, primitive elements such as causation. For example, the alternations in (2) are seen by decompositionists as resulting from the addition, in (2b), of a primitive corresponding to inchoation, or becoming, to the state description in (2a), and then the addition, in (2c), of a second primitive corresponding to causation of the change of state described in (2b).

- (2) a. The glass is broken: broken(g)
- b. The glass broke: BECOME (broken(g))
- c. John broke the glass: CAUSE (P(j), BECOME (broken(g)))²

Combining lexical decomposition with a Davidsonian event semantics gives us a theory, as in Parsons (1990), in which an event can consist of multiple subevents standing in relations such as causation and inchoation. This, in turn, has led to a very productive line of research, growing out of Hale and Keyser (1993) and Kratzer (1996), in which such relations between subevents are reflected directly in the syntactic phrase structure. More recent major works in this field include Travis (2000), Borer (2005), and Ramchand (2008), each of which elaborate in different ways upon this foundational hypothesis.

Although these proposals differ substantially in their details, one idea, most explicit in Hale and Keyser (1993) and Ramchand (2008), is that if a constituent XP describes an event e_1 , and if e_1 contains e_2 as a subevent, then XP contains a phrase YP, which describes e_2 , as a complement of X. Moreover, because each maximal projection contains a single specifier position, each additional subevent potentially licenses one additional argument position. This gives us at least a hope of finding a principled explanation for alternations in argument structure (and, in some cases,

morphology), like those in (2).³ (3) shows the general pattern: the heads X and Y introduce variables corresponding to events (e_1 and e_2), which will eventually be existentially quantified, but also variables corresponding to individuals (x , y and z), which can be saturated by arguments in their specifier and complement positions.



Two striking properties of this tree should be noted. Firstly, the semantic representation of XP contains both an extra individual argument and an extra event argument compared to the more deeply embedded YP. This gives the broad outline of an explanation for the rough correspondence between more complex event structures and more complex argument structures illustrated in (2). Secondly, binary branching syntactic combination corresponds uniformly to function application in the semantics, giving a direct mapping between the two levels of representation.

One question I want to ask in this paper is whether the mapping between event structure and phrase structure is always so close. I will argue that, in fact, it isn't (a claim traditionally associated with lexicalist theories such as Jackendoff 1990 and

Pustejovsky 1991). I show that causal relations apparently identical to those which correspond to complementation in the tree in (3) can be found in other syntactic configurations. Hopefully, though, this argument can be made without damaging the real empirical results in the line of research growing out of Hale and Keyser's paper, for a simple reason: that research deals overwhelmingly with the syntactic instantiation of the event variable in constructions with a single verb, while I will be concerned with constructions with multiple verbs in non-c-commanding configurations.

Once we have the argument for a less uniform syntax-semantics mapping in place, things get more interesting from the point of view of the interface between those two modules. If we allow a slightly looser relation between phrase structure and event structure, we can start to ask which structure is most suitable for describing certain empirical phenomena, and also about the determination of the relation between the different structures. These are huge, open-ended questions, and I have no good general answer to them. My more modest aim here is to show the following: a phenomenon traditionally considered as syntactic (locality of A'-movement) is best described in terms making reference to events, rather than just phrases, as units, and so should be represented in partially event-structural, rather than wholly phrase-structural, terms. However, event-structural well-formedness conditions on the phenomenon in question must be checked cyclically, at points determined by the phrase structure. We therefore end up with a novel argument for a familiar type of cyclic architecture, broadly along the lines of phase theory (Chomsky 2000 *et seq.*) or the parallel architecture of Jackendoff (2002): the interface between the syntactic representation of phrase structure and the semantic representation of event structure is

not wholly determined post-syntactically, but rather at multiple points during the syntactic derivation.

The rest of the paper is structured as follows. Section 2 gives some evidence for a degree of independence of event structure from phrase structure. This evidence is inextricably intertwined with an event-structural constraint on the locality of A'-movement, which I call the Single Event Condition, or SEC, so I introduce that condition there, too. Section 3 shows how this condition, initially motivated by patterns of extraction from adjuncts, extends to do empirical work in extraction from complements. However, section 4 shows that, if checking of the semantically-based SEC is allowed to operate in a global, postsyntactic fashion, as we might expect on an EST-era Y-model, the model overgenerates. This motivates an architecture in which the SEC interacts cyclically with A'-movement.

