The Semantics and Pragmatics of Appositives[*]

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Abstract. Appositives have been argued to provide a powerful argument in favor of a multidimensional semantics, one in which certain expressions fail to interact scopally with various operators because their meaning is located in a separate semantic dimension (Potts 2005, 2007). On this view, appositive relative clauses and nominals have an unexceptional syntax but a semantics that radically differs from that of superficially related constructions (restrictive modifiers on the one hand, presupposition-triggering expressions on the other) –hence the development of new semantic tools. An older line of research (e.g. McCawley 1998) posited instead that appositives have an unexceptional (and conjunctive) semantics, but a very non-standard syntax; in a nutshell, the view was that even when appositives appear to be deeply embedded, they can be attached to higher propositional nodes than meets the eye. This chapter *reviews the phenomenological differences* between appositives and superficially similar constructions, notably restrictive modifiers, presupposition triggers, and parentheticals. It introduces *accounts based on a rich semantics*, in particular Potts's bidimensional framework and more recent accounts in terms of 'post-suppositions'. It *revisits arguments in favor of a syntactic approach* to some 'wide scope' phenomena, following work by McCawley, and discusses various phenomena that have been taken to suggest that in other cases appositives can have genuinely narrow scope. It also lays out some data that suggest that *sometimes the content of appositives 'projects' in a non-trivial way*, possibly reminiscent of presupposition projection. While the issues continue to be the object of vigorous debates, they offer a particularly interesting case study in the division of labor between syntax, semantics and pragmatics.

Appositive relative clauses and nominals took on a special theoretical importance when they were claimed to argue for a multidimensional semantics, one in which certain expressions fail to interact scopally with various operators because their contribution affects a separate semantic dimension (Potts 2005); for this reason, the meaning of an appositive is often called a 'supplement'. On this view, appositives have an unexceptional syntax but a semantics that radically differs from that of superficially related constructions (restrictive modifiers on the one hand, presupposition-triggering expressions on the other) – hence the development of new semantic tools. An example of this behavior is displayed in (1)a: the appositive relative clause is interpreted outside the scope of the matrix attitude verb, hence an inference that Trump will in fact retain the support of the Republican party; by contrast, the conjunct displayed in (1)b exhibits the expected narrow scope behavior, and thus fails to trigger the same inference.

(1)   John wonders whether / hopes that / fears that Trump
         a , who will retain the support of the Republican party,
         b. will retain the support of the Republican Party and
         will be re-elected in 2020.

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This chapter *reviews the phenomenological differences* between appositives and superficially related constructions, notably some restrictive modifiers, some presupposition triggers, and parentheticals. It introduces *accounts based on a rich semantics*, in particular Potts's bidimensional framework and more recent accounts in terms of 'post-suppositions'. It *revisits arguments in favor of a syntactic approach* to some 'wide scope' phenomena, following work by McCawley, and discusses various phenomena that have been taken to suggest that in other cases appositives can have genuinely narrow scope. And it lays out some data that suggest that *sometimes the content of appositives 'projects' in a non-trivial way*, possibly reminiscent of presupposition projection. While the issues continue to be the objet of vigorous debates, they offer a particularly interesting case study in the division of labor between syntax, semantics and pragmatics.

Most of our discussion is focused on Appositive Relative Clauses, henceforth called ARCs. In Section 1, we contrast ARCs with superfically related constructions, and state some initial generalizations in the process. In Section 2, we summarize the 'multidimensional' approach to ARCs, according to which they have an unexceptional syntax and a non-standard semantics. In Section 3, we discuss several alternatives, in particular one according to which ARCs should be treated in terms of 'post-suppositions', and one that posits that they have an exceptional syntax and pragmatics but a relatively simple semantics. Finally, we compare Nominal Appositives to ARCs in Section 4. (This survey does not do justice to cross-linguistic data; we refer the reader to Cinque 2008, Constant 2011, Del Gobbo 2010, Franscarelli and Puglielli 2005, Lin 2003, Sode 2004, Zhang 2001 for relevant discussions.)[1]

1   Characterizing ARCs

1.1   *ARCs vs. RRCs*

In this section, we contrast ARCs with superficially related constructions: Restrictive Relative Clauses for their syntax (henceforth RRCs), presupposition triggers for aspects of their semantics, clausal parentheticals for their syntax and semantics, and finally non-restrictive adjectives.

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[1] Thanks to T. Koev for providing references.

1.1.1   Some formal similarities and dissimilarities between ARCs and RRCs

ARCs involve relative clauses that modify expressions of various categories, as seen in (2) with examples of propositional, predicative, individual and locative modification (the antecedents are underlined).

(2) a. <u>Romney was defeated by Obama</u>, which few people had predicted.
     b. Obama was <u>popular</u>, which Romney wanted to be.
     c. Romney was defeated by <u>Obama</u>, who became the first black President in US history.
     d. A black President was elected <u>in the US</u>, where this hadn't happened before.

When the relative clause that appears in a position that wouldn't be appropriate for a normal modifier, as if the case (2), we can obtain unambiguous appositive readings. But in other cases, ARCs can easily be confused with RRCs, as is illustrated in (3).

(3) a. ARC: The Romans, who arrived early, found a land of wooded hills.
     b. RRC: The Romans who arrived early found a land of wooded hills. (Selkirk 2005)

Still, even in this case the intonation helps disambiguate.[2] ARCs are often preceded by a pause, and they are characterized by a 'comma intonation' that separates the appositive from its syntactic environment. To illustrate, we provide in (4) Selkirk's transcriptions of natural renditions of the sentences in (3) (see Selkirk 2005).[3]

(4) a. ARC: $_{\text{IP}}(($ The Ro$^{\text{H*}}$mans$^{\text{L-}})_{\text{MaP}}$ (who arri$^{!\text{H*}}$ved ea$^{!\text{H*}}$rly$^{\text{L-H\%}})_{\text{MaP}})_{\text{IP}}//$ $_{\text{IP}}((^{\wedge\wedge!}fou^{\text{H*}}$nd a la$^{!\text{H*}}$nd...)$_{\text{MaP}})_{\text{IP}}$
     b. RRC: $_{\text{IP}}(($ The Ro$^{\text{H*}}$mans who arri$^{!\text{H*}}$ved ea$^{!\text{H*}}$rly$^{\text{L}})_{\text{MaP}}$ $(^{\wedge!}$fou$^{\text{H*}}$nd a la$^{!\text{H*}}$nd...)$_{\text{MaP}})_{\text{IP}}$

There are three types of restrictions that can further help to distinguish ARCS from RRCs.

• Some words that can introduce restrictive relative clauses cannot introduce appositive ones. This is for instance the case in English, where restrictive and appositive relative clauses alike can be introduced by *who/which*, but usually only restrictive ones are introduced by *that:*

(5) a. Max wants to visit Doctor Brown, who his sister works for.
     b. *Max wants to visit Doctor Brown, that his sister works for. (Stowell 2005)

• Conversely, some words that can introduce appositive relative clauses cannot introduce restrictive ones. This is the case of *lequel* in (slightly formal) French.

(6) a. C'est Rocard qui, le premier, se rapprocha de Mitterrand, lequel ne lui demandait rien.[4]
     It's Rocard who, the first, SE neared of Mitterrand, LEQUEL NE to-him asked nothing
     'Rocard was the first to move towards Mitterrand, who hadn't asked for anything.'
     b. *C'est Rocard qui, le premier, se rapprocha d'un politicien lequel ne lui demandait rien.
     It's Rocard who, the first, SE neared of a politician LEQUEL NE to-him asked nothing

• There are also negative environments, as in (7), in which appositive relative clauses are not acceptable but restrictive ones are.

(7) a. Nobody that George knows is qualified for this position.
     b. *Nobody, who George knows, is qualified for this position. (Stowell 2005)

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[2] Schubö et al. 2015 confirm this role of intonation in German, but note that it may be absent if there is no communicative need to disambiguate.

[3] *H* stands for *high tone*, *L* for *low tone*, *IP* for *Inflection Phrase*, and *MaP* for *Major Phrase*.

[4] Slightly modified from (i), found online on 09/05/2014 at
http://www.lespectacledumonde.fr/index.php?option=com_content&view=article&catid=29%3Adossier&id=216%3Adossier561&Itemid=70

(i) Rationnel, c'est Rocard qui, le premier, se rapprocha de Mitterrand, lequel ne lui demandait rien.
'Being rational, Rocard was the first to move towards Mitterrand, who hadn't asked for anything.'

1.1.2   Two characteristic properties of ARCs: non-restricting; exhaustive reading of the relative pronoun

Semantic tests can sharpen the distinction between ARCs and RRCs. The key semantic intuition is that, in simple cases (i.e. when a relative clause appears in a matrix sentence with at most one quantifier), an ARC makes the same kind of contribution as a clausal parenthetical: *I flunked a student, who was incompetent* behaves roughly like *I flunked a student (he was incompetent))*. By contrast, an RCC behaves like a *bona fide* modifier: *I flunked a student that was incompetent* behaves like *I flunked an incompetent student*. But depending on the precise environment, truth-conditional effects may appear more or less clearly.

