Free vs. bound variables and the taxonomy of gaps

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Abstract Potts (2002a,b, 2003, 2005) presents an analysis of gap-containing supplements (primarily, *as*-parentheticals) where the gap is a bound variable that adopts the meaning of the constituent that the *as*-clause adjoins to (the *anchor*). This analysis, as Potts presents it, requires modelling the gap as a variable over the semantic type of the anchor. This article presents a class of parenthetical *as*-clauses where this correlation breaks down, in the sense that the gaps are variables over propositions or verbal predicates, but the anchor is neither a proposition nor a verbal predicate. I propose that these cases can be unified with those in Potts's work, as well as a larger class of ellipsis phenomena, if we accept the following premises: (i) there exist both bound variables (resolved compositionally, by Functional Application) and free variables (resolved by anaphora to a salient discourse object); (ii) under certain circumstances, a single superficial gap may be a composite entity, containing both a bound and a free variable that need to be resolved independently of each other; and (iii) discourse-anaphoric resolution takes place only in environments where there is no suitable binder to effect compositional resolution.

Keywords *As*-clauses · Ellipsis sites · Variable resolution

1 Introduction and roadmap

The central theoretical claim of this article is that the distinction between free and bound variables is crucial to understanding why certain classes of gaps have the meaning they do. The empirical domain is an extension of Potts's (2002a, 2002b, 2003, 2005) work on gap-containing supplements, specifically parenthetical *as*-clauses like the ones below. The diacritics [$_{CP}$___] and [$_{Pred}$___] indicate that the gaps are, respectively, proposition-sized (a *CP gap*) and predicate-sized (a *Predicate gap*).

(1) a. Ames was a spy, [(just) as the FBI suspected [$_{CP}$___]].
         As-clause = the FBI suspected that Ames was a spy.

     b. Ames stole important documents, [(just) as the FBI suspected he had [$_{Pred}$___]].
         As-clause = the FBI suspected that Ames had stolen important documents.

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Potts's analysis of (1a) relies on the following, well-supported assumption. First, that the CP gap, while being proposition-sized, doesn't correspond to an actual proposition, but to a variable over propositions; and second, that the constituent that the *as*-clause adjoins to (the *anchor*), *Ames was a spy*, is a proposition. The indicated meaning can then be derived by defining *as* as a function that takes the meaning of the anchor and uses it to resolve the meaning of the gap. An analogous reasoning holds for (1b) where the gap is a variable over verbal predicates (notated $[_{Pred}\_\_\_]$) and the anchor is itself a verbal predicate. I review the relevant details of this system in §2 below: for now, it suffices to say that it requires *as*-clause gaps to be modelled as variables over the type of the anchor. In §3, I introduce a class of *as*-clauses that have not been discussed in previous literature, and which seem to violate this requirement. We will see that, in the relevant cases, the gaps correspond to propositions or verbal predicates, but the anchor is neither a proposition nor a verbal predicate (in most of the cases I discuss, it is an individual). I use the label *non-matching 'as'-clauses* for these cases; the cases discussed in Potts's work will be *matching 'as'-clauses*, by backforming analogy.

In §4, I propose that matching and non-matching *as*-clauses can be folded under a Pottsian analysis (and, more importantly, they can be related to a wider class of gaps) if one accepts that what looks like a single superficial gap might on occasion be composed of two variables that need to be resolved independently of each other. Specifically, we will see that non-matching *as*-clauses can be analyzed in the same terms as ellipsis sites that properly contain a variable (e.g., a movement trace, or a bound pronoun) bound from outside the ellipsis site itself. This variable is resolved compositionally, and the rest of the ellipsis site is resolved by anaphora to a salient discourse antecedent. Within this system, matching *as*-clauses can be accounted for by assimilating them to a separate class of deletions that are also necessarily resolved compositionally, i.e., comparative deletions (see LaCara 2013, to appear, who builds on the insights of Kennedy 2002 and especially Lechner 2004). This analysis jibes with Potts's conjecture that *as*-parentheticals (and, by extension, other types of appositive and expressive content) have an unexceptional syntax, and the exceptionality of their semantics reduces to the fact that they combine at-issue and conventionally implicated (CI) content.

The implementation will follow the hypothesis that the relation between an ellipsis site and its antecedent is mediated by a variable (see Hardt 1993, 1999, Chung et al. 1995, 2011, Elbourne 2005, 2008, Barker 2013, Messick et al. 2015, and references for various implementations of this idea); after Elbourne (2008), I notate this variable as R. In all these works, the assumption (sometimes implicit, sometimes not) is that R is invariably a free contextual variable. Against this background, I will assume condition (2) instead, will allow us to treat R as a free contextual variable in non-matching *as*-clauses and regular ellipsis sites, and as bound variable in matching *as*-clauses and comparative deletions.[1]

(2)   *Compositionality wins*
      If there is a suitable binder, then R is a bound variable; else, it is a free contextual
      variable tracking the meaning of a discourse-salient expression.

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[1] Christopher Potts (p.c.) reminds me that Merchant (2010:§7) contains comparable observations —i.e., whenever a certain ellipsis site is compatible with both a surface-anaphoric and a deep-anaphoric parse, the surface-anaphoric one takes precedence. Obviously, it would be ideal if such effects could be derived from more general factors (Potts himself hints at a game-theoretic account, extending the analysis in Potts 2008), but for the purposes of this paper, I will treat (2) as a primitive condition.

2 Some background: *as*-parentheticals and compositional resolution

Consider again the baseline *as*-clause paradigm from Potts (2002b).

(1) a. Ames was a spy, [(just) as the FBI suspected [$_{CP}$___]].
         As-clause = the FBI suspected that Ames was a spy.
     b. Ames stole important documents, [(just) as the FBI suspected he had [$_{Pred}$___]].
         As-clause = the FBI suspected that Ames had stolen important documents.

Among other things, Potts's analysis seeks to account for the fact that these gaps (and the gaps of other parenthetical modifiers, e.g., appositive relatives, see Potts 2002a, Del Gobbo 2003, and references) are invariably assigned the meaning of the anchor. Potts calls this generalization the *sisterhood restriction*, but I will use the alternative term *full compositional resolution*, for two reasons: first, to stress the connection between *as*-clauses and other gaps (e.g., comparative deletion sites) whose meaning is also obligatorily determined by the meaning of the anchor of the clause they are contained in; and second, to make it easier to talk, later on, about other classes of gaps where the anchor resolves only a proper subpart of the meaning of the gap (*partially compositional resolution*) or it doesn't resolve it at all (*full discourse anaphoric resolution*).

As an illustration of full compositional resolution, consider (3), where the *as*-clause adjoins to the main clause rather than to the subject clause, and the gap necessarily tracks the meaning of the entire main clause. The same reasoning holds for (4).

(3) That space has four dimensions is widely known, [as they announced [$_{CP}$___]].
     a. *As*-clause = they announced it is widely known that space has four dimensions.
     b. *As*-clause ≠ they announced that space has four dimensions.

(4) The fact that Sue read the map carefully probably means that she stayed on the trails, [as did Chuck [$_{Pred}$___]].
     a. *As* clause = Chuck stayed on the trails.
     b. *As* clause ≠ Chuck read the map carefully.

It is instructive to compare (3) and (4) with minimal pairs featuring *it/that* anaphora and VP Ellipsis (notated [$_{VPE}$___]). No compositional resolution effects obtain here, which Potts takes as an indication that the gaps in (3) and (4) cannot be modelled as simple VP Ellipsis or Null Complement Anaphora sites.[2]

(5) That space has four dimensions is widely known. They announced it/that yesterday.
     a. *it/that* = they announced that it is widely known that space has four dimensions.
     b. *it/that* = they announced that space has four dimensions.

(6) The fact that Sue read the map carefully probably means that she stayed on the trails. But we aren't sure whether Chuck did [$_{VPE}$___].
     a. [$_{VPE}$___] = Chuck stayed on the trails.
     b. [$_{VPE}$___] = Chuck read the map carefully.

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[2] Potts further argues against an ellipsis analysis by pointing out that *as*-clause gaps are obligatory (unlike prototypical ellipsis sites, where deletion is optional). LaCara (2013, to appear) counters this argument by pointing out that there exist genuine ellipsis sites (e.g., comparative deletion sites, see Lechner 2004) where deletion is nonetheless obligatory.

Potts (2002a,b) implements compositional resolution by analyzing *as*-clause gaps as either variables over propositions (in the case of CP gaps) or variables over verbal predicates (in the case of Predicate gaps). Then he defines *as* as a two-place function: its inner argument, the complement of *as*, is a predicate of either propositions or verbal predicates; its outer argument, the anchor, is a constituent that is itself either a proposition or a verbal predicate (respectively). In this configuration, *as* uses the meaning of the anchor to resolve the meaning of the gap.

The actual derivation of an example like (1a) is actually going to be somewhat more complicated, for two reasons. First, as Potts (2002b:§2.1.2) shows, *as*-clauses are ungrammatical if the gap is contained in an island internal to the *as*-clause. The examples in (7) illustrate this with relative clause islands (and see the relevant section of Potts 2002b for additional examples with other types of islands); examples (7c)/(7d) are controls with a bridge predicate to show that embedding of the gap is otherwise licit. Potts takes this restriction as an indication of covert A-bar movement from the gap position to the edge of the *as*-clause movement of the gap constituent itself to the edge of the *as*-clause (8).[3] I will ignore this aspect of the syntax of *as*-clauses for most of this paper, but I will return to it in §4.3.