2 The Single Event Condition

One potential empirical argument in favour of the syntactic decompositional approach sketched above with regard to (3) is that it gives us a possible way to explain an observation concerning the interpretation of lexical and periphrastic causatives, due to Fodor (1970), and subsequently developed in various directions by Shibatani (1976), Dowty (1979), Kamp (1979, 1981a), Levin and Rappaport-Hovav (1994), Bittner (1999), and Wolff (2003), among many others. Fodor noticed that the available interpretations of a lexical causative like *melt* are a proper subset of those of periphrastic causatives like *cause to melt* or *make melt*. A variety of different types of causation can be described by verbs like *cause* or *make*, while the causation expressed synthetically in a lexical causative is specifically *direct causation*. Recent research (see in particular Wolff 2003) has begun to converge on a precise, falsifiable characterisation of this notion of direct causation, making reference to force-dynamic

configurations of participants (Talmy 1976, 1988), and volitional properties of the causer, as well as basic relations among events, but for our purposes, we can make do with a simplified characterisation, as follows:

- (4) Given a set $E=\{e_1, e_2, \dots, e_n\}$ of events and a transitive, irreflexive relation \subset over E , e_i *causes* e_j iff $e_i \subset e_j$, and e_i *directly causes* e_j iff $e_i \subset e_j$ and there is no e_k such that $e_i \subset e_k \subset e_j$.

In other words, one event causes another iff, at the appropriate level of granularity, there are no intermediate events in the causal chain linking them.⁴

Now, coming back to Fodor's claim regarding lexical and periphrastic causatives, this characterisation of direct causation predicts the degradation of (5a), relative to (5b): the lexical causative in (5a) implies that Floyd heating the glass directly caused it to melt, but that leaves us without an explanation for the fact that the heating (on Saturday) happened some time before the melting (on Sunday). The periphrastic causative in (5b), encoding a more general, possibly indirect type of causation, has no such clash.⁵

- (5) a. #Floyd melted the glass on Sunday by heating it on Saturday.
b. Floyd caused the glass to melt on Sunday by heating it on Saturday. (Fodor 1970:432–3)

This could be taken, *contra* Fodor, as support for syntactic decomposition, because syntactic decomposition offers the possibility of explaining restrictions on the class of possible lexical meanings in terms of, firstly, a restricted set of functional elements

which make the same semantic contribution across lexical items; and secondly, constraints on the relationship between syntactic and semantic combination. Certainly, this is an attractive position, and I don't want to quarrel with it here.

Rather, the interest of this position for my purposes is the following: the authors cited in the introduction see a verb phrase as denoting a property of a single event, even if the event in question may have proper subparts that are events in their own right. And (5) shows us that there are restrictions on the types of event that a single verb phrase can describe. As things stand, these restrictions could either build on facts about syntax (the inventory of available null heads, for example, or constraints on possible interpretations of relations between a head and the material it c-commands), or they could be due to facts about conceptual semantics (there are certain non-linguistic restrictions on what we can consider as a single event, and if syntactic decomposition is on the right track, these are reflected in phrase structure). There has been a large amount of research in cognitive science which suggests language-independent restrictions on the ways in which we chunk the flow of stuff that happens into discrete units that we might call 'events' (see, for example, Zacks and Tversky 2001, Baldwin et al. 2001, Gergely and Csibra 2003, Wolff 2003, and Jackendoff 2007, ch.4, as well as earlier work on related structures by Miller, Galanter, and Pribram 1960, and Shank and Abelson 1977). This research shows that the notion of a non-linguistic constraint on the set of possible events is a viable one. The argument to be made here is that, to the extent that the same restrictions show up in unrelated syntactic configurations, it is more likely that the restrictions in question are conceptual, rather than phrase-structural, in origin.

To make this argument, I will look at a second construction. This involves A'-movement out of a class of constituents that I shall call *Bare Present Participial Adjuncts* (BPPAs), as in (6).

