A unified analysis of ad-nominal adverbials
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Introduction It has been long noted that certain – especially epistemic – adverbials may modify nominal constituents, as in (1) (Ernst 1983: 180) and (2) (Collins 1988: 5).

(1)   He reduced us to *maybe* the size of a pinhead...

(2)   John and *maybe* Mary went to the store.

In a recent paper, Bogal-Allbritten and Weir (2017) (BAW, henceforth) analyze examples such as (2) as ambiguous between a 'sentential' reading where it is not clear whether 1 or 2 people went to the store (John alone or both John and Mary), and a 'subsentential' reading where 2 people went to the store (both John and somebody else who may be Mary). This should be contrasted with (1), which seems to only have a 'subsentential' reading: there is certainly something that "he reduced us to", even if its nature is uncertain. They argue that such 'subsentential' readings are in principle available in all nominal positions, while 'sentential' readings are restricted to coordination. Correspondingly, they analyze 'subsentential' readings as instances of reduced relative clauses, and 'sentential' readings – as instances of conjunction reduction. As both structures involve underlying sentential structures (reduced relative clauses or elided sentences), the usual sentential adverbials are licensed, so it is not necessary to assume that such adverbials are ambiguous. The analysis also explains the fact observed in Vicente 2013 that the epistemic material may have the form of sentence fragments:

(3)   Alice and *I think (*that)* Bob have gone to the store.

Problems There are numerous empirical and technical problems with the analysis of BAW, some of which are already noted there. **First**, a well-known problem are collective predicates, as in:

(4)   a.   This stew is a mix of cabbage, sausage and *possibly* ham.
      b.   John, Bill, and *possibly* Mary gathered to discuss the matter.

BAW note that these sentences cannot receive the natural conjunction reduction analysis, and they suggest that the underlying structures might be as in (5), thus implicitly relying on a more powerful non-standard mechanism of ellipsis.

(5)   a.   This stew is a mix of cabbage and sausage and *possibly* ham ~~is in the stew~~.
      b.   John and Bill and *possibly* Mary ~~did this~~ gathered to discuss the matter.

The problem is exacerbated in the case of sentences with two or more such coordinate structures, e.g.:

(6)   Tom, *probably* Bill, and *perhaps* John will soon bake croissants and *maybe* scones.

Even allowing for powerful syntactic, semantic and phonological transformations from the underlying structure to the 'conjunction reduced' form, it is not clear what such an underlying structure should be in the case of (6), and how to ensure the most salient single event reading of this sentence (but see Schein 2017 for an attempt). **Second**, as BAW note, their analysis would predict a much wider range of possible sentential material in addition to *I think*, *I suspect*, etc., including their versions with complementizers and non-bridge predicates:

(7)   *Tom and *I think that* Bill gave Rachel some flowers.

(8)   *Tom and *I {found out / am surprised}* Bill gave Rachel some flowers.

Third, a similar problem not reported by BAW is that the analysis also predicts that any sentential adverbs should be allowed on the conjunction reduction analysis, contrary to facts (Collins 1988: 6):

(9)   *John, Bill and *quickly* Mary went to the store.

Fourth, the conjunction reduction analysis of BAW is seriously undermined by the fact that not only coordinate structures cancel the existential entailment. Consider the attested examples:

(10)   Outside of *possibly* Murphy there is not much high-end talent in the Hurricanes prospect pool.

(11)   Sometimes I will start the day with a bowl of blueberries and pecans with *perhaps* a little natural peanut butter stirred in.

(10) does not mean "With one exception – and this exception is possibly Murphy...", but rather "Possibly with the exception of Murphy..." Similarly, (11) is not saying "...a bowl... with something – perhaps with a little natural peanut butter", but rather "...a bowl perhaps with a little natural peanut butter". **Finally**, BAW's analysis of 'subsentential readings' assumes that the nominals modified by adverbials are of the intensional equivalent of type e, type shifted to the intensional equivalent of type $\langle e, t \rangle$. However, such adverbials may also modify generalized quantifiers of type $\langle et, t \rangle$, as in the attested:

(12) Once she had spoken to *possibly* every person...
(13) ...here is the only answer that actually works on maybe most flavours of Linux...
(14) Rhinosporidiosis is a complex phenotype with *perhaps* no parallel in medical science.

