

Sentence-final Adverbs and "Scope"

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In linguistic theorizing, advances in syntax and semantics typically go hand-in-hand: our grasp on the grammar of a construction goes forward with our grasp on its meaning. In what follows, I present an illustration of this point involving sentence-final adverbs. Current syntactic views of sentence-final adverbs include at least two diametrically opposed accounts, each with a certain amount of empirical evidence in its favor. One is old and well established, and has a widely-accepted semantics accompanying it. The second is much newer, and, although more in accord with current syntactic views of the clause, it lacks a corresponding semantics. Here I argue that recent advances in the semantics of adverbs – specifically the proposal of structured, Davidsonian event quantification – supply the missing elements and offer a fresh picture of how the syntax and the semantics of adverbs fit together. One consequence that emerges is a new view of certain well-known data that have been widely analyzed as involving adverb scope. If I am right, these phenomena and their implications have been seriously misunderstood ever since their introduction over thirty years ago. I begin by sketching the basic problem area.

1. Two Analyses of Sentence-final Adverbs

Consider a simple English sentence like (1) containing two sentence-final adverbs (*at home* and *yesterday*), and consider the simple question of how the latter are attached in the clause.

- (1) John watched TV **at home yesterday**.

One well-known hypothesis is that adverbial phrase structure ascends rightward, with sentence-final adverbs adjoining recursively, either to the VP or to the clause (TP) (2).

- (2) [TP John [VP [VP [VP watched TV] **at home**] **yesterday**]]

This view has been advanced and/or assumed by a great many theorists, and also appears in nearly all syntax textbooks. I will refer to it as the **right-ascending analysis**, or, more simply, the classic analysis.

A second, somewhat more recent hypothesis holds that adverbial phrase structure descends rightward. An example of this view is offered in Larson (1988,1989), where

adverbs are generated as lowermost V-complements or specifiers, and are stranded by a verb that undergoes successive raising through a series of stacked VP “shells” (3).

- (3) [TP John [VP knocked [VP on the door t [VP **at home** [V, t **yesterday**]]]]

Versions of this general position are also developed by Stroik (1990,1992a,1992b,1996) and by Alexiadou (1994,1997). I will refer to it as the **right-descending analysis**.¹

Given the sharply differing assumptions in these positions, one might expect deciding between them to be a straightforward matter. Surprisingly, however, this has not been so. Each account appears to have important arguments in its favor.²

1.1. Some Arguments for Right-descent

1.1.1. Domain Phenomena

As is well-known, negative polarity items like *any*, *anyone*, *any* + noun, *ever*, etc. require a “trigger” item standing in a structural relation to them as a condition of well-formedness. The trigger must be an appropriately negative element like *no*, *not*, *n’t*, *few*, *rarely*, etc. The mostly widely accepted view of the structural relation is c-command, where node α c-commands a node β in a tree iff neither of α or β dominates the other, and β is a sister node of α or is contained in a sister node of α .

Under a right-descending analysis, well-formed examples like (4a) are accounted for straightforwardly since the negative trigger (*rarely*) stands in a c-command relation to the negative polarity contained in the final adverb (*during any of our meetings*) (4b). By contrast, under the right-ascending analysis, such examples are problematic since the outer adverb occupies a higher position (4c), and is not c-commanded by the trigger.

- (4) a. John spoke [rarely] [during any of our meetings]
 b. [_S John [VP spoke [VP **rarely** [V, t **during any of our meetings**]]]]
 c. [_S John [VP [VP spoke **rarely**] **during any of our meetings**]]

Domain phenomena thus offer a direct argument for right-descent.³

¹ Kayne’s (1994) “antisymmetry” theory is one particular instance of a right-descending theory, in which right-descent follows from the so-called “Linear Correspondence Axiom”. Kayne (1994) does not discuss the grammar or interpretation of adverbs, however.

² This result has led some to attempt proposals in which both accounts are true, and adverbials are given simultaneous ascending and descending analyses (Pesetsky 1995, Cinque 2002).

³ The force of this argument has been questioned on grounds that c-command can be replaced by an alternative formal notion in the account of licensing. Ernst (1994, 2001), for example, suggests that by substituting a structural licensing relation requiring m-command and linear precedence by the trigger, the well-formedness of (4a) can be accommodated in a right-ascending theory, and hence that a right-descending analysis has no advantage here.

This response tacitly assumes that c-command and m-command (+ precedence) stand on equal footing, and hence that substituting one for the other carries no benefit or penalty. This assumption is false,

(5) a. Duq^wel qi genemaxi t'ix^waxi l(a) guk^wdemaxi
see/saw DEM woman-3REM blackbear-3REM in village-3rem
'The woman saw the blackbear in the village'

b. ...qi sai^k'a qi sa'sems qix gu^k'w'ela -gaxaga l qi 'amleya's-asi
DEM chase DEM children DEM dwelling -in/at DEM playground-POSS
'she chased the children of these villagers at the playground'

(6) a. K^wa ilhnug^{wa}
 K^wa- ilh -nug^{wa}
 sit- inside/in house -I
 ‘I sit down inside’
 b. labetisi
 la- bet -is -i
 go- into enclosed space -on beach -3rem
 ‘she (he, it) goes into a hole on the beach’

These facts assume considerable importance under the so-called “Mirror Principle” of Baker (1985), which expresses a fundamental, widely-documented correlation between word and sentence structure.

According to the Mirror Principle, the order of morphological composition in the word

however. C-command and m-command are not on equal footing, and theories appealing to one versus the other are not equally valued. As Reinhart (1983) points out, in a theory of the syntax-semantics interface that embraces local compositionality, the notion of c-command maps directly to the notion of scope: phrases have their c-command domain as their semantic scope. This is crucial in the analysis of negative polarity items since the latter must both be in the structural domain of a syntactic trigger and be in the semantic scope of a negative. M-command and other, alternative licensing conditions do not deliver this result; they do not correlate with semantic scope. For more on this see fn. 4.

should track the order of syntactic composition in the phrase. Hence very different predictions are made under right-ascending and right-descending theories.