- (6) a. What did John drive Mary crazy [working on ___]?
b. What did John die [working on ___]?
c. *What does John drink coffee [working on ___]?

The most salient difference between extraction from BPPAs and the lexical causatives discussed above is that BPPA constructions contain two verbs, standing in an adjunction relation.⁶ This means that the syntactic configuration purported to map directly onto relations among subevents such as CAUSE and BECOME is not present in these constructions. However, we can argue that the same constraints on the internal structure of events are active here as in lexical causatives. I will discuss two such constraints here.

The first involves the relationship between aspectual classes, as in Vendler (1957), and the contribution of the subject's actions. In both (6a) and (6b), the BPPA describes what the subject was doing immediately before the culmination described by the matrix verb: the matrix verb specifies that there *is* such a preceding process, but does not attach any descriptive content to it, and the BPPA fills in that blank. However, the two differ in how that action relates to the culmination. John's work in (6a), where the matrix VP describes an accomplishment, describes the cause of Mary's craziness, while there is no necessary causal link between John's work and his death in (6b), where the matrix VP describes an achievement.

This distinction is inherited directly from the event structure and argument structure of accomplishments and achievements (see also Pustejovsky 1991). In accomplishment predicates, like transitive *melt* in (5a), the actions of the agent bring about the result state of the glass being molten. No such relation holds in the case of achievement predicates like intransitive *melt* in *The glass melted*. In those cases, the melting is understood to happen spontaneously. The interpretations of BPPAs are parallel to those of the aspectual classes, then, despite the fact that the syntax of BPPA constructions is quite different from the syntax of regular single-verb sentences.

The second similarity involves the directness of the relations involved. In (6a), what drove Mary crazy was John's work, and that relation has to be immediate: (6a) is unacceptable in a situation in which John's work sets off a long chain of causally related events which eventually lead to Mary going crazy. For instance, if John's work made him late for another date with Mary, and his lateness was the immediate cause of her craziness, we couldn't felicitously ask (6a). Similar arguments can be made for (6b), although the relation there is purely temporal rather than causal: the question is felicitous if John was working on something immediately before he died, but not if there is a significant gap between the end of the working and the time of death. This parallels Fodor's observation that the causation in (5a) must be direct.

So far, this looks like a condition on the interpretation of BPPAs: the matrix VP asserts the existence of a number of related subevents, but leaves the nature of one of those subevents unspecified. In the case of both (6a) and (6b), this is the subevent which immediately precedes the beginning of the result state — in the case of (6a), we also infer that whatever John was doing immediately before Mary went crazy is the direct cause of that craziness. In both cases, the BPPA tells us that this immediately

preceding subevent was one of John working on something. In the case of (6c), where there is no such complex subevent structure, and so no underspecified subevent to which the descriptive content of the BPPA could be attached, the structure is ill-formed.

However, there is a further twist. The range of interpretive options for BPPAs in non-A'-movement contexts is wider than in cases like the interrogatives in (6). For example, a declarative counterpart of (6a) like (7a) allows much more readily for an interpretation, such as the one given above, in which trying to fix the radiator wasn't the immediate cause of Mary's anger.⁷ Equally, (7b) is quite acceptable, despite the fact that the corresponding interrogative (6c) was degraded.

- (7) a. John drove Mary crazy [working on the radiator].
b. John drinks coffee [working on his thesis].

This leads to the conclusion that the interpretive effects are not common to all BPPAs, but rather only to extraction out of BPPAs. This can be captured by the following condition, described more fully in Truswell (2007):

(8) The Single Event Condition:

An A'-dependency is legitimate only if the minimal constituent containing the head and foot of the chain describes a single event.