(7) a. * Durians are delicious, [exactly as Nina spoke with a grocer who claimed [$_{CP}$__]].

  b. * Durians are delicious, [exactly as Nina spoke with a grocer who claimed they were [$_{Pred}$__]].

  c. Durians are delicious, [exactly as Nina said that the grocer claimed [$_{CP}$__]].

  d. Durians are delicious, [exactly as Nina said that they were [$_{Pred}$__]].

(8) *A syntax for (1a)*
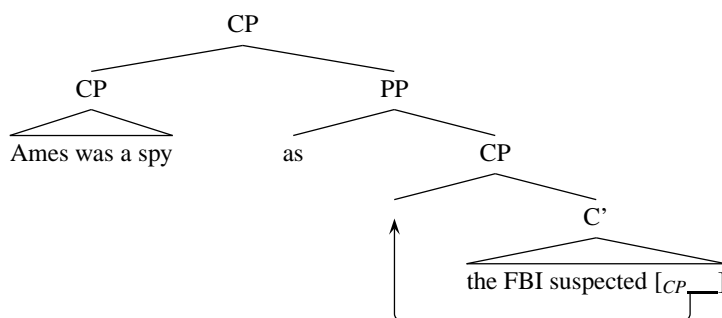
Second, one also needs to account for the fact that the *as*-clause is interpreted as an independent proposition in the CI dimension. Following Potts (2005:ch. 4), I assume a *comma* feature that shifts a well-defined range of constituents from the at-issue dimension to the CI dimension, where not-at-issue content resides.[4] This system requires extending Heim and Kratzer's (1998) definition of Functional Application along the lines of (9), so that it can deal with configurations that mix at-issue and CI content (see Potts 2005:223 and McCready

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[3] Here I am following Potts (2002b:637–640) in treating the *as*-clause as a prepositional phrase. Nothing in this article, however, hinges on the correctness of this point.

[4] There are other ways to implement the distinction between at-issue and CI content —see, e.g., Nouwen (2007), AnderBois et al. (2010), Gutzmann (2012), and references. As far as I can tell, the analysis I present in this article doesn't depend on any specific implementation of this distinction, so readers who do not agree with the one I have chosen are welcome to substitute their own.

2010:13 for further discussion). Here, the colon separates an expression from its semantic type and the bullet separates independent formulae. The superscripts *a* and *c* stand for *at-issue* and *conventionally implicated*, respectively; α, β, and γ are variables over expressions, and σ and τ are variables over types.

(9) *Functional Application with CI content*
    Let α be a branching node with daughters $\beta : \langle \sigma^a, \tau^c \rangle$ and $\gamma : \sigma^a$. Then, $\alpha = \gamma : \sigma^a \bullet \beta(\gamma) : \tau^c$.

We can now define the following lexical entry for *as*, which is effectively the one provided by Potts (2002b:§3.1) updated with the L_{CI} logic of Potts (2003, 2005).

(10) For any $\sigma \in \{\langle t \rangle, \langle et \rangle\}$, as $= \lambda X : \langle \sigma^a, t^c \rangle . \lambda x : \sigma^a . x : \sigma^a \bullet X(x) : \langle t^c \rangle$

With this much in place, we can draw (11) as a representation of (1a) above (I use a `typewriter` font to represent lexical items of the object language in the semantic meta-language). In this particular case, we want a version of (10) where σ stands in for type $\langle t \rangle$ objects. The tree for (1b) is analogous, modulo the distinction between propositions and verbal predicates.

(11)
$$\texttt{spy(ames)} : \langle t^a \rangle$$
$$\bullet$$
$$comma(\texttt{suspect(fbi)(p)}) : \langle t^a, t^c \rangle$$

$$\texttt{spy(ames)} : \langle t^a \rangle \qquad comma(\texttt{suspect(fbi)(p)}) : \langle t^a, t^c \rangle$$

$$\texttt{spy} : \langle e^a, t^a \rangle \quad \texttt{ames} : \langle e^a \rangle \qquad \texttt{as} \quad comma(\texttt{suspect(fbi)(p)}) : \langle t^a, t^c \rangle$$
$$|$$
$$\texttt{suspect(fbi)}(p) : \langle t^a, t^a \rangle$$

In order to interpret this tree (in fact, any tree that mixes at-issue and CI content), we need the following rule.

(12) *Parsetree interpretation (minimally modified from Potts 2005:99)*
    Let *T* be a semantic parsetree with at-issue term $\alpha : \gamma^a$ on its root node and distinct terms $\beta_1 : t^c, \ldots, \beta_n : t^c$ on nodes in it. Then the interpretation of *T* is the tuple

$$\langle [\![\alpha : \sigma^a]\!]^{M_i, g}, \{ [\![\beta_1 : t^c]\!]^{M_i, g}, \ldots, [\![\beta_n : t^c]\!]^{M_i, g} \} \rangle$$

    where $[\![\cdot]\!]^{M_i, g}$ is the interpretation function, taking formulae of the meaning language to the interpreted structure M_i, relative to a variable assignment *g*.

Applying this rule to (11), we get the correct meaning for (1a): a sentence conveying both the at-issue proposition that Ames is a spy and the CI proposition that the FBI suspected Ames of being a spy.

3 The problem of non-matching *as*-clauses

3.1 *As*-clauses with unexpected attachment sites

The reader can confirm that the analysis sketched above, and especially the lexical semantics for *as* in (10), enforces a type between anchors and variables contained in *as*-clauses. If the

anchor is a proposition, then the *as*-clause must contain a variable over propositions; Potts (2002b) assumes that this variable corresponds to a CP gap. An analogous reasoning holds for *as*-clauses whose anchors are verbal predicates. Potts takes this prediction as correct. Specifically, on pages 645–647 of his paper, he discusses examples like (13), where an *as*-clause with a CP gap seems to be adjoining well below the propositional level. He provides evidence to the effect that the *as*-clause is actually adjoining at the propositional level, the observed word order being the result of Heavy NP Shift of the object (14). This syntax allows the *as*-clause to take a propositional anchor, as desired.

(13)   Klaus speaks, [as you said [$_{CP}$___]], a dozen Tai languages.

(14)
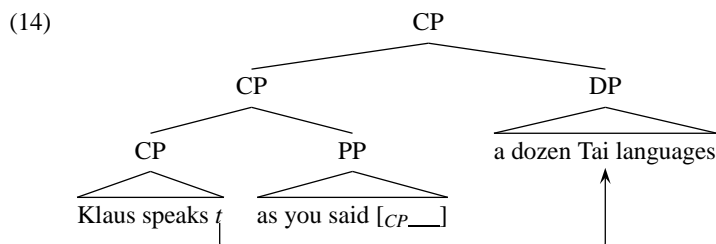
The descriptive goal of this section is to show that, cases like (13) notwithstanding, there exist classes of *as*-clauses where the claimed type correlation between gaps and anchors breaks down. This can be shown by exploiting the fact that *as*-clauses can appear in a wider range of positions than those discussed by Potts. Consider, for starters, *as*-clauses that intervene between a determiner and its NP/AP complement. We can transparently call these cases *DP-internal 'as'-clauses*.

(15)   *Context: school trip to the ancient history museum*
        Curator: Hey, don't touch that vase! It is extremely valuable!
        Guide: Now, look here, kids! This, [as the curator just warned us [$_{CP}$___]], extremely valuable vase was found in 1967 at an archaelogical site in the outskirts of Crete.
        As-clause = the curator just warned us that the vase is extremely valuable.

(16)   Alan: Hey, look at that guy over there wearing a Yankees shirt!
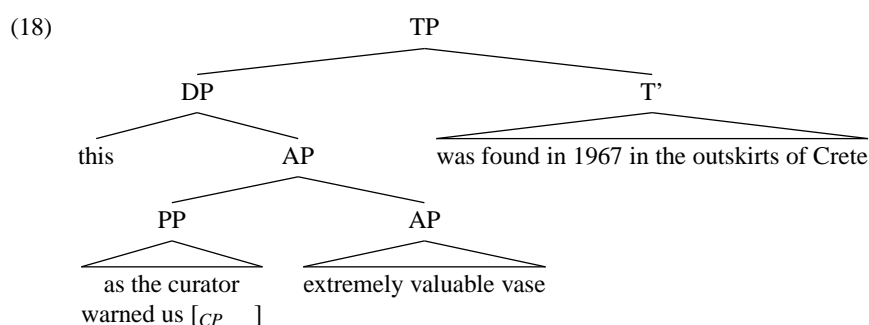   Rudy: Actually, he's not wearing a Yankees shirt, he's wearing a Nationals shirt.
        Alan: Whatever. I just wanted to say that the guy wearing a, [as you aptly pointed out [___]], Nationals shirt is hitting on Edna.
        As-clause = you aptly pointed out that he is wearing a Nationals shirt.

These cases are not amenable to a HNPS treatment analogous to the one Potts proposes for (13) above, given that HNPS of an NP/AP to the exclusion of its determiner is ungrammatical (17). The proper syntax for the *as*-clause in (15), then, is as in (18), with the *as*-clause adjoining directly at the NP/AP level.

(17)   a.   * Archaeologists found [$_{DP}$ this t_i] in 1967 [$_{AP}$ extremely valuable vase]$_i$.
        b.   * That guy was wearing [$_{DP}$ a t_i] yesterday [$_{NP}$ Nationals shirt]$_i$.