Under a right-ascending theory, nominal argument phrases (subjects, objects, indirect objects) combine with the predicate first, followed by adjunct modifiers. The Mirror Principle thus predicts a parallel pattern in the word: the core stem or root should first combine with inflections or clitics marking subject, object, indirect object, etc., followed by affixes with adjunct or modifier relations to the core stem (7a). By contrast, under a right-descending theory, adjuncts “get to” the predicate first; nominal argument phrases combine only afterwards. The Mirror Principle thus predicts the opposite pattern in the word: stem or root followed by adjunct affixes followed by inflections for subject, object, and indirect object (7b).

- | | | | | |
|-----|----|----------------|--|---|
| (7) | a. | Stem-ARG*-ADJ* | Expected Haisla pattern under R-A theory | X |
| | b. | Stem-ADJ*-ARG* | Expected Haisla pattern under R-D theory | ✓ |

Empirically, it is the second pattern that we observe. Hence the right-descending theory is directly supported by these facts under the Mirror Principle.⁴

1.2. A Potent Argument for Right-ascent

For its part, the classical analysis of sentence-final adverbs also has strong arguments in its favor. One of the simplest, and most compelling is offered by Andrews (1983) using examples (8a,b).

- | | | |
|-----|----|---|
| (8) | a. | John knocked on the door intentionally twice . |
| | b. | John knocked on the door twice intentionally . |

As Andrews notes, the two sentences differ in meaning. (8a) asserts that John did something twice, namely, knock on the door intentionally. By contrast (8b) asserts that John did something intentionally, namely, knock on the door twice. The difference is truth conditional. For example, suppose John is proceeding through my neighborhood, intending to knock once on every door. By mistake, he forgets that he has been to my door already, and repeats himself. In this situation it seems that (8a) is true since John intended to knock, and did so twice. But (8b) is false since knocking twice was not part of his intention.

Andrews diagnoses this meaning difference as one of scope. He suggests that the

⁴ Bach himself draws a very different (and rather melancholy) conclusion from these facts, namely that in some languages the processes building words and sentences are entirely independent. The Mirror Principle fails to apply because there simply is no relation between the two.

Bach’s conclusion seems hasty, however. First, it does not appear to do justice to the facts. In Haisla, word form and sentence form are not uncorrelated, as the “independent” theory would predict. The two are inverses, and this inverse patterning seems something that should be explained. Second, and more importantly for our purposes, Bach’s conclusion turns on an assumption that is precisely at issue here: namely, that the composition of phrasal arguments and modifiers is right-ascending.

first reading arises by *twice* taking scope over *intentionally*, and that the second reading arises by the inverse scope. If this diagnosis is correct, then the standard, right-ascending syntax, coupled with the standard semantics from Montague Grammar (Thomason and Stalnaker 1973, Montague 1974) will explain it neatly. As we have seen, in the standard syntax, VP adverbs are adjuncts, adjoining recursively to VP. Outer adverbs asymmetrically c-command inner adverbs. (8a) receives the structure in (9a), where *twice* is highest, whereas (8b) gets the structure in (9b), where *intentionally* is highest.

- (9) a. John [VP [VP [VP knocked on the door] **intentionally**] **twice**]]
 b. John [VP [VP [VP knocked on the door] **twice**] **intentionally**]]

Under the standard Montagovian semantics, VP adverbs are functors, taking (intensions of) VP-denotations as arguments, and returning VP-denotations as values. Outer functors take arguments containing inner functors. If one applies this analysis to the trees in (9a,b), the semantic representations come out as in (10a,b), where **twice'** (the interpretation of *twice*) has widest scope, and where **intentionally'** has widest scope, respectively.⁵

- (10) a. **twice'**(**intentionally'**(**knocked on the door'**))
 b. **intentionally'**(**twice'**(**knocked on the door'**))

Thus applying the standard semantics to the standard, right-ascending syntax gives the adverbs differential scope, as expected under Andrews' diagnosis. The simplicity of this picture has convinced many researchers of the need for right-ascending structure (Ernst 1994, 2001; Laenzlinger 1996; Pesetsky 1995; Cinque 1999, 2002).

1.3. A New Approach

An important feature of tightly-knit arguments like the one just rehearsed is that they cannot easily be challenged piecemeal. Since the parts fit together snugly, in general either the argument is simply right, or else it's all wrong - wrong in all of its parts. This makes such arguments of great potential interest since, if they fall, much falls with them.

In the remainder of this paper, I will suggest that the scope argument given above is in fact wrong in all of its parts. Specifically, I will argue that Andrews' original diagnosis was wrong, and that the contrast in pairs like (9a,b) is not a matter of scope, but rather of predication, equivalent to (11a,b):

- (11) a. John's intentional knockings on the door were two (in number).
 b. John's double-knock on the door was intentional.

⁵ Notice that for this result, a right-ascending account must assume m-command + precedence not to determine scope on pain of getting exactly the wrong result: inner adverbs taking scope over outer ones. This means that a right-ascending theory requires two distinct notions: m-command + precedence and c-command. This result is particularly onerous for the case of NPIs, which must be in the semantic scope of their syntactic trigger; a right-ascending theory requires problematic “LF adjustment” in such cases.

Basic logic texts typically assign simple English sentences like (12a) a representation like (12b), involving two constants and a binary relation. Davidson (1967a) proposes that action sentences like this are not so simple, and involve, in addition, a quantification over events. Davidson's original formulation is given in (12c) (ignoring tense), where an existentially quantified event parameter is simply added to the relational structure of the predicate. The widely-adopted, neo-Davidson position is given in (12d), where the verb is distilled into a core unary event predicate, whose participants are linked to the event by means of conjoined binary thematic relations (see Parsons 1990 and Higginbotham 1989, among many others, for discussion):

- Hereafter, I assume the neo-Davidsonian analysis, but will sometimes abbreviate using classical Davidsonian formulae when decomposition of the verbal relation is irrelevant.