How this works is as follows: we assume a set of well-formed event structures, along the familiar decompositional lines. Specifically, I assume that two subevents can form a single event if they stand in a relation of direct causation or immediate temporal

precedence (corresponding broadly to the CAUSE and BECOME operators of Dowty 1979, or the event structures of Pustejovsky 1991), but other relations like ‘going on at the same time’ are not sufficient to allow formation of a single event from multiple subevents. When the events described by the matrix VP and the BPPA jointly form a single complex event description in accordance with well-formedness conditions on event structure, as in (6a) and (6b), extraction out of the BPPA is possible, according to the SEC. When this cannot be done, as in (6c), which describes two events going on at the same time, extraction out of the BPPA is ruled out by the SEC, although the structure remains legitimate in declarative cases with no A'-dependency, as in (7b).

The striking architectural implication of this condition is that the constraints on event structure are formulated in terms independent of phrase structure. Rather, well-formed event structures may correspond to several different phrase-structural configurations, going beyond the chains of head–complement relations which are the bread and butter of the syntactic decompositional approach.⁸ The SEC then acts as a constraint on the interface between one aspect of the transformational syntax and an independent level of event structure, with its own primitives and relations.

3 Extraction from Complement Clauses

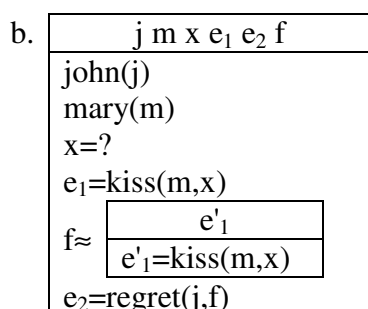
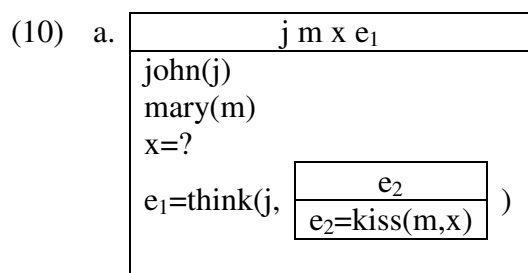
On the assumption that every verb introduces its own event variable, it is natural to ask how the SEC handles extraction from complement clauses, the classic case of successive-cyclic movement. Given that we have a verb in each clause, and therefore two event descriptions, we may ask whether such configurations satisfy the SEC.

In fact, I want to say that extraction from complement clauses sometimes satisfies the SEC, and sometimes doesn't. This correlates with a difference in acceptability of such extractions, explored by Kiparsky and Kiparsky (1970) and Erteschik-Shir (1973), and illustrated in (9).

- (9) a. Who does John think [__ that Mary kissed __]?
b. ?? Who does John regret [__ that Mary kissed __]?

The basic observation is that certain classes of verbs act as ‘bridges’, allowing constituents to get out of subordinate clauses, while others don’t. Moreover, as originally reported by Ross (1967), and Kiparsky and Kiparsky (1970), these classes have something in common semantically. One class (not the only one) that doesn’t allow extraction out of complements is the class of *factive* verbs, as in (9b).⁹ What these have in common, unlike (9a), is that they presuppose the truth of their complement clause: (9a) does not imply that Mary kissed someone, whereas (9b) does.

This means that the speaker is committed to the occurrence of two events in (9b): an event of Mary kissing someone and an event of John regretting the fact that the previous event occurred. On the other hand, in (9a), the speaker is committed to the occurrence of only a single event: an event of John thinking that Mary kissed someone. We can represent this difference perspicuously in Discourse Representation Theory (Kamp 1981b, Kamp and Reyle 1993) by using the approach to presupposition resolution from Van der Sandt (1992). The major properties of that approach are, firstly, that presupposed content generally comes to take wider scope than asserted content would in parallel syntactic configurations; and secondly, after the resolution of presuppositions, presupposed content comes to be indistinguishable from asserted content in a Discourse Representation Structure.¹⁰ This means that the DRSs for the two sentences in (9) look as follows.