It will be useful to note that RRCs are, as their name indicates, restrictive modifiers. A variety of theories guarantee that they have the property in (8)a: an NP *N* modified by a modifier *M* should denote a – proper or improper – subset of what *N* denotes; in particular, if modification is *intersective*, this result will be guaranteed to hold, since an object will satisfy *N M* just in case it satisfies both *N* and *M*. This result follows from the standard rules in (9) (from Heim and Kratzer 1998): (9)a specifies that an RRC *R* is interpreted by way of abstraction rule that yields the property of *being an object that satisfies R*, and (9)b specifies that a *R* combined with an NP *N* will yield the property of *being an object that satisfies R and is in the denotation of N*.

(8)   a. A modifier M of an NP N is *restrictive* just in case for all tuples of parameters π, disregarding linear order,
$$[\![M\ N\ ]\!]^{\pi} \subseteq [\![N\ ]\!]^{\pi}$$

b. A modifier M of an NP N is *restricting* just in case for all tuples of parameters π, disregarding linear order,
$$[\![M\ N\ ]\!]^{\pi} \subset [\![N\ ]\!]^{\pi}$$

(9)   **Meaning of RRCs (Restrictive Relative Clauses)**
Let c be a context of evaluation and s an assignment function.
a. Abstraction Rule [this version of the rule works both in a bivalent and in a trivalent framework]
If E = *who$_i$, which$_i$, that$_i$*, or an abstraction index *i*,
$$[\![E\ F\ ]\!]^{c,s} = \lambda x_e.\ [\![F\ ]\!]^{c,s[i \to x]}$$
where for each object x, s[i→x] is the function defined by:
for each integer j≠i, s[i→x](j)=s(j) s[i→x](i)=x
b. Predicate Modification [bivalent case]
If a and b are both of type <e, t>, $[\![[a\ b]\ ]\!]^{c,s} = \lambda x_e.\ [\![a\ ]\!]^{c,s} (x) = [\![b\ ]\!]^{c,s} (x) = 1$

To illustrate, we show in (11) how to derive the truth conditions of a schematic example such as *Less than 10 students who are incompetent passed*, shown in (10) (the resulting interpretation will sharply contrast with that of a minimally different example in which the RRC is replaced with an ARC, as in (12)).

(10)   RRCs
a. Form of RRCs: [D [NP **who$_i$/that$_i$ S'[i]**]] λk S[k]
e.g.   Less than 10 students **who$_i$ t$_i$ are incompetent passed**
b. Interpretation of RRCs: [D λx [NPx & **S'[x]**]]   λk S[k]
e.g.   [<10 λx[student x & **x incompetent**]] λk k passed
In other words: 'Less than 10 incompetent students passed'.

(11)   Derivation of the meaning of the boxed part of (10)a
$[\![$ students [who$_i$ t$_i$ are incompetent] $]\!]^{c,s}$
$= \lambda x_e.\ [\![$ students $]\!]^{c,s} (x) = [\![$ who$_i$ t$_i$ are incompetent$]\!]^{c,s} (x) = 1$ (by Predicate Modification in (9)b)
$= \lambda x_e.\ [\![$ students $]\!]^{c,s} (x) = [\lambda x'_e.\ x'$ is incompetent](x) = 1$ (by the Abstraction Rule in (9)a)
$= \lambda x_e.\ x$ is a student and x is incompetent

The textbook analysis in (9) already guarantees that RRCs are restrictive in the sense of (8)a. But in fact a stronger results holds: RRCs are almost invariably restrict*ing*, as in (8)b, in the sense that their addition yields a *proper* subset of the denotation of NP they modify. This result is presumably obtained by adding to (9) a pragmatic principle according to which restrictive relative clauses should

have some truth-conditional effect (there are various modifiers that are restrictive without being restricting – which is not unsurprising if restrictiveness is given by the semantics while restricting-ness is a by-product of the pragmatics; see Leffel 2014 for recent references).

ARCs display a very different semantic behavior from RRCs. As a first approximation (to be refined below), ARCs behave in the same way as separate clauses or as clausal parentheticals, and their relativizer functions as an E-type pronoun, which can be paraphrased with a definite description (e.g. Del Gobbo 2003). When relative clauses interact with just one quantifier, as in the schematic example in (12)a, this gives rise to the initial interpretation in (12)b, which sharply contrasts with that of the corresponding NRR in (10)b.

(12) ARCs and clausal parentheticals: initial interpretive properties
　　 a. Form of ARCs: 　　　　　　　　　　[D NP], **who λi S'[i]**, λk S[k]
　　　　　　 e.g. 　　 Less than 10 students, **who $\boxed{\text{i t}_i \text{ are incompetent}}$**, passed.
　　 a'. Form of (some) clausal parenthicals: 　　[D NP] λk S[k] (**S'[pronoun]**)
　　　　　　 e.g. 　　 Less than 10 students passed (**they are incompetent**).
　　 b. Interpretation of ARCs
　　 and of clausal parentheticals: 　　　　[D NP] λk S[k] & **[ιx: NPx & S[x]] λi S'[i]**
　　　 e.g. 　　 [[<10 students] λk k passed] & **[[ιx: student x & x passed] λi i incompetent]**
　　 In other words: 'Less than 10 students passed, and the students who passed are incompetent'.

But how should the desired truth conditions be derived? While the boxed part of (12)a could be interpreted with the rules in (9), we would still need to explain why the ARC in (12)a has the same kind of meaning as the clausal parenthetical in (12)b. We could posit that both the pronoun *they* and non-restrictive *who* have semantics of a definite descriptions, as in (12)c, where ι is a (Fregean) definite description operator, and thus *[ιx: NPx & S[x]]* denotes the objects that satisfy both *NP* and *S*. But none of this will suffice to explain why ARCs can display a wide semantic scope behavior. We would need, at the very least, to extend this sketch with McCawley's idea that ARCs can be attached even when they appear to be deeply embedded.

Semantic contrasts between ARCs and NRRs are clearest when the relative clause appears with a quantifier which is negative (= downward-entailing) in its nominal argument, as in this case the addition of an RCC *weakens* the meaning whereas the addition of an ARC *strengthens* it, as can be seen in (13)-(14). In addition, contemporary theories of implicatures (Katzir 2007) predict that (13)a should evoke the simpler alternative (13)c, and since the latter is more informative than (13)a, we obtain an implicature that *John didn't flunk less than five students,* hence he flunked at least six students, only five of whom were incompetent.

(13) 　a. John flunked less than five students that were incompetent.
　　　 b. John flunked less than five students, who were incompetent.
　　　 c. John flunked less than five students.

(14) Truth-conditional difference
　　　 a. (13)a is **less informative than (= is entailed by)** (13)c.
　　　 b. (13)b is **more informative than (= entails)** (13)c.
　　　 c. In addition, (13)a **implicates that not** (13)c.

There is also another truth-conditional difference between ARCs and RCCs in this case. Because the relative pronoun of an ARC behaves very much like an E-type pronoun, as schematized in (12)c, (13)b entails that all the students John flunked were incompetent, whereas (13)a doesn't. In fact, because of the implicature in (14)c, (13)a implicates the negation of this exhaustivity inference. These differences are summarized in (15).

(15) Exhaustivity difference
　　　 a. (13)a doesn't imply that all the students John flunked were incompent (in fact, it implicates the opposite).
　　　 b. (13)b implies that all the students John flunked were incompetent.

Semantic effects are more subtle when the relative clause appears with a quantifier which is positive (= upward-entailing) in its nominal argument, as in this case both the RCC and the ARC strengthen the meaning: it is immediate that (16)a and (16)b both entail (16)c.

(16) a. John flunked at least five students that were incompetent.
       b. John flunked at least five students, who were incompetent.
       c. John flunked at least five students.

While (16)b intuitively entails (16)a, upon reflection the converse fails because (16)b supports the exhaustive inference that *all students that John flunked were incompetent,* whereas (16)a does not support this inference.[5]

(17) a. Both (16)a and (16)b entail (16)c.
       b. (16)b entails (16)a but the converse fails because only (16)b supports the exhaustive inference *all students John flunked were incompetent*.

1.2   ARCs vs. Presupposition Triggers

It has often been noticed that ARCs often fail to take scope under operators, and their ability to 'take wide semantic scope' even when they are deeply embedded invites comparisons with presupposition triggers, which sometimes display a similar behavior. In this section, we highlight the differences between these two classes.

1.2.1   Epistemic status

❑ *Non-at-issueness*

While appositives have a different form from standard presupposition triggers, one could posit that they are just a member of this broad class. Initial motivation for this view stems from the fact that, like (many) presuppositions, supplements are (often) not at-issue, as seen for instance in the contrast in (18) (see Potts 2005 for related discussion):

(18)   a. Mary knows that Lance is a cancer survivor. –No!
        => Lance is a cancer survivor.
        b. Lance, who is a cancer survivor, won the Tour de France. –No!
        => Lance is a cancer survivor.
        c. Lance is a cancer survivor and won the Tour de France. –No!
        ≠> Lance is a cancer survivor.