(13) a. Mary kissed John **quickly**. MANNER
b. $\exists e[\text{kiss}(m, j, e) \ \& \ \text{quick}(e, C)]$
("There is a kissing of John by Mary and it is quick (for such an action).")

- (14) a. Mary kissed John **for-an-hour**. DURATION
b. $\exists e[\text{kiss}(m, j, e) \ \& \ \text{for-an-hour}(e)]$
("There is a kissing of John by Mary and it is an hour long.")
- (15) a. Mary kissed John **in-the-park**. LOCATION
b. $\exists e[\text{kiss}(m, j, e) \ \& \ \text{in-the-park}(e)]$

("There is a kissing of John by Mary and it is in the park.")

The Davidsonian event analysis has the interesting property that adverbial predicates are not scopal. Unlike the standard semantics, adverbs are not analyzed as functors applying to VP denotations of the familiar sort. Rather they are simple conjuncts. Our scope-like intuition that “*quickly* applies to *kissed John*” in (13a) arises from the fact that VP denotes an event of John-kissing, and *quick* is true of this whole event.

Another point to note about (13)-(15) is that the event quantifications are represented as unrestricted/unstructured. The existential quantifier attaches to a “flat” structure of co-equal event conjuncts. A number of authors have argued that this aspect of Davidson’s analysis is in need of refinement – that in certain cases event quantification is structured into quantifier, restriction and scope.

2.1. Focus (Herburger 2000)

Herburger (2000) offers an attractive account of focus, whose centerpiece is an appeal to structured event quantification. Compare (12a) (repeated as (16a)) with the focused variant in (16b). Whereas the first asserts the existence of a kissing of John by Mary, the second is taken to divide up this information into a presupposition or background-entailment of Mary’s kissing someone, and an assertion that the individual in question was John.⁶ Herburger correlates this difference in “information packaging” with a difference in event representations. The first receives gets the flat, unstructured event representation in (17a), whereas the second gets the representation in (17b), where the non-focused material forms a restriction on the event quantifier, and the focused material constitutes its scope.⁷

- (16) a. Mary kissed John.
 b. Mary kissed JOHN.
 i. Presupposes/Background-entails: Mary kissed someone.
 ii. Asserts: The individual was John
- (17) a. $\exists e$ [kissing(e) & Agent(e, m) & Patient(e, j)]
 "There was a kissing event with Mary as agent and John as patient"
 b. $\exists e$ [kissing(e) & Agent(e, m)] (Patient(e, j))
- | | | |
|----------|--|--------------------------|
| | Restriction
Presupposed/BEnt | Scope
Asserted |
| Q | “For some kissing by Mary, its Patient was John” | |

Under the assumption that the restriction on a structured quantifier is presupposed/background-entailed and the scope is asserted, the difference in information

⁶ See Jackendoff (1972), Rochmont (1985) and Rooth (1985, 1992) for representative work on focus.

⁷ The focus representations in (17) and hereafter are simplified; spelled-out versions would include the restriction as part of the assertion: $\exists e$ [kissing(e) & Agent(e,m)](kissing(e) & Agent(e,m) & Patient(e,j)): “there is a kissing by Mary which is a kissing by Mary of John”. The simplification is harmless here.

packaging follows directly from these representations.⁸ Alternative foci are accommodated along the lines shown in (18)-(20):

- (18) a. MARY kissed John.
 b. $\exists e$ [kissing(e) & Patient(e, j)] (Agent(e, m))
 "For some kissing of John, its agent was Mary"
- (19) a. Mary KISSED John.
 b. $\exists e$ [Agent(e, m) & Patient(e, j)] (kissing(e))
 "For some event with Mary as agent & John as patient, it was a kissing"
- (20) a. Mary kissed John QUICKLY.
 b. $\exists e$ [kissing(e) & Agent(e, m) & Patient(e, j)] (quick(e, C))
 "For some kissing with Mary as agent & John as patient, it was quick"

Thus if Herburger's analysis is correct, structured event quantification is the semantic core of focus phenomena.

2.2. Middles (Condoravdi 1989)

An even earlier appeal to structured event quantification is Condoravdi's (1989) analysis of middles, which have generic force and typically require a postverbal predicate (an adverb or adjunct PP). As (21a-c) show, without the latter, middles are generally perceived as odd or incomplete.

- (21) a. These flowers grow ?*(quickly/in sandy soil)
 b. Ballerinas dance ?*(beautifully)
 c. Bread cuts ?*(easily).

Condoravdi makes a striking proposal that correlates these features. She suggests that middles involve structured, generic event quantification, in which the sentence nucleus (the verb and its arguments) forms the restriction, and the adjunct expression constitutes the scope. Thus (21a) is analyzed as in (22a), where Γ is a generic quantifier, and where the semantic contributions of the sentence are partitioned as shown. The "main clause" gives the restrictive term; its content is presupposed or background-entailed. The "adjunct" gives the scope term; its content is asserted. (21b,c) are analyzed similarly in (22b,c), respectively.

- (22) a. Γe [Con(f, e) & growing(e) & Theme(e, f)] (**quick(e)**)
- | | | |
|---|--|--|
| Q | <div style="border-top: 1px solid black; width: 100%; margin-bottom: 5px;"></div> Restriction | <div style="border-top: 1px solid black; width: 100%; margin-bottom: 5px;"></div> Scope |
| ("Generally, for contextually relevant events involving flowers in which flowers grow, those events are quick") | | |

⁸ See Diesing (1992), Heim and Kratzer (1997), and Herburger (2000) for discussion of the presuppositional contribution of quantificational structure.