(18)

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                              TP
              ┌───────────────┴───────────────┐
             DP                               T'
        ┌─────┴─────┐              ┌───────────┴───────────┐
      this          AP          was found in 1967 in the outskirts of Crete
              ┌──────┴──────┐
             PP             AP
         ┌────┴────┐    ┌────┴────┐
    as the curator   extremely valuable vase
    warned us [_CP__]
```

A second class of cases are those in which the *as*-clause modifies the second conjunct of a subclausal coordinate structure.[5,6] Consider the following examples, involving coordination of DPs, APs, bare verbs, an PPs, respectively (I owe the latter set of examples to Ilse Zimmermann, p.c. 05/2014). As above, we can refer to these cases with the transparent label *conjunction-internal 'as'-clauses*.

(19) a. Ames and, [as the FBI suspected [$_{CP}$___]], Hanssen were spies.
          As-clause = the FBI suspected that Hanssen was a spy.

      b. Ames and, [as the FBI suspected he had [$_{Pred}$___]], Hanssen stole the documents.
          As-clause = the FBI suspected that Hanssen had stolen important documents.

(20) a. This exhaustive and, [as Edna feared [$_{CP}$___]], incriminating report ruined Ames' career.
          As-clause = Edna feared that the report would be incriminating.

      b. This exhaustive and, [as Edna feared it would be [$_{CP}$___]], incriminating report ruined Ames' career.
          As-clause = Edna feared that the report would be incriminating.

(21) a. Alan both runs and, [as Rudy thought [$_{CP}$___]], bikes over two hours every day.
          As-clause = Rudy thought that Alan bikes over two hours every day.

      b. Alan both runs and, [as Rudy thought he might [$_{Pred}$___]], bikes over two hours every day.
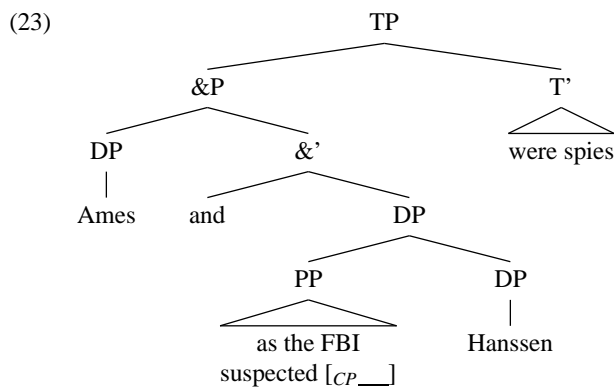   *As*-clause = Rudy thought that Alan bikes over two hours every day.

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[5] The existence of these cases was originally pointed out to me by Nicholas LaCara (p.c., 03/2013). This particular pattern is expected, given that other propositional modifiers (e.g., evidential/evaluative adverbs and predicates) can also appear in the same position (Collins 1988, Schein 1992, i.a.).

[6] Jeroen van Craenenbroeck (p.c., 02/2016) points out that adjunction of the *as*-clause to the first conjunct can be forced, e.g., by conjoining two attributive adjectives and then having the *as*-clause linearly intervene between the determiner and the first adjective. Importantly, the reading where the *as*-clause modifies the first conjunct only requires a focal accent on this conjunct plus an intonational break, notated ⌣, immediately afterwards (ia); note that it is difficult to treat *and valuable* as a parenthetical, as it lacks a prototypical parenthetical intonation. In the absence of this particular prosody, the *as*-clause is interpreted as modifying the entire conjunction (ib).

(i) a. This, [as Edna pointed out [$_{CP}$___]] exPENsive ⌣ and valuable vase will be auctioned tomorrow.
         As-clause = Edna pointed out that the vase is expensive.

     b. This, [as Edna pointed out [$_{CP}$___]] expensive and valuable vase will be auctioned tomorrow.
         As-clause = Edna pointed out that the vase is expensive and valuable.

(22)   a. Right before the lunch break and, [as Edna just pointed out [$_{CP}$ ___]], right after the board meeting are both good times for the IT guy to come fix Harvey's computer.
As-clause = Edna just pointed out that right after board meeting is a good time for the IT guy to come fix Harvey's computer.

      b. Right before the lunch break and, [as Edna anticipated it would be [$_{CP}$ ___]], right after the board meeting are both good times for the IT guy to come fix Harvey's computer.
As-clause = Edna anticipated that right after board meeting would be a good time for the IT guy to come fix Harvey's computer.

The following tree provides a syntax for (19a); analogous trees can be drawn for the other examples. Arguments in favor of this syntax (as opposed to an alternative in terms of clause-level conjunction plus some process of conjunction reduction) can be found in Appendix B at the end of this article.

(23)