❑ *Non-triviality*

But Potts 2005 convincingly argues that one should not assimilate appositives to presupposition triggers. Most strikingly, appositives are subject to a non-triviality condition that is absent from presupposition triggers; thus the sentence in (19) cannot be continued with (19)a because the ARC is trivially true, whereas it can be continued with (19)b despite the fact (or because of the fact) that the presupposition triggered by *know* is trivially true in this context.

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[5] Simple indefinites such as *five students* (by contrast with modified indefinites such as *at least five students*) are sometimes a special case, however. In discourse, they do not always give rise to exhaustivity effects with 'E-type' pronouns, as illustrated in (i)a (which contrasts in this respect with (i)b); this follows from dynamic theories of anaphora (see for instance Geurts 1999).

(i)   a. Your seminar is attended by two French students. They are enjoying it. A third French student isn't, but he doesn't have the required background.
        b. Your seminar is attended by at least two French students. They are enjoying it. #? A third French student isn't, but he doesn't have the required background.

Arguably the same patterns of entailment hold with ARCs, as suggested by the coherence of (ii)a, which seems to pattern with (i)a.

(ii)   a. Your seminar is attended by two French students, who are enjoying it. A third French student isn't, but he doesn't have the required background.
        b. Your seminar is attended by at least two French students, who are enjoying it. #? A third French student isn't, but he doesn't have the required background.

(19) Lance Armstrong survived cancer.
    a. #When reporters interview Lance, <u>a cancer survivor</u> / <u>who survived cancer</u>, he often talks about the disease.
    b. And most riders know that Lance Armstrong is a cancer survivor. (after Potts 2005)

Still, one could argue that in (19)a one can eliminate the appositive without semantic loss, and thus that Gricean considerations can explain why the sentence is deviant. By contrast, in (19)b the presupposition is triggered by a VP which also makes an assertive contribution, and thus the presupposition cannot be eliminated on its own – which might explain why the sentence is acceptable. But more minimal pairs can be found: in (20)a, the sole function of *again* is to trigger a presupposition that John came home some time before Christmas, but the sentence is acceptable (in fact, *again* might even be obligatory). The facts are rather different in (20), where the underlined appositive is odd.

(20) a. Although he came home for Thanksgiving, John came home <u>again</u> for Christmas.
    b. #Although he came home for Thanksgiving, John, <u>who had come home before</u>, came home (again) for Christmas.

We conclude that Potts is correct that unlike presuppositions ARCs are subject to a non-triviality requirement.

1.2.2 Constraints on semantic embedding

Potts 2005 discusses restrictions on the ability of appositives to take semantic scope under a variety of operators. In fact, his theory is designed to guarantee that, semantically, they never take embedded scope; while the radical version of this claim has been challenged, as we will see below, some of the basic data no doubt remain. Importantly, presupposition triggers never display such restrictions, and can normally be embedded in all logical environments.

In simple cases, the scopal differences between presupposition triggers and supplements are hard to see. For instance, in (21) the contribution of the presupposition triggers and of the ARCs all take scope above the negation and above the conditional clause.

(21) a. I don't think that John is here again.
    => John was here before.
    b. I don't think that John, who was here before, is currently here.
    => John was here before.
    b. If John is here again, he should make his voice heard.
    => John was here before.
    b'. If John, who was here before, is currently here, he should make his voice heard.
    => John was here before.

But according to most theories, it is by different mechanisms that the 'wide scope effects' are obtained in (21). This conclusion is made plausible by the fact that in other cases there are acceptability differences between presupposition triggers, which usually embed without restrictions, and ARCs, which are unacceptable if they contain a bound element in the immediate scope of negative or negated quantifiers (for Potts's theory, the prohibition is much broader, as we will see in the next section).

(22) a. Not one of my students knows that he is incompetent.
    => each of my students is incompetent
    b. #?Not one of my students, <u>who is incompetent</u>, is able to pass the test.
    a'. Not one of my students is complaining again.
    =>? each of my students complained before
    b'. #Not one of my students, who was complaining yesterday, is complaining (right now / again).[6]

Contemporary theories of presupposition predict that the contribution of the presupposition triggers in (22)a, b should follow from the context (in a way that different theories make precise in different ways); and when this fails, the contribution of the presupposition can (more or less easily depending on the trigger) be 'accommodated' by adjusting the linguistic or extra-linguistic context (see Beaver and Geurts

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[6] *Note one* could be replaced with *None*, but a reviewer dislikes singular agreement under *none*, which makes the paradigm more complex (a native American informant prefers plural agreement without disallowing singular agreement).

2011, Schlenker 2016). But we can see that the ARCs in (22)b, b' are rather sharply deviant, unlike the presupposition triggers in (22)a, a'. This suggests that ARCs do not embed as easily as presupposition triggers.

1.3   ARCs vs. Clausal Parentheticals

Syntactically, ARCs are easy to distinguish from clausal parentheticals, since the latter have the syntax of root clauses. But in simple cases, ARCs and clausal parentheticals have a rather similar semantic behavior: both must obey a non-triviality requirement, and both are usually not-at-issue in discourse, as is illustrated in (23).

(23) a. Lance Armstrong was tested positive before. #And Lance, who was tested positive before, is now being tested positive again.
b. Lance Armstrong was tested positive before. #And Lance (he was tested positive before) is now being tested positive again.
a'. Lance, who is a cancer survivor, won the Tour de France. –No!
=> Lance is a cancer survivor
b'. Lance (he is a cancer survivor) won the Tour de France. –No!
=> Lance is a cancer survivor

Importantly, however, there are restricted cases in which ARCs can take scope under other operators but clausal parentheticals cannot (e.g. Schlenker 2013b; this will turn out to be an important contrast in our theoretical discussion of ARCs). In (24), the conditional makes it possible to license an imperfect that has scope within the *if*-clause and is interpreted as counterfactual rather than temporal – with the result that the (counterfactual) event of calling the Dean lies in the speaker's future (this interpretation would be unexpected if the imperfect received a temporal interpretation). This possibility is open with an ARC in (24)a and (unsurprisingly) with a separate conjunct in (24)b, but not with a clausal parenthetical in (24)c.

(24) *Context:* someone made a big mistake at the Department.
a. If tomorrow I called the Chair, who in turn called the Dean, then we would be in deep trouble.
≠> If I called the Chair, he would call the Dean
b. *If tomorrow I called the Chair (he in turn called the Dean) then we would be in deep trouble.
c. If tomorrow I called the Chair and he in turn called the Dean, then we would be in deep trouble.
≠> If I called the Chair, he would call the Dean (Schlenker 2013b)

We take this contrast to suggest that clausal parenthetical genuinely have a 'matrix scope' behavior, but that sometimes ARCs can – under ill-understood conditions – take scope under some operators. We revisit this question in Section 3.2.

1.4   ARCs vs. 'non-restrictive' adjectives

There are multiple cases of adjectives which (i) have the syntax of restrictive modifiers, but which (ii) have a 'non-restrictive' interpretation (as we will soon see, the term 'non-restricting' would be more appropriate). This raises the question whether they should be analyzed by the same covert syntactic and/or semantic mechanisms as ARCs.

One common case concerns 'redundant' modifiers in definite descriptions – some involve expressive modifiers such as *stupid* in (21)a, which expresses the speaker's negative attitude towards the denotation of the description; but others don't obviously have an expressive component, as *sick* in (26)a. Strikingly, the resulting construction can be paraphrased with an ARC, as in (25)b and (26)b, although a similar attempt with an RRC works far less well, as seen in (25)c-(26)c.[7]

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[7] As a reviewer notes, if *mother* and *president* are treated as functional nouns, e.g. of type <e, <e,t>>, predicate modification might work in a non-standard way here; this would apply both to the a. and c. examples in (25) and (26). One may replace these expressions with arguably non-relational nouns such as *Pope* in (25)a and *stomach* in (26)a.

(25)   a. The stupid president will cause a disaster. (Schlenker 2007)
        b. The president/director, who is stupid, will cause a disaster.
        c. #The president that's stupid will cause a disaster.

(26)   a. I have to take care of my sick mother. (Leffel 2014)
        b. I have to take care of my mother, who is sick.
        c. # I have to take care of my mother that's sick.