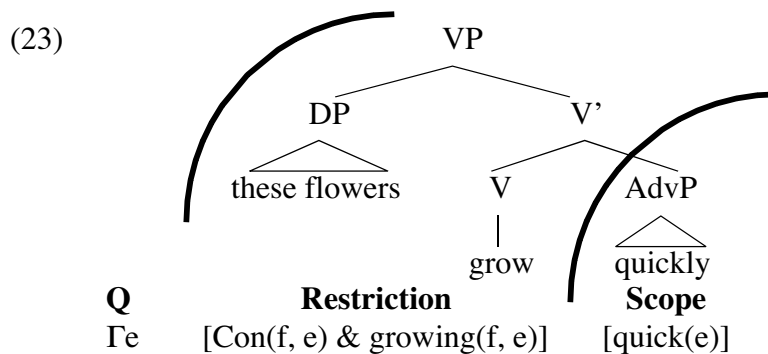
- b. $\Gamma e[\text{Con}(b, e) \ \& \ \text{dancing}(e) \ \& \ \text{Agent}(e, b)]$ (**beautiful(e)**)
- c. $\Gamma e[\text{Con}(br, e) \ \& \ \text{cutting}(e) \ \& \ \text{Theme}(e, br)]$ (**easy(e)**)

This idea leads Condoravdi to a surprising conclusion, namely, that in middles, the so-called “adjunct” is required because, semantically, it typically constitutes the main predication in the sentence! Far from being a modifier, the adverb or adjunct PP actually expresses the principal assertion in the clause.⁹

Condoravdi’s conclusion has very interesting syntactic implications under Diesing’s (1992) “Mapping Hypothesis,” which correlates hierarchical, syntactic structure with quantificational semantic structure; generalizing slightly on her original formulation, high material maps to the restriction and low material to the scope:

Mapping Hypothesis: Lowest material from VP is mapped to the nuclear scope.
The residue is mapped into a restrictive clause.

Note now that Condoravdi’s proposal fits the Mapping Hypothesis very neatly under a right-descending view of adjuncts. Syntactic and quantificational parses match up with no need for LF readjustment:



2.3. *Because-Clauses*

Condoravdi’s analysis of middles provides a first illustration of how the low position of

⁹ The adjunct predicate requirement in middles is sometimes questioned on the basis of examples like (ia,b) involving focus, or (iia,b) with negation:

- (i) a. FLOWERS grow. (ii) a. These flowers (just) don’t grow.
- b. Ballerinas DANCE. b. This bread (just) doesn’t cut.

In fact, these examples pose no threat to Condoravdi’s analysis. Focused middles can be analyzed along the lines in (iii), where (following Herburger) we appeal to structured event quantification, and where the focused item becomes the scope of the generic quantifier. Similarly, examples with negation can be analyzed as instances of “verum focus” (focus on truth value) (iva-d)

- (iii) a. $\Gamma e[\text{Con}(f, e) \ \& \ \text{growing}(e)]$ (**Theme(f, e)**)
- b. $\Gamma e[\text{Con}(f, e) \ \& \ \text{Agent}(b, e)]$ (**dancing (e)**)
- (iv) a. Whatever you do with them, these flowers don’t grow. b. $\Gamma e[\text{Con}(f, e)] (\neg \text{growing}(f, e))$
- c. Whatever you do to it, this bread doesn’t cut. d. $\Gamma e[\text{Con}(b, e)] (\neg \text{cutting}(b, e))$

adverbs assigned in a right-descending theory might be understood semantically through structured event quantification. And in fact there appear to be other cases where this analysis is revealing. One such is the case of *because*-clauses, which have received two very different semantic analyses in the literature.

2.3.1. Propositional Operators

Because-clauses (24a) have been widely analyzed semantically as propositional operators (24b), an account that fits their classic syntactic analysis as outermost TP or VP adjuncts (24c,d), respectively (Williams 1974, Dowty 1979, Johnston 1994). If *because*-clauses apply to complete propositions, then it's natural for them to occur sister to elements that express complete propositions, etc.:

- (24) a. John left because Mary left.
b. **because Mary left'**([^]**John left'**)
c. [_{TP}[_{TP} John left] [_{PP} **because Mary left**]]
d. [_{TP} John [_{VP}[_{VP} left] [_{PP} **because Mary left**]]]

Despite its simplicity, however, the adjunct analysis leaves some puzzling, unanswered questions. Specifically, it does not explain the “information packaging” of sentences with *because*-clauses, and why the latter is apparently the opposite of what we find with other adverbial clauses.

As discussed by Hooper and Thompson (1973), *because*-clause constructions have the interesting property of presupposing the information expressed by the main clause while asserting the information in the adverbial clause (25a). This contrasts sharply with other adverbial clauses, where the converse is true. Thus Heinämäki (1978) observes that with *when*-/*before*-/*after*-clauses, main clause information is asserted whereas adverbial clause information is presupposed (25b):

- (25) a. John left [because Mary left]
 Presupposes: John left
 Asserts: John's leaving was because of Mary's leaving
b. John left [after Mary left]
 Presupposes: Mary left
 Asserts: John's leaving was after Mary's leaving

In propositional operator analyses, this property of *because*-clauses is either ignored or else simply stipulated as a lexical fact about *because* (Johnston 1994). In fact, however, this difference between causal and other adverbial clauses seems to be a deep one that holds cross-linguistically.¹⁰

¹⁰ See Sawada and Larson (2004) for recent discussion.

2.3.2. Event Relations and Quantification

Davidson (1967b) offers an interesting alternative to the standard semantics of causal-clauses, and suggests that, rather than being a propositional operator, *(be)cause* is in fact a simple binary relation between events. On Davidson’s view, (26a), for example, would be analyzed roughly as in (26b), which is read: “there is an event *e* that is a leaving by John and an event *e*’ that caused *e* where *e*’ is a leaving by Mary.

- (26) a. John left [**because** Mary left]
 b. $\exists e[\text{leaving}(j, e) \ \& \ \exists e'[\text{Cause}(e', e) \ \& \ \text{leaving}(m, e')]]$

The Davidsonian analysis of *(be)cause* has a number of salient features. For one thing, note that *because*-clauses are not scopal on this view, they do not apply to, or have scope over VPs or TPs. Relatedly, *because* doesn’t relate propositions expressed by verb phrases or sentences; rather it relates the simple event objects that the latter describe. Finally, and most importantly for our purposes, causal clauses involve quantificational structure; *because*-adverbials introduce a quantification ($\exists e'$) over events together with the primitive cause-relation.