```
                            TP
                 ┌──────────┴──────────┐
                &P                     T'
         ┌───────┴───────┐          ┌──┴──┐
        DP               &'         were spies
         |          ┌─────┴─────┐
       Ames        and          DP
                          ┌──────┴──────┐
                         PP             DP
                    ┌────┴────┐          |
                  as the FBI           Hanssen
                suspected [CP ___]
```

As mentioned in §1, I will subsume DP-internal and conjunction-internal *as*-clauses under the umbrella label *non-matching 'as'-clauses*, which is meant to highlight the observation that the category/type of the gap doesn't match that of the anchor. By analogy, I will use *matching 'as'-clauses* to refer to the kind of *as*-clauses discussed by Potts (2002a,b, 2003, 2005).

3.2 Non-matching *as*-clauses in a Pottsian analysis

Consider how a Pottsian analysis of (19a) and (19b) would go. In order to preserve Potts's intuition that *as* forces its complement to contain a variable over the semantic type of the anchor, we need to augment the lexical entry in (10) so that it can make reference to semantic objects beyond propositions and verbal predicates. For this particular case, we only need to add $\langle e \rangle$ as a possible type in the range of σ, but I include a triple-dot mark in order to offer enough flexibility to account for non-matching clauses where the anchor is not an individual, e.g., (20)–(22) above.[7]

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[7] Given that conjunction-internal *as*-clauses seem to be licit in any type of conjunction, the range of σ could end up being relatively large. This should not be seen as a downside, so long as one maintains the same general semantics for *as* (i.e., the complement of *as* contains a variable over the same type as the anchor). Once we accept that *as* is a flexible function capable of composing with anchors of different types, there is no good reason to assume that a small amount of flexibility is preferable to a large one.

(24)   For any $\sigma \in \{\langle t \rangle, \langle et \rangle, \langle e \rangle, \ldots\}$, as $= \lambda X : \langle \sigma^a, t^c \rangle \lambda x : \sigma^a.x : \sigma^a \bullet X(x) : \langle t^c \rangle$

This is the lexical semantics of *as* that I will assume in the rest of this article. We now need to identify the variable over individuals that *as* requires. Importantly, we cannot treat the gaps of (19a) and (19b) as such variables, given that they demonstrably correspond to individual-type objects. For the case of (19a), we can show this much by capitalizing on Potts's (2002a) comparison of non-matching *as*-clauses and appositive *which*-clauses (25).

(25)   Americans should get cheap oil, [which the whole world knows [$_{DP}$___]].

Potts notes a number of asymmetries that support treating *as*-clause CP gaps as propositional constituents, and *which*-clause gaps as individual-level constituents (properly, variables over individuals left by movement of the $\langle e \rangle$-type operator *which*). First, *which*-clause gaps can appear in exclusively nominal positions, such as the complement of *be (well) aware of* (27a). Matching *as*-clause gaps, in contrast, are illicit in such positions (27b) —by hypothesis, because these gaps are propositional objects (Stowell 1987, Postal 1994).

(26)   a.   We are well aware of [$_{DP}$ the roundness of the Earth].
        b. * We are well aware of [$_{CP}$ (that) the Earth is round].

(27)   a.   The Earth is round, [which we are well aware of [$_{DP}$___]].
        b. * The Earth is round, [as we are well aware of [$_{CP}$___]].

The inverse pattern obtains with verbs like *boast* and *comment*, which allow propositional complements, but not nominal complements (Postal 1994:72).

(28)   a. * Alfred {boasted/commented} [$_{DP}$ the greatness of the results].
        b.   Alfred {boasted/commented} [$_{CP}$ that the results were great].

(29)   a. * The results were great, [which Alfred {boasted/commented} [$_{DP}$___]].
        b.   The results were great, [as Alfred {boasted/commented} [$_{CP}$___]].

The gaps of non-matching *as*-clauses pattern together with the gaps of matching *as*-clauses in being excluded from exclusively nominal positions (30a) and allowed in exclusively propositional positions (30b).

(30)   a. * The Earth and, [as we are well aware of [$_{CP}$___]], the Moon are round.
        b.   The results and, [as Alfred {boasted/commented} [$_{CP}$___]], the prospects were
               great.

Potts also exploits the fact that movement of a type $\langle e \rangle$ constituent across an island boundary causes a noticeably milder deviance than movement of constituents of a different type (Cresti 2002 and references). I illustrate this asymmetry with extraction out of a wh- island.

(31)   a.   [Which book]$_i$ do you wonder [when to read t_i]?
        b. * [For which reason]$_i$ do you wonder [when to read t_i this book]?

This asymmetry extends to *as*- and *which*-clauses. *As*-clause gaps embedded in islands give rise to strong unacceptability (as already noted in §2 above), whereas *which*-clause gaps in identical positions only produce a mild deviance.

(32) a. ? Aldrich was a spy, [which the investigator balked before admitting (that he knew) [$_{DP}$___]].

  b. * Aldrich was a spy, [as the investigator balked before admitting (that he knew) [$_{CP}$___]].

Again, non-matching *as*-clause gaps pattern with matching *as*-clause gaps in giving rise to strong unacceptability when embedded in islands.[8]

(33) * Aldrich and, [as the investigator balked before admitting (that he knew) [$_{CP}$___]], Hanssen were spies.

The conclusion that *as*-clause gaps cannot correspond to type $\langle e \rangle$ objects also holds for Predicate gaps like the one in (19b). The same reasoning we used for CP gaps can be applied here. First, Predicate gaps in both matching and non-matching *as*-clauses are licit in the set of positions where only verbal predicates are licit, *viz.*, the complement positions of modals, auxiliaries, and infinitival *to* —compare (34) to (35). As (36) shows, this position is illicit for DPs, as well as for the gaps of appositive *which*-clauses, which are of category DP (see above).[9] This asymmetry suggests that Predicate gaps are categorially VPs, rather than DPs.

(34) a. Edna {should / is going to} [$_{Pred}$ buy some durians].

  b. Edna has [$_{Pred}$ bought some durians].

(35) a. Edna bought some durians, [(just) as Harvey {should / is going to / has} [$_{Pred}$___]]

  b. Edna and, [(just as he {should / is going to / has} [$_{Pred}$___]], Harvey bought some durians.

(36) a. * Edna {should / is going to / has} [$_{DP}$ some durians].

  b. * Edna bought some durians, [which Harvey {should / is going to / has} [$_{DP}$___]].

Similarly, Predicate gaps in non-matching *as*-clauses also give rise to strong unacceptability when embedded in islands, indicating that they are not left by movement of a type $\langle e \rangle$ constituent.

(37) * Aldrich and, [as Edna balked before admitting she knew he had [$_{Pred}$___]], Hanssen stole important documents.

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[8] Potts (2002a:65) provides an additional argument based on Postal's (1998) claim that *tell*, in the sense of 'determine', rejects weak definite pronominal objects (i). If so, the contrast between (ii) and (iii) would follow from the hypotheses that *which*-clause gaps qualify as weak definite pronouns, but *as*-clause gaps don't.

  (i) We could tell {∗it/that/that Ames was a spy} just by looking in his martini glass.

  (ii) * Ames was a spy, [which we could tell [$_{DP}$___] just by looking in his martini glass].

  (iii) Ames was a spy, [as we could tell [$_{CP}$___] just by looking in his martini glass].

This argument is problematic, though, given that it is unclear to what extent the contrast in (ia) holds. Levine (2001:148–149), in his review of Postal (1998), already provides a number of counterexamples; Potts (2002a) himself, in his footnote 9, writes that "the validity of this implication is perhaps in doubt", providing naturally attested examples that suggest that "some speakers do not deem this site antipronominal".

[9] A reviewer finds (36b) "not very degraded, especially if *too* is added". This reviewer speculates that this might indicate an alternative usage of *which* as a conjunction. A different possibility is that this reviewer is parsing this example as a regular appositive relative (*Edna bought some durians, which Harvey should buy too*) augmented with VP ellipsis. At present, I don't know how to adjudicate between these options (or other possible ones).

Additionally, LaCara (2013, to appear) argues at length (*contra* Potts 2002b) that that Predicate gaps are a special case of VP Ellipsis —see LaCara's work and Appendix A for discussion. By definition, VPE sites correspond to verbal predicates, rather than individuals. All these facts point towards the conclusion that the gaps of conjunction-internal *as*-clauses (and, by hypothesis, of all non-matching *as*-clauses) invariably correspond to propositional or predicative objects, regardless of the type of the anchor.[10] This conclusion, however, poses an apparent problem for a Pottsian analysis: how can we use the anchor to provide the gap with a propositional or predicative meaning, if the anchor is not itself a proposition or a verbal predicate?[11]

3.3 Partially compositional resolution

As a first step in attacking the problem introduced above, I propose that gaps and variables do not necessarily stand in a one-to-one relation. A gap (i.e., a position in the signal where an expected constituent fails to be realized) can, under certain circumstances, be a composite entity containing two or more variables, which need to be resolved independently of each other. I propose that the gaps of non-matching *as*-clauses instantiate this pattern: one of the variables is bound by the anchor (just as in matching *as*-clauses), and the other is a free variable resolved by anaphora to a salient discourse antecedent. I will refer to this pattern as *partially compositional resolution*, although readers should keep in mind that this is really a shorthand for *partially compositional and partially discourse-anaphoric resolution*.

---

[10] A reviewer of this article disagrees with this generalization, offering the following examples (with judgments as indicated) as evidence that English also allows *as*-clause gaps in DP positions.

(i) a. ?? Ames and, [as the FBI said [$_{DP}$___] had [$_{Pred}$___]], Hanssen stole the documents.
  b. ? Ames and, [as I was worried [$_{DP}$___] might be [$_{Pred}$___]], Hanssen were arrested.
  c. ? Ames and, [as I thought might be so stupid], Hanssen stole the documents.