Importantly, in examples such as (25) the adjective is 'non-restricting' (in the terminology of (8)), because in the relevant context the extension of *stupid president* is identical to – and thus not a proper subset of – the extension of *president*. But this observation need not imply that the adjective cannot be interpreted by way of the standard rule of Predicate Modification in (9)b, since the latter does not entail that the modifier should be restric*ting*. In fact, this rule combined with a modicum of pragmatic reasoning might suffice to derive the data discussed so far, along the following lines (see Schlenker 2007 for one possible derivation of the effect for expressive modifiers).
• First, we notice that, say, *my sick mother* in (26)a presupposes that the speaker has exactly one sick mother, which leads to the inference that the speaker's mother is sick – as is desired.
• Second, we have to explain why this inference is epistemically informative, despite the fact that a presupposition ought to be trivial. The reasoning could go as follows (see Schlenker 2007 for an attempt at a formal derivation in the case of expressive modifiers). (i) In (26)a, the noun on its own suffices to single out the denotation of the definite description, hence Gricean principles of manner presumably mandate that the modifier should have some other function. (ii) Thus the information that the speaker's mother is sick should be non-trivial and/or of particular relevance in the conversation. (iii) Furthermore, sometimes it is enough for the speaker to present himself as taking a piece of information for granted to guarantee that it thereby becomes part of what is 'common belief' in the context of the conversation (see Stalnaker 2002 and Schlenker 2007). The suggestion is that in the end this explains why such presuppositions are acceptable despite the fact that they are non-trivial.
• Third, however, we must explain why restrictive relative clauses do not usually allow for similar readings, as is shown by the contrast between (26)a and (26)b. This is an open question at this point.[8]

As emphasized in Leffel 2014, however, there are cases in which this general strategy won't work. Leffel observes that there is a sharp contrast between (27)a and (27)b: the former triggers the inference that only the *harmful* chemicals will be eliminated, whereas the latter leads to the inference that every toxin is eliminated, and also that every toxin is harmful.

(27)   a. Every harmful chemical will be eliminated.
        => Not every chemical will be eliminated.
        b. Every harmful toxin will be eliminated.
        => Every toxin will be eliminated
        => Every toxin will be harmful (Leffel 2014)

The behavior of (27)a is unsurprising. Contemporary theories of implicatures and alternatives (Katzir 2007) posit that *Every harmful chemical is eliminated* competes with the simpler and more informative sentence *Every chemical is eliminated,* hence an implicature that the speaker is not in a position to assert that every chemical is eliminated – possibly because this sentence is false. So why doesn't the same inference arise in (27)b? There are two broad directions that one could explore.

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[8] The foregoing remarks suggest that one need not posit special compositional rules to analyze 'non-restrictive' adjectives. Still, if equating them with covert ARCs is not just unnecessary but wrong, one would expect that they should *fail* to display the special restrictions on semantically embedded ARCs discussed in Section 1.2.2. The crucial question, then, is whether there is a clear contrast between (i)a and (i)b.

(i)   a. None/Not one of my friends takes care of his sick mother.
           b. None/Not one of my friends takes care of his mother, who is sick.

 If we treat 'non-restrictive' adjectives as having their normal contribution (by way of Predicate Modification), (i)a should be acceptable and should trigger an inference that all of my friends' mothers are sick. (i)b should be less acceptable because the ARC takes scope under a negative quantifier. It's not clear that this prediction is borne out because (i)b seems rather acceptable, possibly due to a mechanism of quantificational subordination. We leave this issue for future research.

• One is pragmatic, and could build on world knowledge, with the assumption that (one can accommodate that) toxins are known to be toxic. But it would still remain to be explained (i) why a modifier is used when it is trivial, and (ii) how world knowledge can override the implicature which is predicted by current analyses, namely that not every toxin will be eliminated, hence that there are non-harmful toxins.

• An alternative posits a non-standard syntactic and/or semantic analysis of these constructions. In recent work, Leffel 2014 discusses several possible theories. One is that due to a covert operator or a non-standard composition rule, *harmful toxins* ends up denoting the same thing as *toxins*, but with a presupposition that toxins are harmful. This analysis derives something like the observed inference, and it also explains why no undesirable implicature is generated, for with this presupposition it is not the case any more that whenever *Every toxin will be eliminated* is true, *Every harmful toxin will be eliminated* since the latter has a presupposition that the former lacks. A second possible theory is that *harmful* is a non-restrictive modifier of a kind predicate – which in effect turns this example into a more complex case of non-restrictive modification.

      The choice among these general directions is still open – a situation that might change with further research. We can only grant that, at this point, the semantic distinction between 'non-restrictive' adjectives and ARCs is somewhat open.

2   A Simple Syntax and a Bidimensional Semantics

2.1   *Potts's Analysis[9]*

Potts 2005 characterized supplements in general (and ARCs in particular) by the properties in (i)-(iii):
(i) their *non-deniability*, illustrated above in (18);
(ii) their *non-triviality*, illustrated above in (19);
(iii) their *scopelessness* or wide scope behavior with respect to negation, illustrated above in (21); and their failure to interact with quantifiers, as illustrated above in (22).

      Potts 2005 proposed that supplements belong to a new dimension of meaning, the conventional implicature (or CI) dimension. He developed a bidimensional analysis by duplicating logical types, by way of rules that are displayed in (28):

(28) Potts's type system for conventional implicatures

    i. e^a, t^a, and s^a are basic at-issue types.

    ii. e^c, t^c, and s^c are basic CI types.

    iii. If τ and σ are at-issue types, then $\langle \tau, \sigma \rangle$ is an at-issue type.

    iv. If τ is an at-issue type and σ is a CI type, then $\langle \tau, \sigma \rangle$ is a CI type.

    v. The full set of types is the union of the at-issue and CI types.

We should note that type duplication is not complete. While each of the basic types exists both in an 'at-issue' and in a 'conventional implicature' version, this is not so of all complex types: the rule in (28) (especially (iv)) guarantees that no expression will ever take an expression with a CI type as one of its arguments. We can already see what the analytical strategy will be:
(i) *Non-deniability:* By assumption, we will take the new dimension not to be the 'main' one, which will presumably explain why it cannot be targeted by denials in discourse.
(ii) *Scopelessness:* By construction of the type system, no expression can be sensitive to the expressive component of its argument. For this reason, the expressive component of an expression will never interact scopally with negations and quantifiers.
(iii) *Non-triviality:* Since supplements have nothing to do with presuppositions, there is no reason they should have the trivial character of the latter.

      On a technical level, an example of Potts's analysis is given in (29) for the expression *Lance, the cyclist;* a more complicated version of the same derivation could be given if the nominal appositive *the cyclist* were replaced with the ARC *who is a cyclist*.

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[9]The content of this section borrows from Schlenker 2016.

(29) Potts's analysis of *Lance, the cyclist*

Without laying out full details, let us explain the main ideas informally:

• The comma before *a cyclist* is taken to have a meaning, which transforms the at-issue expression *a cyclist*, of type <e^a, t^a>, into the CI expression , *a cyclist*, which has the complex type <e^a, t^c>, where t^c is (crucially) a CI type.

• New composition rules guarantee that:

a. the supplement, *a cyclist*, of type <e^a, t^c>, can compose with its argument *Lance*, of type e^a, to yield a CI meaning of type t^c,

b. while at the same time, the at-issue meaning of *Lance* is entirely preserved in a separate (at-issue) dimension.

In (29), the two dimensions are separated vertically by the bullet sign •. An additional rule (called 'parsetree interpretation') will then collect all the meanings of propositional type that appear a semantic parsetree (of which the right-hand side of (29) would only be a part) to yield a pair of the form <at-issue meaning, {CI meaning #1, CI meaning #2, ..., CI meaning #n}>. The second coordinate of the pair is an unordered set that simply collects all the propositional CI meanings that appear in the semantic parsetree.[10]

2.2 Refinement 1: Indefinites

Nouwen 2007 observes that the ARC (30)a is semantically dependent on the indefinite *a Dutch boxer* (the same observation extends to the nominal appositive in (30)a'; we come back to nominal appositives in Section 4). Does this refute Potts's view that ARCs don't give to scopal interactions with operators? Not really, because the same phenomenon arises in (30)b, where *he* is intuitively dependent on the indefinite – and because *he* and its antecedent appear in different sentences, the usual notion of 'scope' cannot be responsible for their interaction.

(30) a. A Dutch boxer, who is famous, took part in the event.
　　 a'. A Dutch boxer, a famous one, took part in the event.
　　 b. A Dutch boxer took part in the event. He is famous.

The parallel between ARC and independent clauses is further highlighted by the fact that in both cases a dependency on a quantifier such as *every Dutch boxer* in another clause is degraded, as is illustrated in (31).

(31) a. #Every Dutch boxer, who is famous, took part in the event.
　　 a'. #Every Dutch boxer, a famous one, took part in the event.
　　 b. Every Dutch boxer took part in the event. #He is famous.

The natural conclusion is that some mechanism allows a singular pronoun to be dependent on an indefinite (but not on a universal quantifier) without being in it syntactic scope; whatever this mechanism is, it probably applies in identical fashion to (30)a-a' and (30)b. Very much in the spirit of Potts's own theory, Nouwen's system is designed to capture this generalization by allowing variables in an appositive to be dynamically bound by an existential quantifier that appears outside of it.

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[10] The type system of Potts 2005 is applied both to appositives and to expressives. See McCready 2010 for a more sophisticated type system which is intended to apply to expressions such as *honkey* or *Kraut* (derogatory terms used to refer to white people and to Germans respectively), which both have an at-issue and an expressive component.

Nouwen's general intuition is that these results can be derived if one integrates a Pottsian bidimensional analysis with a dynamic semantics in which indefinites introduce discourse referents. More precisely:

• A standard dynamic semantics for anaphora takes sentences to update information states, analyzed as sets of pairs of the form <s, w>, where s is an assignment of values to individual variables x_1, x_2, ..., and w is a possible world.