I want to suggest that the last point provides an approach to the information packaging question that eludes the propositional operator analysis. Lewis, (1975) and Kratzer (1986) have argued persuasively that *if-/when*-clauses always restrict (explicit or covert) adverbs of quantification; and De Swart (1993) and Johnston (1994) have extended this general view to temporal *when-/before-/after*-clauses as well. Under the usual information packaging of quantification, these proposals explain why the content of these adverbials is standardly presupposed/background-entailed (27):

- (27) a. John always leaves [if/when/before/after Mary leaves]
 b. ALWAYS [if/when/before/after Mary leaves] [John leaves]
- Q**
Restriction
Scope
Presupposed/Background Entailed
Asserted

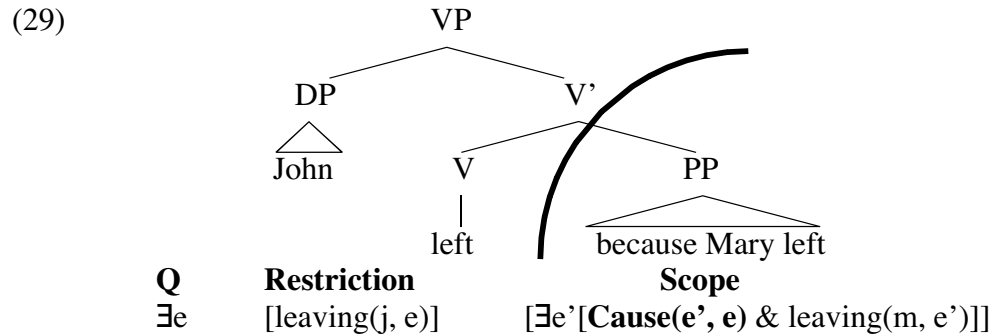
Suppose now we extend this idea to *because*-clauses, replacing the unrestricted event quantification in (26b) with the structured/restricted event quantification shown in (28b), Then the partitioning of information will come out correctly:

- (28) a. John left [**because** Mary left]
 b. $\exists e [\text{leaving}(j, e)] [\exists e'[\text{leaving}(m, e') \ \& \ \text{Cause}(e', e)]]$
- Q**
Restriction
Scope
“For some leaving by John, it was caused by Mary leaving”

The main clause is presupposed because it provides the restriction on the main event quantifier. The *because*-clause is asserted because it constitutes the scope of the event

quantification.

The structured event-quantification hypothesis fits very neatly into a right-descending syntax under the Mapping Hypothesis, as illustrated in (29):



It also permits a fresh approach to the special syntactic properties of causal modifiers. As is well-known, non-preposed causal adverbs strongly prefer an absolute sentence-final position (cf. *John will leave [tomorrow][because Mary left]* vs. ??*John will leave [because Mary left][tomorrow]*). In a right-ascending theory, this requires an analysis as outermost adjuncts; but this syntax is not straightforward under their semantic analysis as propositional operators since other propositional operators, e.g., modals, behave differently (see Ernst 2001 for discussion). In right-descending theory, the issue becomes radically recast; rather than being outermost adjuncts, causal-clauses are innermost innermost V-complements, hence we are led to seek some very intimate connection to the verb. Interestingly, Davidson (1967b) provides just such a connection, arguing that the cause-relation has a privileged status for events. In brief, causal-relations are for Davidson precisely what individuate and distinguish events: events with same causes and the same effects are the same event. If this is so, then the intimate connection between verbs and *because*-clauses makes sense considerable. If verbs are predicates of events, then *because*-clauses do not merely add additional information about those events, but contribute to determining what events they actually are.

2.4. Some General Lessons

We can summarize the main lessons of this section as arguing that under a semantics of structured Davidsonian event quantification embracing the Mapping Hypothesis:

- What is called an “adjunct” may actually constitute the main predicate (middles)
- What is analyzed as scopal may be reanalyzed as predication (*because*-clauses)
- What is analyzed as providing mere adjunct information may be reanalyzed as individuating the core object of which V predicates (*because*-clauses)
- Right-descending syntax becomes a semantically natural structure for adverbs (middles and *because*-clauses)

3. Re-examining Adverbial “Scope Contrasts”

With these results in hand, let us now return to the analysis of sentence-final “scope” contrasts and the crucial Andrews facts.

3.1. The Predicational Nature of Sentence-finals Advs

Adverbs like *intentionally* in (30a) and *twice* in (30b) have been widely assumed to be scopal given that *intentionally* resembles *intend*, a scopal, intensionality-inducing element (31a), and given that *twice* resembles a temporal quantifier, which can take a restriction and count over times or events (31b).

- (30) a. John knocked on the door **intentionally**.
b. John knocked on the door **twice**.
- (31) a. John **intended** $\left\{ \begin{array}{l} \text{to knock on the door} \\ \text{to visit Santa Claus} \end{array} \right\}$.
b. **Twice** [when he was standing there] John knocked on the door.

In fact, however, the status scopal operator status of these items is far from clear.

3.1.1. Sentence-final *intentionally* as an (Event) Predicate

English does contain clearly intensional adverbs such as *purportedly*, *supposedly*, and *allegedly*. These occur sentence-initially (32a,b) and sentence medially (32c), but never sentence-finally (without a pause) (32d). They exhibit the usual diagnostics for intensionality insofar as non-denoting terms do not necessarily induce falsity (32a), substitution can fail in their scope (32b), and indefinites in their domain can receive a non-specific interpretation (32c):

- (32) a. **Purportedly/supposedly/allegedly** John met Santa Claus.
b. **Purportedly/supposedly/allegedly** John met Boris Karloff/Bill Pratt.
c. John **purportedly/supposedly/allegedly** married a Norwegian.
d. John met Santa Claus *(,) **purportedly/supposedly/allegedly**.

Interestingly, *intentionally*, *deliberately*, *voluntarily*, etc. pattern quite differently. These forms never occur sentence-initially (33a). They always yield falsity with non-denoting terms (33b), and their status with respect to other two diagnostics for intensionality is unclear at best (33c,d).