The speakers I have consulted disagree with the referee's judgments, unanimously marking these examples as fully unacceptable. This pattern is somewhat unexpected, given that comparable examples with appositive relative clauses are noticeably more acceptable (examples provided by the same reviewer). I have nothing insightful to say about this asymmetry.

(i) a. ?? Ames, [who the FBI said [$_{DP}$___] had [___]], stole the documents.
  b. ? Ames, [who I was worried [$_{DP}$___] might be [___]], was arrested.
  c. ? Ames, [who I thought might be so stupid], stole the documents.

[11] One could potentially try to get around this issue by appealing to Schein's (1992) proposal that bare DPs are genuine propositional objects, complete with a full argument and event structure. If this analysis could be extended to treat bare DPs as either propositions or verbal predicates, as required (and similarly for APs, PPs...), then the problem posed by non-matching *as*-clauses would effectively dissolve, since the anchor could always supply the propositional/predicative meaning that the gap requires. Even ignoring the plausibility of an extension along these lines, Schein's original proposal is already suspicious. Winter (2001:44), for example, criticizes it by pointing out that it " marks a complete departure from compositionality. Unfortunately, no alternative hypothesis about the syntax-semantics interface is proposed; an unrestricted arsenal of syntactic rules is allowed to map surface structures to some notation of "logical form"". In this article, I am adopting instead a more traditional approach where DPs invariably denote individuals (allowing for standard type-shifting operations under the appropriate circumstances).

To show that discourse anaphora is involved in the resolution of these gaps, consider the following conversation, and especially Alan's final utterance.

(38) *Context: Rudy and Alan are playing Trivial Pursuit. Edna, who is just walking by, overhears this part of the game.*

> Rudy: According to Deuteronomy, Jews aren't allowed to wear garments that combine which two fabrics?
>
> Alan: I know that one of them is wool, but I can't remember the other.
>
> Edna: *(Leans closer to Alan and whispers:)* Psst! The other fabric is linen.
>
> Alan: That's it! Jews can't wear garments made of wool and, [as Edna just reminded me [$_{CP}$__]], linen!

Consider what the meaning of the *as*-clause is. It cannot be *Edna reminded me that Jews can't wear clothes made of wool and linen* because that is not what Edna did; she only supplied the piece of information that Alan was missing, not the full answer to Rudy's question. Similarly, it cannot be *Edna reminded me that Jews can't wear clothes made of linen* because Edna didn't assert that linen-only clothes are illicit among Jews. Rather, the actual meaning of Alan's utterance is *Edna reminded me that the other fabric is linen* —and crucially, this meaning cannot be retrieved from Alan's own utterance. It must instead be retrieved from Edna's utterance, and this retrieval cannot be done via Functional Application, which is only defined over LF structures. It must be done instead via discourse anaphora, which can be defined over discourse objects.[12]

A similar reasoning holds for those *as*-clauses that retrieve the meaning of the gap from the non-linguistic context (I owe the following example to Craig Thiersch, p.c. 01/2014).

(39) *Context: the World Health Organization has recently released a report outlining the benefits of Mediterranean cuisines. As we walk into a Lebanese restaurant, you point at all the platters of humus being served and say:*

> This simple and [as the WHO claims [$_{CP}$__]] healthy dip is their specialty.

> a. *As*-clause = the WHO claims that this dip, qua part of a Mediterranean cuisine, is healthy.
>
> b. *As*-clause ≠ the WHO claims that this healthy dip is their specialty.

In short, both (38) and (39) show that the meaning of *as*-clause gaps can occasionally be partially resolved by anaphora to the surrounding discourse. The two crucial words in the last sentence are *occasionally* and *partially*. Consider first *partially*, which alludes to the fact that discourse-anaphoric effects always obtain in combination with compositional resolution of a proper subpart of the gap. For example, in (19a), repeated below as (40), the meaning of anchor is necessarily passed down to the gap, so the *as*-clause ends up asserting that the FBI suspected Hanssen (rather than Ames, or both Ames and Hanssen) of being a spy. The minimal pair in (41) shows that this restriction is not a general property of pronominal anaphors.

---

[12] Here we need not worry that the anaphoric relation crosses the at-issue/CI boundary. Although this boundary is opaque for certain relations (e.g., quantifier binding, cf. Potts 2002b:664ff), it is transparent for discourse anaphora (Potts 2005:§3.3, Amaral et al. 2007, Nouwen 2007, AnderBois et al. 2010, Collins et al. 2014).

(40)   Ames and, [as the FBI suspected [$_{CP}$___]], Hanssen were spies.

     a. *As* clause = the FBI suspected that Hanssen was a spy.

     b. *As* clause $\neq$ the FBI suspected that Ames was a spy.

     c. *As* clause $\neq$ the FBI suspected that Ames and Hanssen were spies.

(41)   Ames and Hanssen were spies. The FBI suspected it/that.

     a. *it/that* $\neq$ the FBI suspected that Hanssen was a spy.

     b. *it/that* $\neq$ the FBI suspected that Ames was a spy.

     c. *it/that* = the FBI suspected that Ames and Hanssen were spies.

Analogous partially compositional resolution effects obtain in non-matching *as*-clauses with Predicate gaps: the only available reading of (42) is the one where Hanssen was the FBI's only suspect. In contrast, a comparable example with VP ellipsis has a wider range of readings (note that the ambiguity of (43) depends on whether the subject pronoun is interpreted as anaphoric to *Ames* or *Hanssen*).

(42)   Ames and, [as the FBI suspected he had [$_{Pred}$___]], Hanssen stole important documents.

     a. *As*-clause = the FBI suspected that Hanssen had stolen important documents.

     b. *As*-clause $\neq$ the FBI suspected that Ames had stolen important documents.

     c. *As*-clause $\neq$ the FBI suspected that Ames and Hanssen had stolen important documents.

(43)   Ames and Hanssen stole important documents. The FBI suspected he had [$_{VPE}$___].

     a. [$_{VPE}$___]= the FBI suspected that Hanssen had stolen important documents.

     b. [$_{VPE}$___]= the FBI suspected that Ames had stolen important documents.

     c. [$_{VPE}$___]$\neq$ the FBI suspected that Ames and Hanssen had stolen important documents.

Additionally, the *occasionally* qualifier refers to the fact that resolution via discourse anaphora is not freely available, even if one attempts to combine it with partially compositional resolution. Christopher Potts (p.c.) illustrates this restriction by noting that the gaps in (44a)/(44b) are necessarily resolved fully compositionally.[13] If resolution via discourse anaphora were truly freely available, the unacceptable readings could be derived by using *Hanssen* as the anchor and then retrieving the rest of the meaning of the gaps by anaphora the preceding sentences.

(44)   a. Ames was a spy. Hanssen, [as the FBI suspected [$_{CP}$___]], fled the country.
       As-clause = the FBI suspected that Hanssen had fled the country.
       As-clause $\neq$ the FBI suspected that Hanssen was a spy

     b. Ames stole some documents. Hanssen, [as the FBI suspected he had [$_{Pred}$___]], fled the country.
       As-clauses = the FBI suspected that Hanssen had fled the country
       As-clause $\neq$ the FBI suspected that Hanssen had stolen some documents

---

[13]   In Potts (2002b), these readings are analyzed by adjoining the *as*-clause to the root clause *v*P and then capitalizing on the *v*P internal subject position to ensure that the anchor has the requisite propositional meaning

The patterns discussed so far are summarized in (45). In §4 below, I present additional that shows that (45) is part of a more general taxonomy of gaps.

(45)   *Gap resolution strategies in 'as' clauses*

    a. Full compositional resolution: whenever the anchor can resolve the entire meaning of the gap.

    b. Partial compositional resolution augmented with discourse anaphora: whenever the anchor can resolve only a proper subpart of the meaning of the gap.

    c. Full discourse-anaphoric resolution: never.

4 Resolving the gap compositionally vs. anaphorically

4.1 Line of attack

Importantly for the purposes of this article, the structure I am proposing for non-matching *as*-clause gaps (partially compositional resolution augmented with discourse-anaphoric resolution) is already attested elsewhere, i.e., in ellipsis sites that properly contain a variable (a movement trace or a bound pronound) bound by some constituent external to the ellipsis site. Apart from the rather obvious case of sluicing (Ross 1969, Merchant 2001), these configurations also include VPE sites containing the trace of a relativized DP (46), VPE sites containing traces of wh- and focus movement (47), Pseudogapping sites (48), and Antecedent-Contained Deletions, where avoiding infinite regress requires the VPE site to contain a QR trace (49). Here, I am using a light grey font to represent elided material.

(46)   a. The book that I read is on the table. The magazine$_i$ that you$_k$ did [t_k read t_i] is in the rack.

    b. The people$_i$ that really should [t_i run for office] tend not to run for office.

(47)   a. I don't know which puppy you should adopt, but I know [which one]$_i$ you$_k$ shouldn't [t_k adopt t_i].

    b. I don't know if Pete signed the BLUE papers, but [the GREEN ones]$_i$, he$_k$ definitely did [t_k sign t_i].

(48)   Rudy read a book; Edna$_i$ did [t_i read t_k] [a magazine]$_k$.

(49)   Edna visited every town that Rudy$_i$ did [t_i visit t_k] [every town]$_k$.

Note that the variable need not be a movement trace: the sloppy reading of (50) requires that the VP Ellipsis site contain a pronoun bound by *every New Yorker*.[14]

(50)   Every$_i$ San Franciscan thinks that his$_i$ city is the most beautiful one, and every$_k$ New Yorker does [think that his$_k$ city is the most beautiful one] too.

---

[14] There are claims in the literature to the effect that sloppy readings do not require a binder, arguably most prominently articulated by Hardt (1999) and references, and more recently by Kehler (2015). I refer readers to Tomioka (1999) and Elbourne (2008) for discussion. What is important for our current discussion is that the sloppy pronoun in (50) does have a binder.

In all these examples, ellipsis and variable binding need not happen simultaneously, and so need to be treated as formally independent processes. I propose that non-matching *as*-clauses should be treated in an analogous way. Assume that the gaps of *as*-clauses are derived by PF deletion of a morphosyntactically complex constituent (*contra* Potts 2002b, but after LaCara 2013, to appear; see Appendix A for discussion). If so, we can define a gap-internal variable bound by the *as*-clause anchor; the rest of the gap will be resolved by anaphora to a salient antecedent. Under this view, the only peculiarity of non-matching *as*-clauses is the fact that ellipsis is obligatory, which obscures the formal independence of the compositional and discourse-anaphoric resolution strategies.