• The standard dynamic effect of a dynamic existential quantifier $\exists x_n$ is to allow one to go from an information state with pairs <s, w> to an information state with pairs <s', w> such that s' assigns the same value as s does to all variables except possibly x_n.

• Nouwen's innovation is to replace pairs of the form <s, w> with triples of the form <s, w, w'>, where the first world coordinate w encodes the at-issue dimension and the second world coordinate w' encodes the not-at-issue dimension. Crucially, however, both dimensions are connected to the same assignment of values to discourse referents.

To illustrate, the sentence *[A Dutch boxer]$_n$, who is famous, won a tournament* will lead from a given information state to a set of triples <s, w, w'> such that $s(x_n)$ is a Dutch boxer and won a tournament in w (corresponding to the at-issue dimension), and $s(x_n)$ is famous in w' (corresponding to the supplemental dimension).

2.3   Refinement 2: Perspectival Shift

From the start, Potts 2005 noticed that the claim that supplements are never semantically embedded might be too strong. Thus in (32)a, the appositive clause is interpreted exactly as if it were in the scope of the speech act; and furthermore it appears in the 'Konjunktiv I', a mood which is characteristic of reported speech in German (see Fabricius-Hansen and Sæbø 2004).

(32)   a.   Juan   behauptet,   dass   Maria,   <u>die   sehr   schwach sei</u>,
                Juan   maintains   that   Maria   who   very   weak   be.konj
           krank   sei.
           sick   be.konj
           'Juan maintains that Maria, who is supposed to be really weak, is sick.' (Potts 2005)

           b. Juan   behauptet,   dass   Maria   krank   sei.   <u>Sie   sei</u>
           Juan   maintains   that   Maria   sick   be.konj *She   be*.konj
           <u>sehr   schwach</u>.
           very   weak
           'Juan maintains that Maria is sick. According to him, she is very weak.' (Potts 2005)

But as Potts is quick to point out, this is by no means a counterexample to his analysis: as (32)b shows, independent clauses in the Konjunktiv I can be understood *as if* they were semantically embedded – presumably by a mechanism of 'modal subordination' or 'perspective shifting'. Harris and Potts 2009 argue with experimental means that the latter mechanism is also available in English. Thus their subjects accepted to attribute to the agent (= Sid, rather than the speaker) the content of the nominal appositive *a complete waste of time* both in (33)a and in (33)b.

(33)   My brother Sid hates school.
           a. He says that he puts off his homework, <u>a complete waste of time</u>, to the last minute.
           b. He puts off his homework, <u>a complete waste of time</u>, to the last minute.

The fact that the nominal appositive in (33)a appears to be semantically embedded does not speak against Potts's bidimensional approach: as (33)b shows, it is independently possible to interpret such a nominal appositive *as if* it were embedded under an attitude operator – even when none is present (*put off* is certainly not an attitude verb!). Harris and Potts 2009 conclude that both examples in (33) should be analyzed by positing a pragmatic operation of perspectival shift – one that crucially does *not* require that the nominal appositive be semantically embedded under the verb *say*.

3   Alternatives

In a critical review of Potts 2005, Amaral et al. 2007 noted that appositives display a more complex semantic behavior than might initially meet the eye, and in particular that they need not be 'speaker-

oriented', and that they may display anaphoric interactions with assertive content, including within the scope of other operators. This and other related remarks led to the development of several alternative analyses of appositives.

3.1   Appositive Impositions

Potts's system is designed to guarantee that the supplemental dimension introduced for ARCs (as well as for nominal appositives and expressives) cannot 'feed into' the at-issue dimension. AnderBois et al. 2010, 2013 display a variety of phenomena that 'cross' the supplemental/at-issue boundary in precisely this way:

(34)   a. John, who saw Mary, saw Susan.
        b. John saw Mary, who saw him too.

(35)   a. Mary, who courts a semanticist at every conference party, always dances with him.
        b. Mary courts a semanticist at every conference party, where she always dances with him.

In (34)a, the presupposition triggered by the particle *too* is satisfied by the content of the appositive clause. Similarly, in (35)a the pronoun *him* can only be interpreted by reference to the quantificational dependency introduced in the appositive clause. In (34)b and (35)b, the direction of the dependency is reversed, and it is an element of the at-issue dimension that depends on an semantic property of the not-at-issue dimension.

   In presupposition theory, one often posits that a presupposition must follow from the context of the conversation, analyzed as a 'context set' which includes those worlds compatible with what the speech act participants take for granted (e.g. Stalnaker 1974). AnderBois et al. 2010, 2013 propose to analyze appositives as 'impositions' on the context set, which may freely interact with 'assertions' by way of Logical Forms that represent the context set and the assertive proposal as distinct propositional variables, p^{cs} for the context set and p for the assertive proposal. An example that 'interleaves' constraints on the context set and on the assertive proposal is given in (36), with the logical analysis in (37). New discourse referents (variables) are introduced by way of the notation *[p]* (propositional variable) and *[x]* (individual variable). (37)a introduces the propositional variable *p,* corresponding to the assertive proposal, and constrained to refer to worlds within the context set (hence $p \subseteq p^{cs}$). (37)b introduces the new variable *x* whose value is John, (37)c contributes an appositive update that specifies that x nearly killed a woman x, and (37)d contributes an at-issue update that x visited y. Crucially, the appositive update is evaluated with respect to the context set variable p^{cs} rather than with respect to the assertive proposal variable p, whereas the at-issue updates are interpreted relative to p, not relative to p^{cs}.

(36)   John^x, who nearly killed a^y woman with his$_x$ car, visited her$_y$ in the hospital.

(37)   Logical analysis of (36) for AnderBois et al. 2013.
        a. **New proposal:** $[p] \wedge p \subseteq p^{cs} \wedge$
        b. **Issue:** $[x] \wedge x = \text{JOHN} \wedge$
        c. **Appositive:** $[y] \wedge \text{WOMAN}_{p^{cs}}(y) \wedge \text{NEARLY-KILL}_{p^{cs}}(x, y) \wedge$
        d. **Issue:** $\text{VISIT}_p(x, y) \wedge$
        e. **Proposal accepted:** $[p^{cs}] \wedge p^{cs} = p$

Importantly, the same variable can appear in formulas that carry different propositional variables. Thus *x* appears both in (37)c and in (37)d –which yields the anaphoric link between the supplemental and the assertive dimensions.

   How do things work on the semantic side? Without getting into technical details (laid out in AnderBois et al. 2010, 2013), the key is to set up a compositional dynamic semantics that distinguishes between a version of Potts's two dimensions, *while allowing interactions between them*. AnderBois et al. set up a system in which two propositional variables are kept separate:
• p^{cs} is a propositional variable that keeps track of possible values of the context set.
• p is a propositional variable that keeps track of the at-issue proposal.
• For individual variables, a dynamic system keeps track of *all their possible values* given the linguistic information available at a certain point in the computation of the meaning of a sentence.
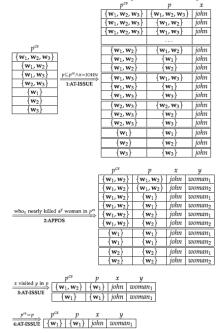• Applying the same recipe to the propositional variables p^{cs} and *p,* we will also keep track of all the possible values that are compatible with what is known at a certain stage of a semantic computation.

Since any number of constraints could lead to a further restriction of the context set, we will initially take the values of p^{cs} and p to be all the possible subsets the initial context set.

As an example, let us consider the semantic analysis that AnderBois et al. 2013 offer for (36).

(38) Semantic analysis (36), on the assumption that:
(i) John nearly killed $woman_1$ and $woman_2$ in world w_1 and, also, in world w_2;
(ii) there is no near-killing in world w_3;
(iii) John visited $woman_1$ in world w_1 and no other relevant visit occurred in any possible world.

p^{cs}

p^{cs}
$\{w_1, w_2, w_3\}$
$\{w_1, w_2\}$
$\{w_1, w_3\}$
$\{w_2, w_3\}$
$\{w_1\}$
$\{w_2\}$
$\{w_3\}$

$\xrightarrow[\text{1:AT-ISSUE}]{p \subseteq p^{cs} \wedge x = \text{JOHN}}$

p^{cs}	p	x
$\{w_1, w_2, w_3\}$	$\{w_1, w_2, w_3\}$	john
$\{w_1, w_2, w_3\}$	$\{w_1, w_2\}$	john
$\{w_1, w_2, w_3\}$	$\{w_1, w_3\}$	john
...		
$\{w_1, w_2\}$	$\{w_1, w_2\}$	john
$\{w_1, w_2\}$	$\{w_1\}$	john
$\{w_1, w_2\}$	$\{w_2\}$	john
$\{w_1, w_3\}$	$\{w_1, w_3\}$	john
$\{w_1, w_3\}$	$\{w_1\}$	john
$\{w_1, w_3\}$	$\{w_3\}$	john
$\{w_2, w_3\}$	$\{w_2, w_3\}$	john
$\{w_2, w_3\}$	$\{w_2\}$	john
$\{w_2, w_3\}$	$\{w_3\}$	john
$\{w_1\}$	$\{w_1\}$	john
$\{w_2\}$	$\{w_2\}$	john
$\{w_3\}$	$\{w_3\}$	john