Several details are glossed over in these representations — I refer the interested reader to Van der Sandt (1992) for a DRT treatment of presupposition; Asher (1993) for a detailed theory of the representation of abstract objects, including events, facts and propositions; and Geurts (1998) for a suggestive discussion of the interaction of presupposition and propositional attitude verbs (albeit one that doesn't say much explicitly about factives). However, hopefully the point is clear. If we look at the universe of the outer DRS in each case, which shows the entities that the utterance claims to exist in the actual world, we see that the nonfactive (10a) includes only a single event variable, e₁ (the second event variable, e₂, is buried inside a subordinate DRS, and so the utterance doesn't make any claims about its existence in the actual world). However, the outer DRS in the factive (10b) has two event variables, e₁ and e₂. This full DRS should be read roughly as follows: there are three individuals: John, Mary, and a third whose identity we are asking about. There is an event of Mary kissing that third individual, and the occurrence of that event corresponds to a fact, f. There is also a second event of John regretting that fact.

Of course, this extra event variable means that the representation in (10b) falls foul of the SEC, while that in (10a) does not. This, then, is what the SEC has to say about extraction from complement clauses. It is possible, but only when the content of the complement clause is not presupposed.

4 Cyclicity

The account of extraction from complement clauses and of factive islands in the previous section made crucial use of presupposition. But presuppositions have a habit of disappearing when embedded in certain contexts. For example, propositional attitude verbs such as *believe* and *hope* tend to block any presuppositions that their complements carry (they are what Karttunen 1973 calls *plugs*). So most people find that (11b) does not carry the same presupposition as (11a), that John was a smoker (see Karttunen 1973, section 11, for some discussion of the variability of this judgement).

(11)a. John has stopped smoking.

b. Bill believes that John has stopped smoking.

In conjunction with the SEC, this could lead to a very strong prediction. This is that, because embedding under a presupposition plug blocks any presuppositions and so frequently yields a description of a single event, as in (9a), such embedding should ameliorate any of the degraded sentences ruled out by the SEC. This prediction is clearly false. (12) reproduces the paradigm from (6), with each example embedded under a presupposition plug, and (13) does the same for (9). The judgements are just as before.

- (12)a. What did Bill say [__ that John drove Mary crazy [working on __]]?
- b. What did Bill say [__ that John died [working on __]]?
- c. * What did Bill say [__ that John drinks coffee [working on __]]?
- (13)a. Who did Bill say [__ that John thinks [__ that Mary kissed __]]?
- b. ?? Who did Bill say [__ that John regrets [__ that Mary kissed __]]?

However, we only predict this if we check the SEC in a global, postsyntactic fashion. That is, the problem only arises if we wait until we have our final syntactic representation, and only then check if the SEC is satisfied. The alternative is to check the SEC at some intermediate point, plausibly after movement to the intermediate landing site in embedded [Spec,C]. At this point, the SEC is violated in a degraded case like (12c) in just the same way as it was in (6c) above.

(14)*What that John drinks coffee [working on __]?

This leads us to the following conclusion.

(15)The Single Event Condition is checked cyclically.

In other words, the event-structural approach to extraction from adjuncts and complements requires a model of the grammar which allows the semantic SEC to influence syntactic operations cyclically. Although the final output in examples like (12) and (13) satisfies the SEC, an ill-formed intermediate stage still suffices to rule out the degraded examples.

5 Conclusion

This paper has made two major claims with respect to linguistic interfaces. The first is that, if we adopt a model of event structure which stands in a looser correspondence to phrase structure than is often assumed, we see that certain conditions on locality of A'-movement which are generally handled by conditions on phrase-structural representations should instead be handled in terms of conditions on the mapping between phrase structure and event structure. Secondly, the interaction of these two structures is determined cyclically, rather than globally. Although the size of the cycles in question was left open here (is the SEC checked at every phrase? At every phase? At every clause? At every movement step?), it is clear that such cyclic interactions of different levels of representation are incompatible with the classical Y-model of the Extended Standard Theory, but resonate well with phase theory, initiated by Chomsky (2000), as well as more radical departures such as the parallel architecture of Jackendoff (2002).