   We do not want to follow this reasoning to the conclusion that matching *as*-clauses should be treated as ellipsis sites that do not contain a bound variable. If this were correct, then we would expect the gaps of these *as*-clauses to be fully resolvable by discourse anaphora, just as regular ellipsis sites. This is factually not so, as suggested by the range of acceptable readings of (3)/(4) from §2, repeated here.

(3)   That space has four dimensions is widely known, [as they announced [$_{CP}$___]].

    a. *As*-clause = they announced it is widely known that space has four dimensions.

    b. *As*-clause ≠ they announced that space has four dimensions.

(4)   The fact that Sue read the map carefully probably means that she stayed on the trails, [as did Chuck [$_{Pred}$___]].

    a. *As* clause = Chuck stayed on the trails.

    b. *As* clause ≠ Chuck read the map carefully.

Instead, I am going to propose that matching *as*-clauses should be treated in the same way as comparative deletions, which necessarily take a local antecedent despite being derived by the same kind of PF deletion that underlies VP ellipsis, sluicing, and other more familiar ellipses (Kennedy 2002, Lechner 2004, Bhatt and Takahashi 2011, and references, all harking back to Bresnan 1973). In the same way as in matching *as*-clauses, it is not possible to resolve the gap by discourse anaphora to a non-local antecedent.

(51)   The table is wider than this rug is, but this rug is longer than the desk is [___].

    a. comparative clause = the length of the rug exceeds the length of the desk.

    b. comparative clause ≠ the length of the rug exceeds the width of the desk.

Taking these additional data into account, we can update the taxonomy in (45) as follows.

(52)   *Gap resolution strategies*

    a. Full compositional resolution: matching *as*-clause gaps, comparative deletion sites.

    b. Partially compositional resolution augmented with discourse anaphora: non-matching *as*-clause gaps, ellipsis sites containing a trace or bound pronoun.

    c. Discourse-anaphoric resolution: ellipsis sites that do not contain an trace or bound pronoun.

4.2 Variable variable resolution

To facilitate the analysis of the taxonomy in (52), I am going to assume that ellipsis sites are associated to a variable that tracks the meaning of a suitable antecedent. This is an idea that has been repeatedly explored in the literature on ellipsis, under different implementations. Hardt (1993, 1999), for example, focusing on VP ellipsis, argues that there is no such as an ellipsis site (qua an independent syntactic constituent) and proposes that each auxiliary or modal corresponds to two homophonous but formally distinct lexical items: one of them acts as regular auxiliary/modal and selects an overt VP, and the other acts as an indexical that retrieves the meaning of a salient VP from discourse. Chung et al. (1995, 2011), focusing on sluicing, assume instead that there is a genuine ellipsis site, which they treat as an atomic proform that retrieves the LF of a suitable salient TP from discourse (Barker 2013 pursues a similar intuition, but from a very different framework). Under this approach, the entire ellipsis site is effectively a variable. Finally, Elbourne (2008) and Messick et al. (2015) treat the variable as constituent separate from a morphosyntactically articulate ellipsis site. The analysis I am going to propose below could, in principle, be couched in either one of these three approaches; that said, I am going to couch it in Elbourne's and Messick et al.'s terms, largely because this particular implementation (unlike Hardt's Chung et al.'s, or Barker's) is compatible with the accumulated evidence that ellipsis sites have a complex internal syntax. The tree below illustrates this approach, with the variable (notated R) composing with the ellipsis site via an extension of Heim and Kratzer's (1998) Predicate Modification rule.[15] I refer the interested reader to Elbourne's and Messick et al.'s papers for extended arguments in favor of this particular syntax.

(53)
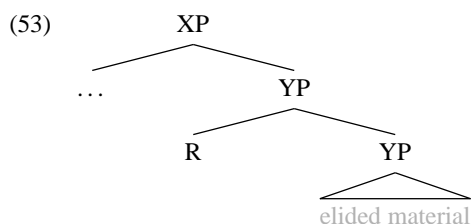
We can exploit the presence of R to account for the taxonomy in (52). Consider first the fact that standard approaches to ellipsis (e.g., Rooth 1992, Schwarzschild 1999, Merchant 2001, AnderBois 2014, and references) calculate whether the identity condition on ellipsis is satisfied by comparing the meanings of the ellipsis site and the antecedent directly.[16] In the system defined above, identity is calculated indirectly, by having R act as a proxy for the antecedent. Formally, we can rephrase the condition in Merchant (2001:31) as follows.

---

[15] This is Messick et al.'s (2015) analysis. Elbourne (2008) proposes a different one, where R and the ellipsis site compose via Functional Application; the crucial component of this analysis is a functional head THE, which allows R to have a range of identity types (e.g., $\langle\langle e^a,t^a\rangle,\langle e^a,t^a\rangle\rangle$ whenever it combines with a type $\langle e^a,t^a\rangle$ ellipsis site). As Messick et al. point out (see also Heim and Kratzer 1998:§4.3.2), both analyses are effectively indistinguishable on empirical grounds, at least as far as English goes. In what follows, I will adopt Messick et al.'s approach, largely in the interest of simplicity.

[16] I am somewhat oversimplifying here by assuming that identity is a purely semantic relation. One would need to augment it with some reference to morphosyntactic structure in order to account for the form identity effects reported in Chung (2013), Merchant (2013b), Barros (2014), and others.

(54) *Condition on deletion*

  a. A constituent *E* can be deleted if *E* is *e*-GIVEN.

  b. *E* is *e*-GIVEN iff *E* has a salient antecedent *A* whose meaning is tracked by R, and module ∃-type shifting:

    i. R entails F-clo(*E*), and

    ii. *E* entails F-clo(R).

For completeness, ∃-type shifting and F-clo are defined as in Merchant (2001:14).

(55) ∃-*type shifting*
  ∃-type shifting raises expressions to type ⟨*t*⟩ and existentially binds unfilled arguments.

(56) *Focus closure*
  The focus closure of α, notated F-clo(α), is the result of replacing F-marked parts of α with ∃-bound variables of the appropriate type (modulo ∃-type shifting).

In a large majority of cases, (54b) is going to have the same effect as Merchant's (2001) original condition, which makes reference to entailments between the ∃-type shifted meanings of *E* and *A* and their respective focus closures. To ensure that (54b) covers (52), we need to make certain assumptions about the status of R. In Elbourne's (2008) and Messick et al.'s (2015)'s treatments, R is a free contextual variable (this is effectively also the position of Hardt 1993, 1999 and Chung et al. 1995, 2011, modulo syntactic differences). In contrast, I propose that R can be either free or bound —and its free vs. bound status in any given environment is defined condition (2), repeated here.

(2) *Compositionality wins*
  If there is a suitable binder, then R is a bound variable; else, it is a free contextual variable tracking the meaning of a discourse-salient expression.

The rest of §4.2 explores how this system accounts for the taxonomy in (52).

4.2.1 Full discourse-anaphoric resolution

Let us begin by considering a case of regular VP ellipsis, qua a configuration where the ellipsis site doesn't contain a trace or bound pronoun (57). Note that this assumes that VPE sites does contain the VP-internal subject trace; this assumption is somewhat contentious for English (Elbourne 2008, for one, adopts it, but Merchant 2013b doesn't), but I will assume it to be correct for the sake of exposition. Readers unhappy with this assumption can recast the discussion in this section in a language where VPE sites demonstrably exclude VP-internal subject positions (e.g., Farsi, as described in Toosarvandani 2009).

(57) Jack drank some beer. Sally did [drink some beer] too.

The absence of a lexical item with the semantics of *as* (which forces its external argument to act as binder of some variable contained in its internal argument) precludes a compositional resolution of R. Even if the clause containing the VPE site is adjoined to another VP, the meaning of the VPE site is not tied to the meaning of the host of adjunction and can be resolved by any salient discourse antecedent. This was already illustrated in (6) above, repeated below.

(6)   The fact that Sue read the map carefully probably means that she stayed on the trails.
      But we aren't sure whether Chuck did [$_{VPE}$___].

      a.   [$_{VPE}$___] = Chuck stayed on the trails.
      b.   [$_{VPE}$___] = Chuck read the map carefully.

The tree for (57) is given below, where `beer` is a shorthand for *some beer*. On the assumption
that R can be assigned the meaning `drink(beer)` : $\langle e^a, t^a \rangle$ (i.e., the same meaning as the
antecedent VP), the calculation of identity in (59) satisfies (54) above.

(58)   `drink(beer)(sally)` : $\langle t^a \rangle$

       `sally` : $\langle e^a \rangle$ `drink(beer)` : $\langle e^a, t^a \rangle$

                              R   `drink(beer)` : $\langle e^a, t^a \rangle$

                                    `drink` : $\langle e^a, \langle e^a, t^a \rangle \rangle$ `beer` : $\langle e^a \rangle$

(59)   a. $E = \text{F-clo}(E) = \exists x : \langle e^a \rangle.(\texttt{drink(beer)}(x) : \langle t^a \rangle)$
       b. $R = \text{F-clo}(R) = \exists x : \langle e^a \rangle.(\texttt{drink(beer)}(x) : \langle t^a \rangle)$
       c. E entails F-clo(R), satisfying (54b-i).
       d.   R entails F-clo(E), satisfying (54b-ii).

4.2.2 Partially compositional resolution

Consider now VPE sites containing a variable bound from outside. I use example (47b) from
§4.1 as a test case.

(47)   b.   I don't know if Pete signed the BLUE papers, but [the GREEN ones]$_i$, he$_k$ defi-
            nitely did [t_k sign t_i].

The relevant tree goes below (60), along with the calculation of identity (61). On the assump-
tion that R can be assigned a meaning along the lines of `sign(x)` : $\langle e^a, t^a \rangle$ (see specifically
Hardt 1999 for discussion that such meanings are in fact available as VPE antecedents),
condition (54) is satisfied again.

(60)   `sign(green ones)(pete)` : $\langle t^a \rangle$

      `green ones` : $\langle e^a \rangle$ `sign(x)(pete)` : $\langle e^a, t^a \rangle$ (by Predicate Abstraction)
                                              |
                              `sign(x)(pete)` : $\langle t^a \rangle$

                   `pete` : $\langle e^a \rangle$ `sign(x)` : $\langle e^a, t^a \rangle$

                                    R   `sign(x)` : $\langle e^a, t^a \rangle$

                              `sign` : $\langle e^a, \langle e^a, t^a \rangle \rangle$ x : $\langle e^a \rangle$