$\xrightarrow[\text{2:APPOS}]{who_x \text{ nearly killed } a^y \text{ woman in } p^{cs}}$

p^{cs}	p	x	y
$\{w_1, w_2\}$	$\{w_1, w_2\}$	john	$woman_1$
$\{w_1, w_2\}$	$\{w_1, w_2\}$	john	$woman_2$
$\{w_1, w_2\}$	$\{w_1\}$	john	$woman_1$
$\{w_1, w_2\}$	$\{w_1\}$	john	$woman_2$
$\{w_1, w_2\}$	$\{w_2\}$	john	$woman_1$
$\{w_1, w_2\}$	$\{w_2\}$	john	$woman_2$
$\{w_1\}$	$\{w_1\}$	john	$woman_1$
$\{w_1\}$	$\{w_1\}$	john	$woman_2$
$\{w_2\}$	$\{w_2\}$	john	$woman_1$
$\{w_2\}$	$\{w_2\}$	john	$woman_2$

$\xrightarrow[\text{3:AT-ISSUE}]{x \text{ visited } y \text{ in } p}$

p^{cs}	p	x	y
$\{w_1, w_2\}$	$\{w_1\}$	john	$woman_1$
$\{w_1\}$	$\{w_1\}$	john	$woman_1$

$\xrightarrow[\text{4:AT-ISSUE}]{p^{cs} = p}$

p^{cs}	p	x	y
$\{w_1\}$	$\{w_1\}$	john	$woman_1$

Initially, the context set is $\{w_1, w_2, w_3\}$, and thus p^{cs} could end up denoting any non-empty subset of it (we follow AnderBois et al. in excluding the possibility that the null set is denoted, as this would be tantamount to the assertion of a contradiction). This is the reason we have 7 rows in the first table. As for the proposal variable p, it is only constrained to denote a subset of the context set, as is represented in the second column of the second table in (38).[11]

After the subject *John* is analyzed, it introduces a discourse referent x which denotes John, as is represented in the third column of the second table in (38). At this point, the ARC *who nearly killed a^y woman with his$_x$ car* is analyzed. It has two effects:
• first, it removes all the rows in which p^{cs} denotes a set that includes w_3, in which no near-killing of a woman occurred (by (38)(i)-(ii));
• second, it assigns to the discourse referent y introduced by *a woman$_y$* one of $\{woman_1, woman_2\}$, who were both nearly killed in world w_1 and also in world w_2.

Finally, the at-issue component *visited her$_y$ in the hospital* is analyzed. Since John visited $woman_1$ in w_1 and no other relevant visit occurred in any world (by (38)(iii)), we only keep rows in which p denotes $\{w_1\}$ and y denotes $woman_1$.

At this stage, the supplements have made certain impositions on the context set (by way of the propositional variable p^{cs}), and we have kept separate the assertive proposition, represented by p. When the sentence has been semantically analyzed, if the proposal is accepted, p^{cs} can take a value inherited from p – hence the very last stage represented in (38), where p^{cs} and p alike denote $\{w_1\}$.

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[11] A different result would be obtained if (iii) were changed to (iii'):
(iii') John visited $woman_1$ in world w_1 and woman w_2 in world w_2 and no other relevant visit occurred in any possible world.
In this case, the at-issue step would lead to a situation in which one keeps all rows in which p has value w_1 and y has value $woman_1$, and all rows in which p has value w_2 and y has value $woman_2$. In the end, the proposal to equate p^{cs} with p gives rise to two rows (rather than to just one, as in (38)): [$\{w_1\}$, $\{w_1\}$, John, $woman_1$] and [$\{w_2\}$, $\{w_2\}$, John, $woman_2$].

Importantly, individual variables can in this system interact simultaneously with the context set propositional variable p^{cs} and with the assertive propositional variable p. This is what guarantees that there can be anaphoric relations in either direction between the supplemental and the at-issue (= assertive) dimension. What about scopal interactions with operators? Here things are somewhat tricky. Without further elaborations, AnderBois et al.'s system would predict that both at-issue and supplemental content can take scope under operators. Take the example of negation. In dynamic semantics, negation must be allowed to take scope over indefinites, analyzed as variables. As a result, the standard dynamic semantics of $\neg F$ specifies that the formula is true for an assignment function h just in case there is no way to extend h with values for the variables in F which makes F true. But in the case of a formula such as (39) (e.g. *Mary will not invite John, who is sick, to the party*), this would have the undesirable result that both the at-issue variable p and the context set variable p^{cs} would take scope under negation – which is undesirable.

(39) $\neg(\text{AT-ISSUE-CONTENT}_p(x, y, \ldots) \land \text{APPOS-CONTENT}_{p^{cs}} (x, y, \ldots))$

The authors solve the problem by defining a somewhat non-standard semantics for *not F*. In a nutshell, its Logical Form is *not$^{p'}_p$ F*, and its semantics guarantees that (i) the new propositional variable p' should denote the largest possible set of worlds that satisfy F, and that (ii) its denotation should have an empty intersection with the denotation of p. Since the context set variable p^{cs} plays no role in this definition, its content will *not* be negated by negation, hence the appearance of a 'wide scope' behavior despite the low syntactic attachment of the appositive in (39).

3.2   Complex Syntax and Unidimensional Semantics[12]

The theories surveyed so far were designed to guarantee that appositives should not display genuine scopal interaction with operators. In refinements of Potts's theory discussed above, it is only to the extent that apparent interaction (with indefinites for Nouwen's analysis, or with mechanisms of perspectival shift for Harris and Potts' analysis) arise at the discourse level that they are predicted to arise in appositives. In AnderBois et al.'s theory of appositive impositions, anaphoric relations can cross the appositive boundary in either direction, but as we saw with the example of negation, the system is designed to ensure that in terms of scopal interactions appositives display a 'wide scope' behavior even when they are interpreted with low syntactic attachment. We now turn to an analysis that argues that appositives can display a wide scope behavior when they are syntactically attached high, but that they may also – in restricted and partly ill-understood conditions – be attached low, in which case they can be interpreted *within* the scope of other operators.

3.2.1   Scopal interactions

By way of motivation, we should note that the logic applied by Potts to the German example in (32) leads to the opposite conclusion in other languages. In particular, it was argued in Schlenker (2010, 2013a, b) that the availability of appositive clauses in the subjunctive in French argues against Potts's proposal. The argument is in two steps. First, subjunctive appositive clauses are possible if they are embedded under the right modal operator, as shown in (40)a, whereas subjunctive independent clauses are entirely impossible, as seen in (40)b.[13] In other words, the *distribution* of the subjunctive argues that we are dealing with a case of genuine embedding. Second, ARCs in the subjunctive are interpreted within the scope of the modal operator, unlike independent clauses or some appositive clauses in other moods. Thus (40)a does not yield an inference that *if Jean had called his mother / Anne, she would have called her lawyer*. In this respect, it differs from (40)b', which does trigger this inference.

(40)   *Context:* There was incident at school.
         a. Il est concevable que Jean ait appelé sa mère / Anne, qui ait appelé son avocat.
         It's conceivable that Jean has-sub called his mother / Anne, who had-subj called her lawyer.
         ≠> If Jean had called his mother / Anne, she would have called her lawyer.

---

[12] The content of this section partly borrows from Schlenker 2016.
[13] There may be variation in the acceptability of the appositive subjunctive clause, but usually the *contrast* with subjunctive clausal parentheticals is sharp.

b. **Il est concevable que Jean ait appelé sa mère / Anne. Elle ait appelé son avocat.
It's conceivable that Jean has-sub called his mother. She had-subj called her lawyer.

a'. Il est concevable que Jean ait appelé sa mère, qui aurait appelé son avocat.
It's conceivable that Jean has-subj called his mother, who would have called her lawyer.
=> If Jean had called his mother, she would have called her lawyer.

b'. Il est concevable que Jean ait appelé sa mère. Elle aurait appelé son avocat.
It's conceivable that Jean has-subj called his mother. She would have called her lawyer.
=> If Jean had called his mother, she would have called her lawyer.