Such examples pose a serious problem also for earlier analyses of ad-nominal uses of adverbial modifiers.

Analysis   (For reasons of space, a simplified extensional version of the main ideas of the proposed analysis is presented here.) We maintain a uniform analysis of adverbials such as *perhaps*, but we propose that their base type is not $\langle t,t\rangle$, but $\langle\langle et,t\rangle,\langle et,t\rangle\rangle$, i.e., they are modifiers of properties of sets. We build on the fact that all DPs have reasonable semantic representations of the type $\langle et,t\rangle$, i.e., as generalized quantifiers (while not all can be reasonably represented as objects of type e or $\langle e,t\rangle$; Partee 1987). Obviously, adverbials of type $\langle\langle et,t\rangle,\langle et,t\rangle\rangle$ may naturally modify such DPs *qua* generalized quantifiers:

(15) *perhaps*: $\lambda Q_{\langle et,t\rangle}\lambda R_{et}.\,perhaps(Q(R))$

(16) *John*: $\lambda P_{et}.P(j) \rightsquigarrow perhaps\ John$: $\lambda P_{et}.\,perhaps(P(j))$

(17) *every person*: $\lambda P_{et}.\,every(person,P) \rightsquigarrow perhaps\ every\ person$: $\lambda P_{et}.\,perhaps(every(person,P))$

This solves the last of the problems listed above. It is less clear, though, that such adverbials may still modify sentences. This is the case if we assume the way to combine compositional semantics and event semantics proposed in Champollion 2015. According to that proposal, before Champollion's version of existential closure is applied, sentences are of type $\langle et,t\rangle$, e.g., for *Bill came*:

(18) $\lambda R_{et}.\exists P_{et}.[P(b) \wedge \exists e.[come(e) \wedge R(e) \wedge agent(e) = P]]$

The representation in (18) is an appropriate argument for *perhaps* in (15), with the following result of functional application and existential closure (on the sentential analysis of *perhaps*):

(19) $perhaps(\exists P_{et}.[P(b) \wedge \exists e.[come(e) \wedge agent(e) = P]])$

The advantage of this analysis is that neither DPs have to be analyzed as underlying sentences, nor sentences as underlying DPs; semantics does not necessitate building any additional syntactic structures.

Collective predicates and sentences with more than one coordinate structure (see the first problem above) also receive a natural analysis. For example, (4b) receives the following representation, on which there is a gathering event whose agent is a set P such that John belongs to this set, Bill belongs to this set and possibly Mary belongs to this set:

(20) $\exists P_{et}.[P(j) \wedge P(b) \wedge possibly(P(m)) \wedge \exists e.[gather(e) \wedge agent(e) = P]])$

Similarly, (6) receives a straightforward representation on which there is a baking event whose agent is a set containing Tom, probably Bill, and perhaps John, and whose patient is a set containing croissants and maybe containing scones.

The second and third problems are also avoided: as there is no underlying sentential structure, the analysis only allows for adverbials which may modify the proposition of a certain set having some property expressed by a generalized quantifier; this rightly excludes, e.g., manner adverbials, as well as unrestricted sentential material. Of course, it still needs to be explained why complementizerless epistemic bridge verbs are allowed in such positions.

Finally, the fourth problem is also avoided, as the proposed analysis does not assume any systematic syntactic or semantic ambiguity of coordinate structures with adverbials (so it avoids yet another problem with BAW's analysis – spurious ambiguities of coordinate structures without adverbials). Instead, the only representation of, say, *perhaps John* is $\lambda P.\,perhaps(P(j))$, saying that John belongs to the set P in some epistemically accessible world; whether this set may be empty or not in the current world, is a matter of entailments of particular thematic roles and independent pragmatic factors.

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