(61)   a. $E = \text{F-clo}(E) = \exists x : \langle e^a \rangle.(\texttt{sign}(y)(x) : \langle t^a \rangle)$

     b. $R = \text{F-clo}(R) = \exists x : \langle e^a \rangle.(\texttt{sign}(y)(x) : \langle t^a \rangle)$

     c. E entails F-clo(R), satisfying (54b-i).

     d.   R entails F-clo(E), satisfying (54b-ii).

The derivation of non-matching *as*-clauses is going to be largely analogous; I use example (19a) as a test case.

(19)   a.   Ames and, [as the FBI suspected [$_{CP}$___]], Hanssen were spies.

For explicitness, I divide the derivation in two parts. The tree in (62) illustrates the internal composition of the *as*-clause, including the anchor *Hanssen*. The variable $x : e^a$ is introduced as the sister of $\texttt{spy} : \langle e^a, t^a \rangle$ and carried all the way up the tree until it can be resolved by $\texttt{hanssen} : \langle e^a \rangle$. There are various noteworthy things here. First, and unlike in (47b), there is a *comma* feature that shifts the complement of *as* into the CI dimension. Second, note that the anchor $\texttt{hanssen} : \langle e^a \rangle$ is an individual, whereas the gap corresponds to a propositional constituent, as discussed in §3.2 above. Because (54) requires R to be the same kind of object as the ellipsis site, it follows that R cannot be bound by an individual anchor: just as in (47b), it is a free variable that tracks the meaning of a discourse-salient antecedent, which we can define as $\texttt{spy}(x) : \langle t^a \rangle$.[17] The calculation of identity is analogous to the one in (61) and need not be stated explicitly. Finally, the application of Predicate Abstraction creates a predicate of individuals, which can act as the inner argument of *as*.

(62)

$$\texttt{hanssen} : \langle e^a \rangle$$
$$\bullet$$
$$comma(\texttt{suspect}(\texttt{spy}(\texttt{hanssen}))(\texttt{fbi})) : t^c$$

$comma(\texttt{suspect}(\texttt{spy}(x))(\texttt{fbi})) : \langle e^a, t^c \rangle$ $\texttt{hanssen} : \langle e^a \rangle$

as $comma(\texttt{suspect}(\texttt{spy}(x))(\texttt{fbi})) : \langle e^a, t^c \rangle$

$\texttt{suspect}(\texttt{spy}(x))(\texttt{fbi}) : \langle e^a, t^a \rangle$ (by PA)

$\texttt{suspect}(\texttt{spy}(x))(\texttt{fbi}) : \langle t^a \rangle$

$\texttt{suspect}(\texttt{spy}(x)) : \langle e^a, t^a \rangle$ $\texttt{fbi} : \langle e^a \rangle$

$\texttt{suspect} : \langle t^a, \langle e^a, t^a \rangle \rangle$ $\texttt{spy}(x) : \langle t^a \rangle$

R $\texttt{spy}(x) : \langle t^a \rangle$

$\texttt{spy} : \langle e^a, t^a \rangle$ $x : \langle e^a \rangle$

---

[17] Here I am deliberately ignoring the issue of anaphoric vs. cataphoric resolution of ellipsis sites. This reflects, on the one hand, the fact that existing theories of anaphoric resolution tend to say little, if anything, about cataphora itself and its relation to anaphora; and on the other hand, the fact that so far I haven't looked in detail into whether cataphoric *as*-clause gaps have the same restrictions as cataphoric ellipses. Given these factors, accounting for any anaphora/cataphora asymmetries is something that will have to wait.

The second part of the derivation consists on combining the topmost meaning of (62) with the rest of the main clause. Before we get there, note that this node, which already contains both at-issue and CI content, is not covered by the Functional Application rule in (9). To get around this problem, I define the additional rule in (63), which allows the at-issue part of the anchor to combine with additional at-issue content.

(63) *Functional Application of nodes with at-issue and CI content*
       Let α be a branching node with daughters $\beta : \langle \sigma^a, \tau^a \rangle$ and $\gamma : \sigma^a \bullet \langle t^c \rangle$. Then $\alpha = \beta(\gamma : \sigma^a) : \tau^a \bullet \gamma : \langle t^c \rangle$.

The second part of the derivation, then, is as follows.[18] This much yields the observed reading of (19a), i.e., the at-issue proposition that Ames and Hanssen were spies, plus the CI proposition that the FBI suspected Hanssen of being a spy.

(64)

$$\texttt{spy(ames}\oplus\texttt{hanssen)} : \langle t^a \rangle$$
$$\bullet$$
$$comma(\texttt{suspect(spy(hanssen))(fbi))} : \langle t^a, t^c \rangle$$

$$\texttt{spy} : \langle e^a, t^a \rangle \qquad \texttt{ames}\oplus\texttt{hanssen} : \langle e^a \rangle$$
$$\bullet$$
$$comma(\texttt{suspect(spy(hanssen))(fbi))} : t^c$$

$$\texttt{ames} : \langle e^a \rangle$$
$$\texttt{and} \qquad \texttt{hanssen} : \langle e^a \rangle$$
$$\bullet$$
$$comma(\texttt{suspect(spy(hanssen))(fbi))} : t^c$$
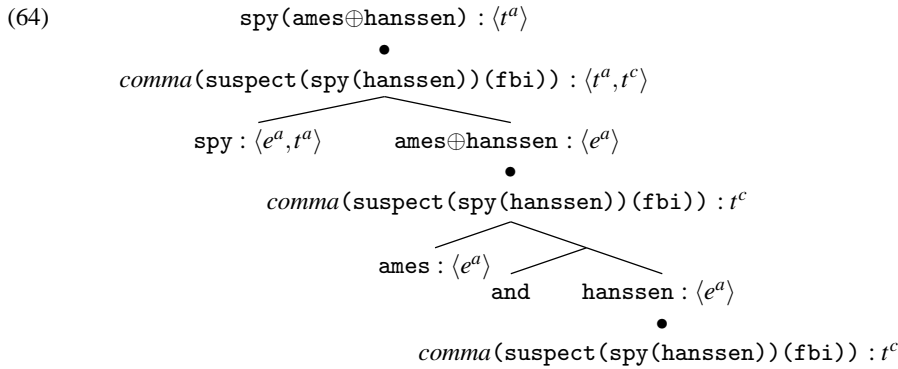
4.2.3 Interlude: bound variables outside the gap site

The following examples illustrate the fact that bound variables can also be completely external to ellipsis sites. This is, of course, expected: if bound variable resolution and ellipsis resolution can be treated as formally independent processes, then nothing restricts bound variables to appear exclusively within ellipsis sites.

(65) a. [The professor]$_i$ that t_i thinks you should read *Aspects* is a syntactician. [The professor]$_k$ that t_k thinks you shouldn't [read *Aspects*] is a semanticist.
       b. I know who$_i$ Jack told t_i that you should adopt a puppy, but I don't know who$_k$ he told you shouldn't [adopt a puppy].
       c. Every$_i$ San Franciscan bets his$_i$ hard-earned money that the Warriors will win the NBA finals. Every$_k$ New Yorker bets his$_k$ that the Knicks will [win the NBA finals].

The analysis I have developed so far predicts that we should find analogous patterns in non-matching *as*-clauses. Two reviewers of this article have argued that this prediction is correct, offering (66a) as an illustration. Patrick Elliott (p.c.) provides the additional (66b).

---

[18] For the sake of exposition, I am using an admittedly vague and simplistic semantics for conjunction, where *and* is a two-place operator that returns the join of its arguments. Readers unhappy with this assumption are welcome to substitute their favorite treatment of conjunction.

(66)   a.   Gerald was teasing you about being slow and out of shape. Ironically enough,
            Harvey and, [as HE$_i$ basically predicted YOU would [$_{Pred}$___]], Gerald$_i$ dropped
            out of the race.
            As-clause = Gerald predicted you would drop out of the race.
       b.   Harvey and, [just as he$_i$ predicted YOU would [$_{Pred}$___]], Gerald$_i$ placed bets that
            Mary would drop out of the race.
            As-clause = Gerald predicted you would place bets that Mary would drop out of
            the race.

In general, the speakers I have polled find (66) somewhat degraded relative to either (65) or
the examples discussed in §4.2.2 above. I have nothing substantial to say about this decrease
in acceptability. Importantly, the examples in (66) are still reported as substantially more
acceptable than the minimal pairs in (67), where the *as*-clause contains no variable bound
by the anchor. This is expected, given that the semantics of *as* (24) requires its complement
to contain a variable that can be bound by the anchor.

(67)   a.   *? Gerald was teasing you about being slow and out of shape. Ironically enough,
            Harvey and, [as EDNA basically predicted YOU would [$_{Pred}$___]], Gerald dropped
            out of the race.
            As-clause = Gerald predicted you would drop out of the race.
       b.   *? Harvey and, [just as Edna predicted YOU would [$_{Pred}$___]], Gerald placed bets
            that Mary would drop out of the race.
            As-clause = Gerald predicted you would place bets that Mary would drop out
            of the race.

4.2.4 Fully compositional resolution

We can finally come back to matching *as*-clauses. The analysis I am going to propose is
effectively the same as the one in Potts (2002b), as described in §2 above; as a consequence,
all the additional effects on matching *as*-clauses discussed in Potts's work carry over. The
only difference is that, instead of letting the anchor to bind the gap directly, I am going
to let the anchor bind the R variable associated to the gap. Given that deletion of the gap
constituent is contingent on satisfying condition (54), and given that in this particular case
the meaning of R is determined compositionally, the full compositional resolution effects
discussed in §2 (see examples (3)/(4)) follow (comparative clauses, which also exhibit the
same restriction on the resolution of their ellipsis sites, are amenable to the same analysis).
For illustration, I offer the derivation of (1a), repeated here. Tree (68) provides the derivation
of the *as*-clause, and (69) illustrates how it hooks up to the main clause. The calculation of
identity that licenses deletion of the complement of *suspect* is given in (70), and it is based
on the assumption that R, being bound by the anchor, will necessarily have the meaning
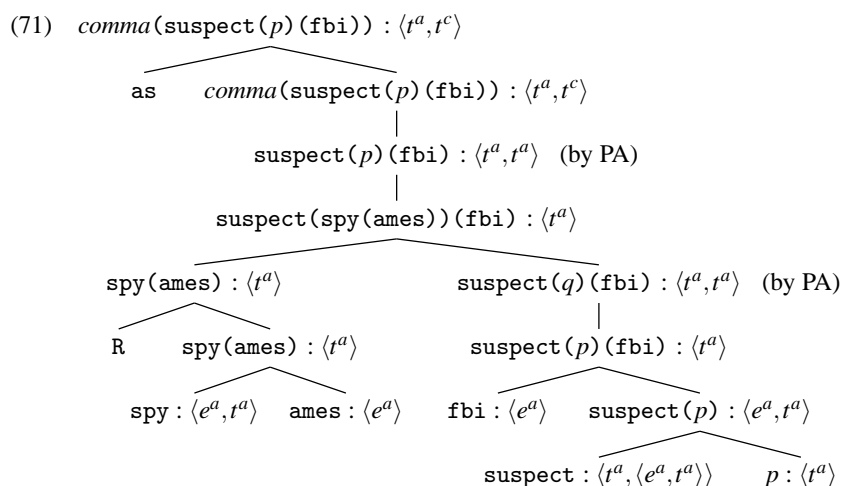spy(ames) : $\langle t^a \rangle$.

(1a)   a.   Ames was a spy [(just) as the FBI suspect [$_{CP}$___]].

(68) $comma(\mathtt{suspect}(p)(\mathtt{fbi})) : \langle t^a, t^c \rangle$

$\mathtt{as}$ $comma(\mathtt{suspect}(p)(\mathtt{fbi})) : \langle t^a, t^c \rangle$

$\mathtt{suspect}(p)(\mathtt{fbi}) : \langle t^a, t^a \rangle$ (by PA)

$\mathtt{suspect}(\mathtt{spy}(\mathtt{ames}))(\mathtt{fbi}) : \langle t^a \rangle$

$\mathtt{fbi} : \langle e^a \rangle$ $\mathtt{suspect}(\mathtt{spy}(\mathtt{ames})) : \langle e^a, t^a \rangle$

$\mathtt{suspect} : \langle t^a, \langle e^a, t^a \rangle \rangle$ $\mathtt{spy}(\mathtt{ames}) : \langle t^a \rangle$

$\mathtt{R}$ $\mathtt{spy}(\mathtt{ames}) : \langle t^a \rangle$

$\mathtt{spy} : \langle e^a, t^a \rangle$ $\mathtt{ames} : \langle e^a \rangle$

(69) $\mathtt{spy}(\mathtt{ames}) : \langle t^a \rangle$

$\bullet$

$comma(\mathtt{suspect}(\mathtt{spy}(\mathtt{ames}))(\mathtt{fbi})) : t^c$

$\mathtt{spy}(\mathtt{ames}) : \langle t^a \rangle$ $comma(\mathtt{suspect}(p)(\mathtt{fbi})) : \langle t^a, t^c \rangle$

$\mathtt{spy} : \langle e^a, t^a \rangle$ $\mathtt{ames} : \langle e^a \rangle$
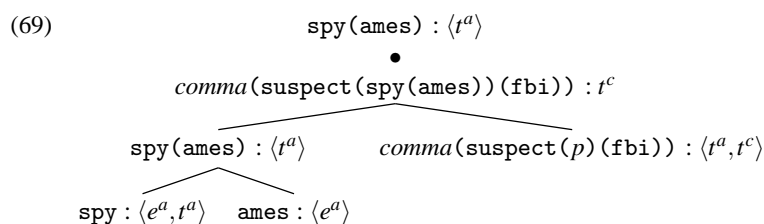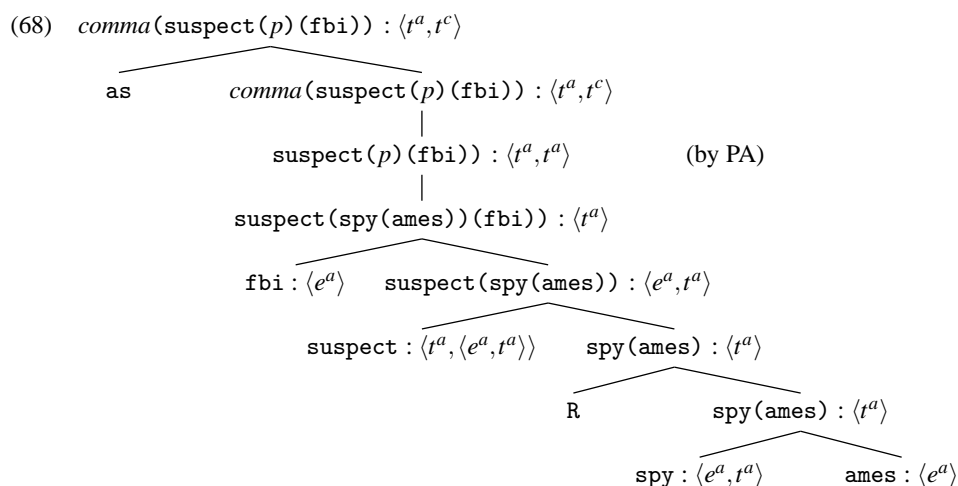
(70)   a. $E = \text{F-clo}(E) = \mathtt{spy}(\mathtt{ames}) : \langle t^a \rangle$
     b. $\text{R} = \text{F-clo}(\text{R}) = \mathtt{spy}(\mathtt{ames}) : \langle t^a \rangle$
     c. E entails F-clo(R), satisfying (54b-i).
     d.   R entails F-clo(E), satisfying (54b-ii).

4.3 Movement and its dissociation from abstraction

So far I have been ignoring Potts's (2002b) evidence in favor of movement of A-bar movement of the gap (cf. §2) above. It is not difficult to integrate this movement within the system defined above: one only needs to invoke an additional application of Predicate Abstraction that introduces a variable in the gap position and lets the gap constituent be interpreted in a derived position. The following tree illustrates this derivation for the *as*-clause of (1a).

(71) $comma(\texttt{suspect}(p)(\texttt{fbi})) : \langle t^a, t^c \rangle$