   This argument can be replicated with the modally interpreted imperfect in the scope of *if*-clauses in English, as we discussed in (24) above: the imperfect could have a purely modal interpretation in an ARC but not in a clausal parenthetical, suggesting that the former but not the latter was in the scope of the *if*-clause. Schlenker 2010, 2013a,b suggested that under ill-understood conditions, appositives can be interpreted with narrow scope relative to other operators – which would seem to speak against Pott's bidimensional system (highly relevant experimental results on German, which confirm the availability of narrow scope ARCs, can be found in Poschmann to appear).[14]

3.2.2 *A unidimensional analysis*

Schlenker 2010, 2013a,b sketches a 'unidimensional' analysis to handle these data. It makes the assumptions in (i)-(iii).
(i) As in McCawley's analysis, appositives can be syntactically attached with matrix scope even when they appear in embedded positions; this is intended to account for *some* of the cases that motivated Potts's bidimensional analysis.[15]
(ii) Appositives (a) are preferably attached with maximal scope (with the possible exception of attitude reports), but (b) they can in some cases be syntactically attached within the scope of other operators (whether attitudinal or not), in which case they semantically interact with them; this is intended to account for the limited cases of semantic embedding illustrated by (40)a.[16]
(iii) Appositives are (a) semantically conjoined with the rest of the sentence, but (b) they are subject to a pragmatic rule that requires that their content should be relatively easy to accommodate ('Translucency'); this is intended to capture some non-trivial projection facts for appositives that do not

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[14] Sæbø 2011 provides other examples based on embedding under the verb 'surprise'. While most of his examples involve nominal appositives, we believe they can be replicated with ARCs (see also his fn. 1). We provide in (i) a modified version of his example (18), and in (ii) a version of it with an ARC, as well as a control with a clausal parenthetical. (A potential worry is that the facts might not be as different as one might wish in (ii)b, which presumably does not involve genuine scopal interaction.)

(i) In John 4 Jesus spoke with a Samaritan woman and asked for a drink. She had two things against her: she was a woman, and a Samaritan.
      a. John was surprised that Jesus, a Jewish man, spoke to Ruth, a Samaritan woman.
      b. John was surprised that Jesus, a Jew, spoke to Ruth, a Samaritan.
      c. John was surprised that Jesus, a man, spoke to Ruth, a woman.

(ii)   a. John was surprised that Jesus, who was a Jewish man, spoke to Ruth, who was a Samaritan woman.
          b. John was surprised that Jesus (he was a Jewish man) spoke to Ruth (she was a Samaritan woman).
Inference marginal

[15] Potts 2005 discusses a syntactic analysis along these lines (in the versions of McCawley 1998 and Huddleston and Pullum 2002) in his Chapter 6, and concludes that in the end this approach needs to 'duplicate' the mechanisms of his bidimensional analysis.
[16] There is an unexplored connection between this analysis of ARCs and DRT-based analyses of presuppositions, which posit that the latter are represented as separate bits of information that can be attached at various levels and are preferably attached high.

have matrix scope: although these are semantically interpreted in the scope of other operators, they give rise to inferences that at-issue controls would not produce.

3.2.3 *Narrow scope and supplement projection*

While the assumption in (ii) is motivated by the data we saw above, independent arguments are needed for the assumption in (i). Furthermore, these ought to be based on *syntactic facts*, since the observation that appositives are *semantically* unembedded is a given for Potts's approach. Finding unambiguously syntactic tests is not trivial; one line of argument goes back to McCawley 1998, who discussed (41).

(41)   John sold a violin, which had once belonged to Nathan Milstein, to Itzhak Perlman, and Mary did too.

McCawley observed that the second sentence does not imply that the violin that Mary sold to Perlman had once belonged to Nathan Milstein. On the (possibly controversial) assumption that ellipsis targets a constituent, this suggests that the appositive can be attached outside the constituent which is the antecedent of the elided VP. An alternative, however, is to posit that ellipsis resolution is at bottom a *semantic* operation, and hence that McCawley's facts do not speak against Potts's 'in situ' analysis of appositive clauses, but rather argue *for* Potts's bidimensional semantics.

The initial similarity between supplement projection and presupposition projection is highlighted by examples such as (42):

(42)   No candidate suspects that his wife, who is after all his biggest supporter, will vote against him. (Fox, p.c. to von Fintel; similar examples in Schlenker 2010, 2013a,b)

Here the appositive clause contains a variable (*his*) which appears to be bound by the quantifier *no candidate*; furthermore, we obtain precisely the kind of universal inference we observed with presuppositions, namely that for *each* candidate x, x's wife is x's biggest supporter (or even: x thinks that x's wife is x's biggest supporter). Still, to show that this is genuinely a case of 'supplement projection', we need a control that shows that the dependency we find is not due to a discourse effect. This could be achieved by replacing the ARC with the clausal parenthetical *(she is after all his biggest supporter)*. But when this control is made, it may not be entirely clear that the two constructions are so different, and it might be that a discourse phenomenon (a complex case of 'quantificational subordination') is responsible for the effect we find in (42).[17]

Thus in order to establish *bona fide* projection facts, we must ensure that an ARC genuinely has narrow scope. An example is displayed in (43), where a past tense can be used to refer to a future moment in case it is embedded under a future tense. This is possible in (43)a but not so much in (43)b. This contrast is expected if the ARC but not the clausal parenthetical can be embedded; and of course a full conjunction can be embedded without difficulty, as can be seen in (43)d.[18]

(43)   *Context:* Former French minister DSK is thought to be in discussions to settle the civil lawsuit against him. The speaker is talking to a journalist who has information about how the procedure will unfold.

       I will be wondering next Wednesday whether DSK

       a. , who met with the judge the day before,
       =>(?) DSK will meet with the judge next Tuesday
       b. ? (he met with the judge the day before)
       c. (he will have met with the judge the day before)
       => DSK will meet with the judge next Tuesday
       d. met with the judge the day before and

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[17] The facts are subtle, however. An informant tells us that (i)b is indeed acceptable but that, for him, (i)a isn't. An anonymous referee finds no contrast.

(i) a   a. <*>No candidate suspects that his wife (she is after all his biggest supporter) will vote against him.
          b. No candidate suspects that his wife will vote against him (she is after all his biggest supporter).

[18] An anonymous referee finds the contrasts sharper than we indicate, with (43)a being felicitous and (43)b very degraded.

≠> DSK will meet with the judge next Tuesday

agreed to a settlement.

Now to the crucial point: although *wonder* introduces an intensional construction, (43)a leads to a relatively strong inference that DSK will meet with the judge next Tuesday, whereas no such effect is found in (43)d. If these data are correct, they suggest that some ARCs that are in the semantic scope of some operators can give rise to projection phenomena.

A more complex version of the same phenomenon can be found in (1), which has the form *If S_1, will we wonder whether S_2+ARC?*, where S_2+ARC is a clause S_2 modified by an ARC.

(44) If the big event takes place on Tuesday, will we be wondering next Wednesday whether DSK

a. , who met with the judge the day before,
=>(?) if the big event takes place on Tuesday, DSK will meet with the judge on that same day
b. ? (he met with the judge the day before)
c. (he will have met with the judge the day before)
=> if the big event takes place on Tuesday, DSK will meet with the judge on that same day

d. met with the judge the day before and
≠> if the big event takes place on Tuesday, DSK will meet with the judge on that same day

agreed to a settlement?

Here the inference obtained is arguably conditional in nature – schematically: *If S_1, ARC*, despite the fact that with a full conjunction, *If S_1, will we wonder whether S_2 and S_3* gives rise to no comparable inference with respect to S_2 or S_3. By contrast, the pattern we observe is reminiscent of presupposition projection in conditionals: writing $\underline{S_2}$ (underlined) for the presupposition of the consequent, *If S_1, $\underline{S_2}S_3$?* is usually taken to yield the inference that *If S_1, S_2* (sometimes strengthened to S_1 – see Beaver and Geurts 2011 and Schlenker 2016). This pattern is illustrated in (45), where *realize* triggers a factive presupposition (so here S_1 = John is over 62, S_2 = John can't apply, S_3 = John believes he can't apply).

(45) If John is over 62, does he realize he can't apply?
=> if John is over 62, he can't apply

While these data are only suggestive at this point, they could suggest there are deep similarities between presupposition projection and supplement projection.

Despite these similarities, the differences we highlighted in Section 1.2 remain: supplements are deviant in some negative environments in which presupposition triggers are acceptable. In addition, Potts's original observation about the *non-triviality* requirement on supplements still holds, and thus supplements cannot simply be treated in presuppositional terms.

There might arguably be a way to capture the similarities and differences between presuppositions and supplements. In dynamic semantics, a presupposition trigger π uttered with respect to a global context set C is taken to be acceptable if it follows from (and is thus trivial in) its 'local context' given C (and the local context of π is determined by C together with the semantics of the sentence π occurs in; see Beaver and Geurts 2011 and Schlenker 2016). In the analysis sketched in Schlenker 2010, 2013a,b, the special pragmatic requirement is that a supplement *S* uttered relative to a global context set C should be such that (i) *S* is *non-trivial* in its local context given C. This accounts for the non-triviality requirement on ARCs. However, (ii) it should be possible to add to C unsurprising assumptions to obtain a context set C^+ with respect to which the content of *S does* follow in its local context (computed relative to C^+). This makes a rather subtle prediction, which would need to be assessed at greater length: in sentences such as (43)a and (1)a, the global inference triggered by the embedded supplement should be quite a bit weaker than a presuppositional inference. This is because on the proposed analysis,   the pragmatics of ARCs does not directly constrain the context of the conversation, but rather constrains a context that *could* be obtained by making some relatively uncontroversial assumptions. These are hard predictions to test at this point.

It should be added that this analysis does not explain why ARCs are deviant in some negative environments in which presupposition triggers are acceptable; nor does it explain why matrix attachment of an ARC is often strongly preferred.