References

- Asher, N. (1993). *Reference to Abstract Objects in Discourse*. Dordrecht: Kluwer.
- Baldwin, D., Baird, J., Saylor, M., and Clark, A. (2001). 'Infants Parse Dynamic Action', *Child Development* 72: 708–717.
- Bittner, M. (1999). 'Concealed Causatives', *Natural Language Semantics* 7: 1-78.
- Borer, H. (2005). *Structuring Sense. Volume 2: The Normal Course of Events*. Oxford: Oxford University Press.
- Chomsky, N. (2000). 'Minimalist Inquiries: The Framework', in R. Martin, D. Michaels, and J. Uriagereka (eds.), *Step by Step: Essays on Minimalist Syntax in Honor of Howard Lasnik*. Cambridge, MA: MIT Press, 89–115.

- Davidson, D. (1967). 'The Logical Form of Action Sentences', in N. Rescher (ed.), *The Logic of Decision and Action*. Pittsburgh, PA: University of Pittsburgh Press, 81–95.
- Dowty, D. (1979). *Word Meaning and Montague Grammar: The Semantics of Verbs and Times in Generative Semantics and Montague's PTQ*. Dordrecht: Reidel.
- Erteschik-Shir, N. (1973). *On the Nature of Island Constraints*. Ph.D. thesis, Massachusetts Institute of Technology, Cambridge, MA.
- Fodor, J. A. (1970). 'Three Reasons for not deriving "Kill" from "Cause to Die"', *Linguistic Inquiry* 1: 429–438.
- Gergely, G., and Csibra, G. (2003). 'Teleological Reasoning in Infancy: The Naïve Theory of Rational Action', *Trends in Cognitive Sciences* 7: 287–292.
- Geurts, B. (1998). 'Presuppositions and Anaphors in Attitude Contexts', *Linguistics and Philosophy* 21: 545–601.
- Hale, K., and Keyser, S. J. (1993). 'On Argument Structure and the Lexical Expression of Syntactic Relations', in K. Hale and S. J. Keyser (eds.), *The View from Building 20: Essays in Honor of Sylvain Bromberger*. Cambridge, MA: MIT Press, 53–109.
- Haspelmath, M. (1993). 'More on the Typology of Inchoative/Causative Verb Alternations', in B. Comrie and M. Polinsky (eds.), *Causatives and Transitivity*. Amsterdam: John Benjamins, 87-120.
- Higginbotham, J. (1985). 'On Semantics', *Linguistic Inquiry* 16: 547–593.
- Jackendoff, R. (1990). *Semantic Structures*. Cambridge, MA: MIT Press.
- (2002). *Foundations of Language: Brain, Meaning, Grammar, Evolution*. New York: Oxford University Press.

- (2007). *Language, Culture, Consciousness: Essays on Mental Structure*. Cambridge, MA; MIT Press.
- Kamp, H. (1979). 'Events, Instants and Temporal Reference', in R. Bäuerle, U. Egli, and A. von Stechow (eds.), *Semantics from Different Points of View*. Berlin: Springer, 376-417.
- (1981a). 'Some Remarks on the Logic of Change, Part I', in C. Rohrer (ed.), *Time, Tense, and Quantifiers: Proceedings of the Stuttgart Conference on the Logic of Tense and Quantification*. Tübingen: Max Niemeyer, 135-179.
- (1981b). 'A Theory of Truth and Semantic Representation', in J. Groenendijk, T. Janssen, and M. Stokhof (eds.), *Formal Methods in the Study of Language*. Amsterdam: Mathematisch Centrum, 277–322.
- and Reyle, U. (1993). *From Discourse to Logic: Introduction to Modeltheoretic Semantics of Natural Language, Formal Logic and Discourse Representation Theory*. Dordrecht: Kluwer.
- Karttunen, L. (1973). 'Presuppositions of Compound Sentences', *Linguistic Inquiry* 4: 169–193.
- Kiparsky, P., and Kiparsky, C. (1970). 'Fact', in M. Bierwisch and K. Heidolph (eds.), *Progress in Linguistics*. The Hague: Mouton, 143–173.
- Kratzer, A. (1996). 'Severing the External Argument from Its Verb', in J. Rooryck and L. Zaring (eds.), *Phrase Structure and the Lexicon*. Dordrecht: Kluwer, 109–137.
- Lakoff, G. (1970). *Irregularity in Syntax*. New York: Holt, Rinehart and Winston.
- Langendoen, D. T., and Savin, H. (1971). 'The Projection Problem for Presuppositions', in C. Fillmore and D. T. Langendoen (eds.), *Studies in Linguistic Semantics*. New York: Holt, Rinehart and Winston, 54–60.