- (33) a. ***Intentionally/Deliberately/Voluntarily** John insulted Boris.
b. #John met Santa Claus **intentionally/deliberately/voluntarily**.
c. John pushed Boris Karloff/Bill Pratt **intentionally/deliberately/voluntarily**.
d. John married an actress **intentionally/deliberately/voluntarily**.

Furthermore, there is another crucial difference: whereas the adjectival counterparts of *purportedly*, *supposedly*, and *allegedly* are neither predicative nor intersective (34), as we would expect of scopal elements, the adjectives corresponding to *intentionally*, *deliberately*, *voluntarily* are in fact both predicative and fully intersective (35):

- (34) a. ??John's actions were **purported/supposed/alleged**.
b. John's painting is a **purported/supposed/alleged** forgery.
 ≠ John's painting is **purported/supposed/alleged** and it is a forgery.
- (35) a. John's actions were **intentional/deliberate/voluntary**.
b. That was an **intentional/deliberate** act of aggression against Iraq.
 (That was intentional/deliberate & it was an act of aggression against Iraq.)
c. That was a **voluntary sacrifice**. (That was voluntary and it was a sacrifice.)

Finally, Jackendoff (1972) observes that whereas sentence-medial *intentionally* is subject-oriented (i.e., intention is ascribed to the referent of whatever NP occupies the subject position) (36a,b) sentence-final *intentionally* is not; with the latter intention is ascribed uniformly to the semantic agent (36c,d):

- (36) a. Joe **intentionally/deliberately/carefully** has seduced Mary.
b. Mary has **intentionally/deliberately/carefully** been seduced by Joe.
c. Joe has seduced Mary **intentionally/deliberately/carefully**.
d. Mary has been seduced by Joe **intentionally/deliberately/carefully**.

I propose that these points can be drawn together, basically by accepting Jackendoff's view that sentence-final adverbs like *intentionally* are not scopal operators, but rather manner adverbs. Specifically, within the Davidsonian event semantics adopted here, I suggest that *intentionally* (and related forms) are simple predicates, true of a particular class of events, viz., actions (events having agents) – and that the truth of the predication carries an entailment of intention. On this proposal, (37a) is interpreted as in (37b), and where *intentional(e)* carries the further entailment in (37c). Here the exact propositional content of the agent's intent is left vague, and intentionality is associated with the agent.

- (37) a. John knocked on the door intentionally.
b. $\exists e$ [knocking(j, d, e) & **intentional(e)**]
c. *intentional(e)* \Rightarrow the agent of e intended to bring e about

This explains the basic predication character of *intentionally*, as revealed by (35), and also why (36c,d) do not show subject-orientation: intention is attributed to the agent of e no matter how the latter is expressed syntactically.

3.1.2 Sentence-final *twice* as a (Quantity) Predicate

Twice can also, I believe, be given a predication analysis. *Twice* is plainly related to the form *two*, which has been analyzed not only as a quantifier (38a) but also a quantity

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predicate applying to pluralities (38b,c). It is natural to extend this idea to *twice*, and to other sentence-final frequency adverbs like *frequently/often, rarely/infrequently*, which correspond to the quantity predicates *many* and *few* (39):

- (38) a. Two of the men were present.
b. Two men were in the garden.
c. The problems are **two** (in number).
- (39) a. **Many/few** men were in the garden.
b. Our problems are **many**, and our solutions are **few**.

Indeed if we adopt a strictly predicational, non-quantificational view of sentence-final frequency adverbs, then we can explain why unambiguously quantificational forms are forbidden from final position (40), and why forms like *often* that are ambiguous between a quantificational (41a) and predicational reading when they occur mid-sentence, lose their quantificational meaning when they appear finally (41b):

- (40) a. John knocked on the door { **twice/often/frequently/rarely/infrequently**
b. ***always/*mostly**
- (41) a. Texans **often** eat barbeque.
i. ‘Many Texans eat barbeque.’
ii. ‘In general for a Texan, his/her barbeque-eatings are many’
b. Texans eat barbeque **often**.
‘In general for a Texan, his/her barbeque-eatings are many’

The conclusion I draw from this is the sentence-final *twice* is not clearly quantificational. More specifically, I wish to propose that sentence-final *twice* is a quantity predicate applying to pluralities of events - a measure adverb in the sense of Larson (2003), and that examples like (42a) be analyzed along the lines of (42b), which is read as follows: there was an event E whose subevents e were knockings on the door by John, and that event E was two in number.

- (42) a. John knocked on the door twice.
b. $\exists E [\forall e [Ee \rightarrow \text{knocking}(j, d, e)] \ \& \ \text{two}(E)]$