3.3   The role of linear order

We observed in Section 1.2.1 that the content of ARCs is usually not at-issue. Koev 2012, 2013 and Koev and Syrett 2014 qualify this observation: sometimes they can contribute at-issue content, but this is easier for clause-final than for clause-medial ARCs. One test is whether *No!* as a reply to (46) can target the ARC rather than the main clause; Koev and Syrett 2014 show that while *No!* preferably targets the main clause, it can also target the ARC, but more easily in (46)b than in (46)a.

(46) a. My friend Sophie, who performed a piece by Mozart, is a classical violinist.
  b. The symphony hired my friend Sophie, who performed a piece by Mozart.

To account for these observations, Koev 2012, 2013 adopts a dynamic framework and makes the assumptions (i)-(iv):
(i) Following AnderBois et al. 2013, propositions are not directly incorporated into the context set. Rather, they constitute *proposals* which are incorporated into the context set (represented as distinguished variable p^{cs}) in case the addressee doesn't object.
(ii) Proposals are introduced at the left edge of clauses, and accepted at the right edge of clauses.
(iii) For this reason, non-clause final ARCs can only be understood to constrain the context, and not to make a new proposal.
(iv) But clause-final ARCs can construed in two ways: as being within the main clause, in which case they behave like clause-internal ARCs; or as lying outside of the clause, in which case they introduce a new proposal.

Koev's analysis can be interpreted in two ways: on one interpretation, only *sentence-final* ARCs can have an at-issue status; on another interpretation, all *clause-final* ARCs can have at-issue status, even when the relevant clause is embedded. Koev opts for the first interpretation, but in view of our data on semantic embeddability in Section 3.2, the second interpretation might be preferable.

Be that as it may, the role of linear order should also be investigated when one tests for the semantic embeddability of ARCs; one might find that here too clause-final position makes semantic embedding easier (two of our three examples of embedding above involved clause-final ARCs, namely in (24) and (40), though not in (43)).

It should be added that the nature of the *discourse relation* that connects an ARC to its antecedent is commonly believed to play an important role in the availability of embedded and/or at-issue readings; see for instance Holler 2005, 2008, Schlenker 2013 and Poschmann, to appear for relevant data (for discourse conditions on appositives, see also Loock 2010 and Ott and Onea 2014).

4   Nominal Appositives vs. ARCs

Before closing, we would like to mention some ill-understood differences between ARCs and some types of nominal appositives. Using the terminology of Ott and Onea 2015, nominal appositives may be specificational, as in (47)a, where *John Smith* is a kind of reformulation of its host *an old friend*; or they may be predicational, as in (47)b, where *an old friend* predicates a property of John Smith.

(47) a. I met an old friend, John Smith, at the pub today.
  b. I met John Smith, an old friend, at the pub today.

Predicational nominal appositives, which bear some superficial similarities to ARCs, have been analyzed along several lines, two of which will be briefly discussed (but see Sæbø 2011 and Ott and Onea 2015 for further analyses). One, due to Nouwen 2014, posits that they generally display a different behavior from ARCs; another one, defended by AnderBois et al. 2013, posits that they come in two varieties: one behaves like ARCs, while the other one is 'corrective'

Nouwen 2014 seeks to explain two facts about nominal appositives (= NAs) (we assume the judgments Nouwen provides in his paper):
(i) They allow for narrow scope readings in cases in which ARCs don't, as in (48)-(49):

(48) a. If a professor, a famous one, publishes a book, he will make a lot of money.
  ≈ If a professor is famous and publishes a book, he will make a lot of money.

b. If a professor, who is famous, publishes a book, he will make a lot of money.
≠ If a professor is famous and publishes a book, he will make a lot of money.
(Wang et al. 2005, cited in Nouwen 2014)

(49) It is not the case that a boxer, a famous one, lives in this street.
≈ It is not the case that any boxer is famous and lives in this street.
(Nouwen 2014)

(ii) Still, nominal appositives don't allow for narrow scope readings when they attach to proper names.

(50) If Jake, a famous boxer, writes a book, he will make a lot of money.
≠ If Jake is a famous boxer and writes a book, he will make a lot of money.
(Nouwen 2014)

(51) It is not the case that Jake, a famous boxer, lives in Utrecht.
≠ It is not the case that Jake is a famous boxer and lives in Utrecht.
(Nouwen 2014)

Nouwen 2014 proposes a modified version of the 'unidimensional' theory discussed in Section 3.2. In a nutshell, he makes two key assumptions. First, nominal appositives can attach to any propositional node that dominates them, whereas ARCs cannot attach at embedded levels (*contra* the claims of the unidimensional theory). Second, there is a competition between matrix and embedded attachment: whenever possible, matrix attachment is preferred if this does not affect the resulting meaning.

This theory explains why narrow scope is possible when a nominal appositive attaches to an indefinite but not when it attaches to a proper name: in the former case, if the indefinite has narrow scope, high attachment could not yield the same meaning (because it would destroy the intended scopal relation), and hence by the competition principle narrow scope is *ipso facto* possible. When a nominal appositive attaches to a proper name, high attachment yields the same meaning as low attachment, and it is thus preferred: by the competition principle, narrow scope attachment is predicted to be impossible.[19]

But as AnderBois et al. 2013 point out, there might be something quite special going on with some nominal appositives whose NP-component entails the NP-component of the DP they attach to. This phenomenon, which we term 'corrective specification', exists in a variety of contexts besides apposition. Consider first the examples in (52), which do not involve any standard apposition.

(52) Uttered by the person in charge of internships at a company (interns are usually high school students, undergraduates and graduate students).
a. If I get a student – if I get a GOOD student – I'll be delighted.
b. ? If I get a student – if I get an UNDERGRADUATE – I'll be delighted.

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[19] Nouwen's analysis also makes fine-grained predictions about the attachment of nominal appositives to definite descriptions: a narrow scope reading should be possible just in case the definite description has a non-referential reading. He argues that this prediction is correct: in (i)a, *this son* is not referential, and thus high attachment of the nominal appositive is impossible; we get the entailments in (i)b-c.

(i)   a. If I ever get another son, I will call this son, my 5th one, Horatio.
        b. If I ever get another son, I will call this son Horatio.
        c. If I ever get another son, this son will be my 5th one.

Nouwen further argues that because the nominal appositive has a presupposition-like semantics, its contribution projects in (ii)a in the same way as in the presupposition example in (ii)b:

(ii)   a. It is not the case that if I ever get another son, I will call this son, my 5th one, Horatio.
        b. It is not the case that if I ever get another son, I will call this fifth son of mine Horatio.

c. (#) If I get an undergraduate – if I get a GOOD student – I'll be delighted.
d. (#) If I get an undergraduate – if I get a NICE student – I'll be delighted.[20]

The initial *if*-clause is repeated, but with a further specification, as in (52)a-b – hence the second *if*-clause entails the initial one: both *I have a good student* and *I have a graduate student* entail *I have a student*. By contrast, when this entailment fails, as in (52)c-d, the result is deviant – presumably because the speaker cannot be construed as further specifying the content of an earlier proposition.

　　　Without providing an analysis of corrective specification, we can describe it with the following generalization:

(53) **Interpretation of corrections**
　　　If constitutent *C'* is a correction of constituent *C*, interpret the string *a C C' b* as *a C' b*.

Importantly, the general availability of this mechanism immediately implies that some constructions that look very much like nominal appositives should be read as corrective specifications. Strikingly, all of Nouwen's examples involve NPs that could be construed as corrective, since in each case the NP component of the appositive entails that of the DP it attaches to. And when they are replaced with appositives that fail the entailment condition, the examples seem to become worse:

(54) a. If a professor, a famous one, publishes a book, he will make a lot of money.
　　 ≈ If a professor is famous and publishes a book, he will make a lot of money.
　　 b. ?? If a professor, a famous writer, publishes a book, he will make a lot of money.
　　 b'. ?? If a professor, a famous person, publishes a book, he will make a lot of money.

Thus a good case can be made for the conclusion that nominal appositives come in two varieties, one of which possibly behaves like ARCs, while the other one is corrective in nature.[21]

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　　　While several crucial theoretical and empirical issues are wide open, we hope to have explained why appositives have played a central role in recent semantic debates: they raise foundational questions about the division of labor between syntax, semantics and pragmatics, and do so within an empirical domain that is extremely rich, even when one restricts attention to English data. Further data coming from cross-linguistic work as well as experimental approaches are sure to further constrain debates in future years.

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[20] We put the # in parentheses because one informant noted that (52)c-d can be accepted to the extent that they come with a special inference, namely that all undergraduates are good / nice students.

[21] Following this line of reasoning, we would need to re-analyze the data in (i) in fn. 19 in terms of matrix attachment with modal subordination rather than in terms of embedded attachment. This seems feasible, because (i)a has a good paraphrase in terms of a clausal parenthetical, as in (i)b.

(i)　　　a. If I ever get another son, I will call this son, my 5th one, Horatio.
　　　　　 b. If ever get another son, I will call this son (he will be my 5th one) Horatio.

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