- Levin, B., and Rappaport-Hovav, M. (1994). 'A Preliminary Analysis of Causative Verbs in English', *Lingua* 92: 35-77.
- (1999). 'Two Structures for Compositionally Derived Events', in *Proceedings of SALT 9*. Ithaca, NY: Cornell Linguistics Circle, 199-233.
- Lewis, D. (1973). 'Causation', *Journal of Philosophy* 70: 556-567.
- McCawley, J. (1968). 'Lexical Insertion in a Transformational Grammar without Deep Structure', in B. Darden, C.-J. Bailey, and A. Davison (eds.), *Papers from the Fourth Regional Meeting, Chicago Linguistic Society, April 19-20, 1968*. Chicago, IL: University of Chicago, 71-80.
- Miller, G., Galanter, E., and Pribram, K. (1960). *Plans and the Structure of Behavior*. New York: Holt.
- Parsons, T. (1990). *Events in the Semantics of English: A Study in Subatomic Semantics*. Cambridge, MA: MIT Press.
- Pustejovsky, J. (1991). 'The Syntax of Event Structure', *Cognition* 41: 47-81.
- Ramchand, G. (2008). *Verb Meaning and the Lexicon: A First Phase Syntax*. Cambridge: Cambridge University Press.
- Reinhart, T. (2002). 'The Theta System: An Overview', *Theoretical Linguistics* 28: 229-290.
- Ross, J. R. (1967). *Constraints on Variables in Syntax*. Ph.D. thesis, Massachusetts Institute of Technology, Cambridge, MA.
- Saksena, A. (1982). *Topics in the Analysis of Causatives with an Account of Hindi Paradigms*. Los Angeles, CA: University of California Press.
- Schank, R., and Abelson, R. (1977). *Scripts, Plans, Goals, and Understanding: An Inquiry into Human Knowledge Structures*. Hillsdale, NJ: Lawrence Erlbaum.

- Shibatani, M. (1976). 'The Grammar of Causative Constructions: A Conspectus', in M. Shibatani (ed.), *Syntax and Semantics 6: The Grammar of Causative Constructions*. New York: Academic Press, 1-40.
- Talmy, L. (1976). 'Semantic Causative Types', in M. Shibatani (ed.), *Syntax and Semantics 6: The Grammar of Causative Constructions*. New York: Academic Press, 43-116.
- (1988). 'Force Dynamics in Language and Cognition', *Cognitive Science* 12: 49-100.
- Travis, L. (2000). 'Event Structure in Syntax', in C. Tenny and J. Pustejovsky (eds.), *Events as Grammatical Objects: The Converging Perspectives of Lexical Semantics and Syntax*. Stanford, CA: CSLI, 145-185.
- Truswell, R. (2007). *Locality of Wh-movement and the Individuation of Events*. Ph.D. thesis, University College London.
- Van der Sandt, R. (1992). 'Presupposition Projection as Anaphora Resolution', *Journal of Semantics* 9: 333-377.
- Vendler, Z. (1957). 'Verbs and Times', *Philosophical Review* 66: 143-160.
- Wolff, P. (2003). 'Direct Causation in the Linguistic Coding and Individuation of Causal Events', *Cognition* 88: 1-48.
- Zacks, J., and Tversky, B. (2001). 'Event Structure in Perception and Conception', *Psychological Bulletin* 127: 3-21.

Notes

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²This departs from Lakoff (1970) and many other researchers in seeing CAUSE as a relation between two events, rather than between an individual and an event. This seems to me to be the most natural way of proceeding: individuals do not bring about changes of state except through some action of their own. This assumption is also required as part of the theory to be developed below. However, both positions have plenty of adherents, and the issue is not resolved.