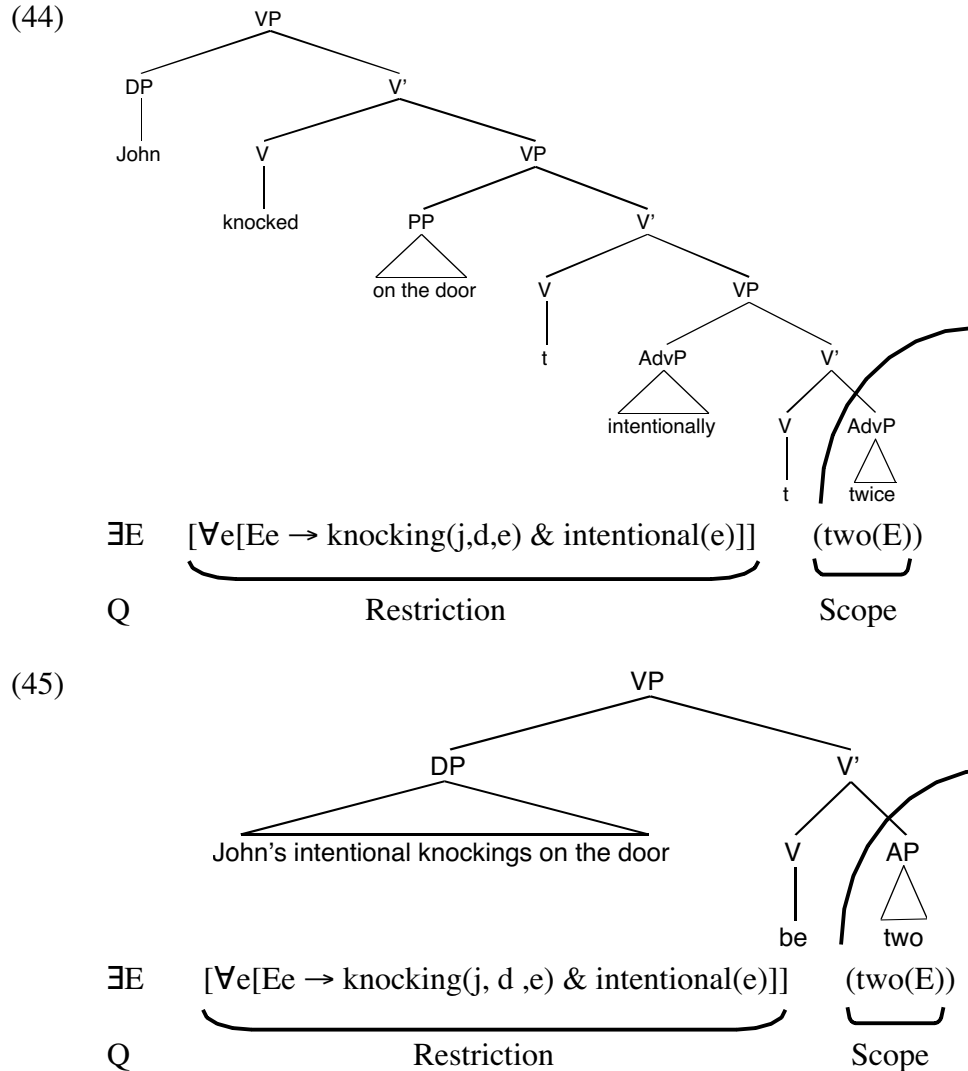
3.2. Andrews’ Examples

3.2.1. *Intentionally-Twice*

Under the results derived above, (43a), our Andrews example with *intentionally-twice*, will have the logical form in (43b), which is read as follows: “for some event E, whose subevents e were all intentional knockings-on-the-door-by-John, E was two in number/binary”. I assume that this is also the correct logical form for (43c), whose predicational syntax is transparent:

- (43) a. John knocked on the door **intentionally twice**.
 b. $\exists E[\forall e[Ee \rightarrow \text{knocking}(j, d, e) \ \& \ \text{intentional}(e)]] \text{ (two}(E))$
 c. [John's intentional knockings on the door] were two (in number).

Compare the VPs of (43a) and (43c), now assuming a right-descending syntax:



In both cases we appear to get the correct association between quantification, restriction and scope.

3.2.2. *Twice-Intentionally*

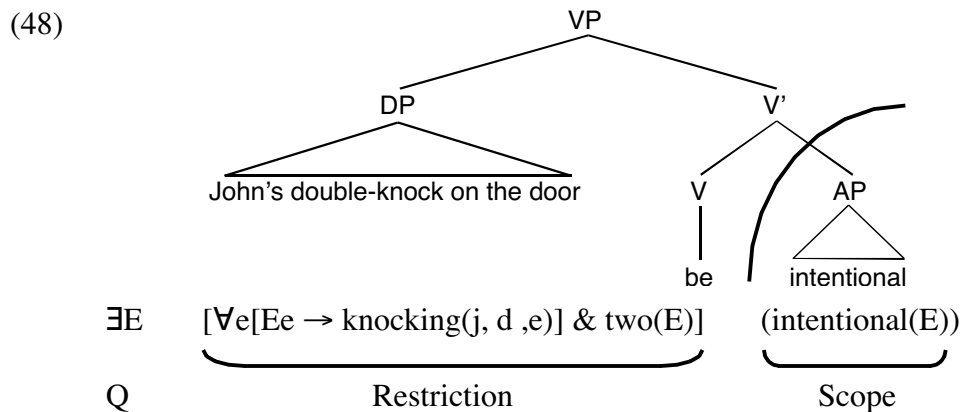
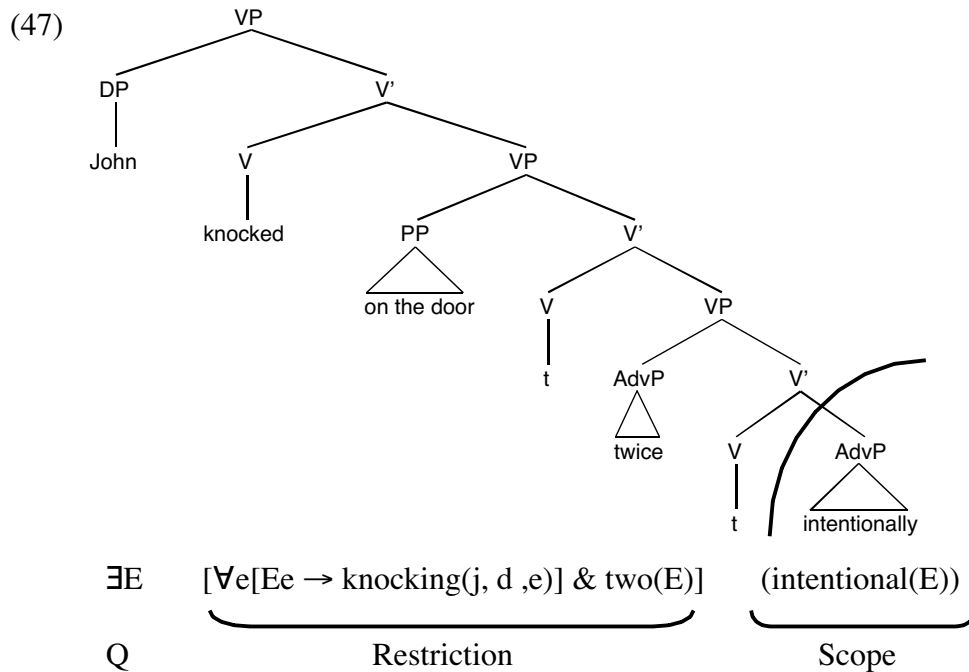
The second Andrews case with *twice-intentionally*, (46a), will have the logical form in (46b), which is read as follows: “for some event *E*, whose subevents *e* were all knockings-on-the-door-by-John and which was two in number/binary, it was intentional.”