³ Ramchand (2008), in particular, defends a uniform analysis of causative-inchoative pairs, among other alternations, based on the hypothesis that each projection in the lowest portion of the tree (her ‘first phase’) introduces an event-describing head, along with a slot (in specifier position) for a ‘subject’ of that head. Each of these positions can be filled either by movement from a lower projection, or by first Merge of a lexical item. Moreover, relations between these eventive heads and their complements correspond to semantic relations of causation. A more complex event structure is therefore optionally accompanied by an expansion of the argument structure, and/or extra morphology. The major hurdle for this hypothesis to overcome is that it predicts that causatives are always derived from inchoatives, and not *vice versa*. In contrast, the morphological and other evidence (Haspelmath 1993, Levin and Rappaport-Hovav 1999, Reinhart 2002) suggests that both causativisation and anticausativisation are attested.

⁴ A causal chain is a series of causally-related events linking the initial cause and ultimate effect, as in Lewis (1973). Of course, the definition of direct causation in the main text is only as good as our characterisation of the set of events it applies over, and this is where a lot of work (in particular Kamp 1979, 1981a, and Bittner 1999) has been focused. The most important consideration is that not every conceivable event is included in the pragmatically determined set of events E in (4), but only relevant events of roughly the same ‘size’ (so we don’t simultaneously consider huge events like wars, medium-size events like killings, and tiny events like muscle movements leading to the pulling of a trigger).

⁵ I am aware of only one serious challenge to Fodor’s generalisation concerning direct causation and lexical causatives. This comes from Hindi, which has two causative suffixes, *-aa* and *-vaa*, corresponding to what has traditionally been termed ‘direct’ and ‘indirect’ causation, respectively (Saksena 1982, Ramchand 2008, ch.6). Despite this distinction in directness of causation, both suffixes show the same degree of morphological idiosyncrasy, and the two suffixes cannot cooccur. In other words, Hindi respects the distinction between direct and indirect causation, but does not map it onto the distinction between lexical and productive causatives in the expected way. There is more empirical work to be done here, and crosslinguistically in general, for sure.

⁶ A reviewer suggests assimilating the possibility of extraction out of BPPAs to the adjunct-complement distinction: when the BPPA and the matrix VP can jointly describe a single event, the BPPA is a complement of the matrix verb; otherwise, it is an adjunct. Although I have no argument against this, it represents a higher degree of semantic determination of phrase-structural relations than is usually countenanced, and I don’t see any independent reason to weaken the autonomy of these two modules

to this extent. Note that the alternative of treating BPPAs under the single-event reading as *specifiers* is problematic for different reasons: (i) it would require a baroque set of movements to accommodate basic word order facts, as BPPAs certainly appear to be right-adjoined on the surface; (ii) many specifiers disallow subextraction in English in any case.

⁷ For some speakers, including a reviewer, this contrast between the interpretation of declarative and interrogative examples is not clear. Such idiolects are unproblematic for this theory – they just reflect grammars in which a BPPA and the VP it modifies must *always* jointly describe a single event, regardless of the presence or absence of A'-movement. For our present purposes, though, this is less revealing than those idiolects where there is an interpretive difference between the declarative and interrogative cases.

⁸ Of course, I haven't shown that there is no way of expanding the syntactic decompositional approach to cover these additional phrase-structural configurations. However, no natural expansion suggests itself to me.

⁹ There is substantial disagreement in the literature about the strength of the degradation induced by extraction out of a factive complement. It is clear that extraction of anything except an argumental DP is completely impossible, and that extraction of an argumental DP is somewhat better. This has led many people to classify factive complements as weak islands. However, it is often felt that extraction from factive complements is worse than extraction from typical weak islands like *wh*-islands (typical judgements are ?? for factives and OK or ? for *wh*-islands). Also Erteschik-Shir (1973:90) found that the degree of ungrammaticality of extraction from a factive complement was gradient, depending on the choice of embedding verb. This is not typical behaviour for other classes of weak islands. I will idealize away from

these serious empirical issues here, and instead treat extraction from factive complements as substantially degraded across the board.

¹⁰The first of these properties is noted already in Kiparsky and Kiparsky (1970), and Langendoen and Savin (1971), who claimed that presuppositions always took maximally wide scope. The DRT approach also accounts for some exceptions to this claim, but those exceptions are tangential to our interests here.