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Again, I assume that this is also the correct logical for (46c), whose syntax is overtly predicational:

- (46) a. John knocked on the door twice intentionally.
b. $\exists E[\forall e[Ee \rightarrow \text{knocking}(j, d, e)] \ \& \ \text{two}(E)] \ (\text{intentional}(E))$
c. [John's double-knock on the door] was intentional.

Compare the VPs of (46a) and (46c), assuming a right-descending syntax:



Again, the correct information packaging seems to be derived.

These results obtained above for Andrews two-adverb cases appear to be extensible to more complex examples and, in particular, seem to be compatible with Philips' (2003) observation that in sequences of three adverbials, the "scope" relations

between the first two become fluid. Consider a pair of Philips examples like (49); the first, with two adverbs, asserts that Sue's multiple-kissing of him was intentional, not that each of many individual kissings was intentional. By contrast, in (49b), with three adverbs, either of these two interpretations seems possible. In the current framework we may derive this result as in (50), where the large event E is many in number, and where either the whole big event is intentional (50a) or where each individual subevent is (50b). This latter possibility arises because in the three-adverb case, *intentionally* occurs within the scope of the distributive quantifier over individual events ($\forall e$). This is not true in the logical form for (49a), however.

- (49) a. Sue kissed him [**many times**] [**intentionally**].
 b. Sue kissed him [**many times**] [**intentionally**] [**in front of the boss**].
- (50) a. $\exists E[\forall e[Ee \rightarrow \text{kissing}(j, d, e)] \ \& \ \text{many}(E) \ \& \ \text{intentional}(E)]$ i-f-o-t-b(E)
 b. $\exists E[\forall e[Ee \rightarrow \text{kissing}(j, d, e)] \ \& \ \text{many}(E) \ \& \ \text{intentional}(e)]$ i-f-o-t-b(E)

In brief, then, all of the crucial Andrews data, together with the more complex examples that Phillips cites, appear to fit into a right-descending analysis.

3.3. VP-Initial Adverbs

This account raises an interesting question for VP-initial adverbs like (51a,b), and sentence-initial cases like (51c). How should they be analyzed?

- (51) a. John **intentionally** knocked on the door.
 b. John **twice** knocked on the door.
 c. **Twice** John knocked on the door.

What I would like to (tentatively) propose is that *intentionally* (like similar adverbs) is ambiguous in (51a) between a simple event predicate and a scopal operator, but that *twice* in (51b,c) is a true quantifier, and thus has only the reading in (52b), not that in (52a):

- (52) a. $\exists E [\forall e [Ee \rightarrow \text{knocking}(j, d, e)]]$ (two(E)) Quantity Predicate
 b. $2e[\text{knocking}(j, d, e)]$ True Quantifier

If this proposal is correct, it makes several interesting predictions. First it predicts that (53a) will be understood as in (53b), which is paraphrased as in (53c), not as in (53d). That is, *intentionally* will be understood as true of individual knocks, not of the whole collective knocking.

- (53) a. John twice knocked on the door intentionally.
 b. $2e[\text{knocking}(j, d, e) \ \& \ \text{intentional}(e)]$
 c. John's two knocks on the door were intentional.
 d. John's double knock on the door was intentional.

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This prediction seems correct and in fact Andrews (1983) noted it and took it as reflecting a strong preference for a preverbal adverb to take scope over a postverbal one. But Andrews could not explain this preference under his own syntactic assumptions since both representations (54a) and (54b) should be legitimate adjunction structures for him:

- (54) a. [_{VP} **twice** [_{VP} [_{VP} knocked on the door] **intentionally**]]
b. [_{VP} [_{VP} **twice** [_{VP} knocked on the door]] **intentionally**]

If I am correct, this fact has nothing to do with scope in Andrews’ sense.

Another prediction is that in initial position, where it can be a quantifier, *twice* should be able to take a *when*-clause as a restriction, whereas in final position, where *twice* must be a quantity predicate, it should not. Again, this prediction seems to be correct. According to my intuitions, (55a) can describe visits by Mary to the Louvre on two separate occasions of her being in Paris. By contrast, (55b) must describe a single occasion of Mary being in Paris, two times during which she visited the Louvre,

- (55) a. Twice when she was in Paris Mary visited the Louvre.
Can mean: ‘On two separate occasions of being in Paris, Mary visited the Louvre during those occasions’ (*when*-clause restricts *twice*)
b. Mary visited the Louvre twice when she was in Paris.
Must mean: ‘On one occasion of being in Paris, Mary visited the Louvre twice during that occasion’ (*when*-clause frames *twice*)

In the first case the *when*-clause functions to restrict the frequency adverb *twice*; in the second case it merely frames the adverb, providing the domain of quantification.

4. Conclusion

In this paper I have argued for a new picture of the semantics of sentence-final adverbs, one in which these elements are not scopal, VP-functors stacked up on the edge of the sentence or verb phrase, but rather event predicates, arranged within a structured Davidsonian event quantification for the clause. I have shown how this quantificational structure is motivated by a number of interesting constructions (focus, middles, *because*-clauses), and how it corresponds directly with a right descending syntax for adverbial attachment under the Mapping Hypothesis of Diesing (1992). I have furthermore tried to show how this proposal accounts for certain well-known phenomena traditionally ascribed to differential adverb scope. Under the analysis proposed here, the phenomena are revealed as predicational, not scopal at all. Furthermore the crucial examples are brought into very close alignment with non-adverbial cases that have transparently predicational structure. Finally, I have briefly and tentatively considered a number of small auxiliary predictions of the account, although I think the latter are far from exhausting its potential consequences.

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