```
            as     comma(suspect(p)(fbi)) : ⟨tᵃ,tᶜ⟩
                                |
                     suspect(p)(fbi) : ⟨tᵃ,tᵃ⟩  (by PA)
                                |
                  suspect(spy(ames))(fbi) : ⟨tᵃ⟩
```

$\texttt{spy}(\texttt{ames}) : \langle t^a \rangle$ $\qquad$ $\texttt{suspect}(q)(\texttt{fbi}) : \langle t^a, t^a \rangle$ (by PA)

```
    R      spy(ames) : ⟨tᵃ⟩           suspect(p)(fbi) : ⟨tᵃ⟩
```

$\texttt{spy} : \langle e^a, t^a \rangle$ $\;$ $\texttt{ames} : \langle e^a \rangle$ $\quad$ $\texttt{fbi} : \langle e^a \rangle$ $\;$ $\texttt{suspect}(p) : \langle e^a, t^a \rangle$

$\texttt{suspect} : \langle t^a, \langle e^a, t^a \rangle \rangle$ $\qquad$ $p : \langle t^a \rangle$

Note that each application of Predicate Abstraction achieves a different goal: the lower one handles movement of the gap, and the second creates a predicate of propositions that can act as the inner argument of *as*. This is dissociation already present in Potts's (2002b) analysis (although somewhat downplayed), but a reviewer of this article wonders to what extent it is justified —i.e., given that movement of the gap needs to be integrated into the analysis anyway, is it possible to use this movement to turn the complement of *as* into a predicate? Non-matching *as*-clauses suggest a negative answer, on the grounds that trying to tie predicate formation to movement would force us into postulating theoretically problematic types of movement. Consider example (19a), and bear in mind that the strong sensitivity of this movement to island boundaries contraindicates movement of a type $\langle e \rangle$ object alone. Rather, we would be forced into a situation in which the propositional gap moves to a peripheral position, and then a type $\langle e \rangle$ operator subextracts from the derived position of the gap.

(72) *An alternative syntax for (19a)*
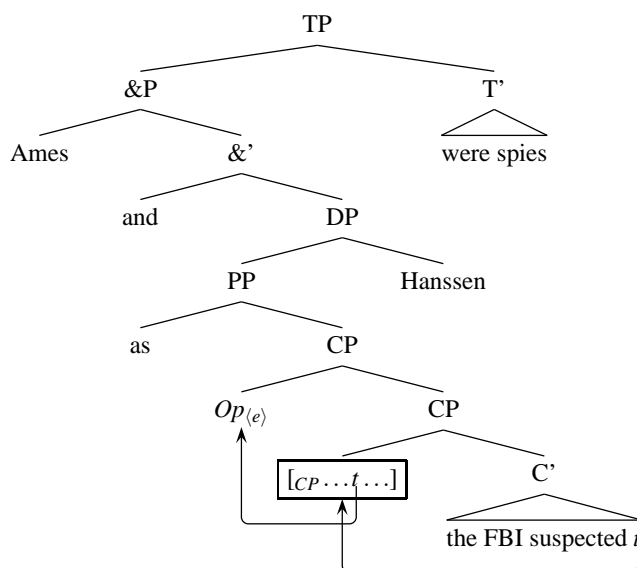
In (72), movement of $Op_{\langle e \rangle}$ violates the Freezing Principle, which blocks movement out of derived positions (cf. Corver 2007 for a summary). Equally or more problematic are examples like (21), repeated below, where the anchor is a bare verb. Even ignoring violations of the Freezing Principle, trying to tie the creation of a suitable variable to a movement operation would require postulating A-bar movement of bare verbs, which is otherwise unattested in English.

(21) a. Alan both runs and, [as Rudy said [$_{CP}$__]], bikes over two hours every day.
      b. Alan both runs and, [as Rudy thought he might [$_{Pred}$__]], bikes over two hours every day.

These examples suggest that the creation of the relevant variable must be dissociated from any movement operations going on inside the *as*-clause, just as implicitly assumed in §§4.2.1–4.2.4 above.

5 Conclusions and outlook

The primary empirical contribution of this article is the generalization that certain *as*-clauses with proposition- and predicate-sized gaps can take anchors other than propositions and properties, respectively. This pattern runs counter to Potts's (2002a, 2002b, 2003, 2005) claim that the meaning of the gap is invariably resolved via Functional Application alone. However, it can be explained if we assimilate non-matching *as*-clauses to other configurations in which an ellipsis site properly contains a variable bound from outside. In both of these constructions, a single superficial gap contains a bound and a free variable, resolved independently of each other —respectively, by Functional Application and by discourse anaphora. More generally, this approach allows us to integrate *as*-clauses into the larger taxonomy of gap-containing constructions.

One of the intuitions that drives much of recent work on parentheticals is Potts' (2003, 2005) conjecture that the syntax of these expressions is unexceptional, and that their semantics is exceptional only in that they are interpreted in a separate dimension. The analysis I have presented here can be viewed as providing at least partial support in favor this conjecture. In order to view it as providing full support for this conjecture, one would have to devise a principled account of why something like condition (2) holds, which favors bound variables over free variables. This is a question I currently lack an answer for.

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A Evidence that *as*-clause gaps have an articulate internal structure

A.1 Preliminaries

Potts (2002b:624ff) assumes that all *as*-clause gaps, irrespective of whether they are CP- or Predicate-sized, correspond to a null, morphosyntactically atomic, flexibly-typed operator (alternatively, one could assume two separate null operators, $\varnothing_{CP}$ and $\varnothing_{Pred}$, each with a slightly different semantics; the difference between these two options is not important for our current purposes). Potts specifically argues against a deletion analysis on the grounds that ellipsis is always optional, but gaps in *as*-clauses cannot be replaced with overt CPs or VPs. Against this background, LaCara (2013, to appear) argues that ellipsis is not always truly optional, pointing to the comparative deletion cases discussed originally by Bresnan (1973) and later on Kennedy (2002) and Lechner (2004). He then goes on to argue that at least Predicate gaps exhibit signs of being derived by deletion of a regular syntactic structure (he also conjectures that at least Predicate gaps are possible only in those languages and environments where Predicate ellipsis is independently possible, which is correct for the limited sample he considers). Readers interested in the details of LaCara's analysis are referred to his papers. The question at this juncture is whether this result can be extended to both matching *as*-clauses with CP gaps and non-matching *as*-clauses with both CP and Predicate gaps. This, in turn, requires some discussion of the validity of the tests that LaCara uses to probe the internal structure (or lack thereof) of gaps.

(A.1) *LaCara's (2013) tests for internal structure in 'as'-clause gaps; (A.1e) is from Merchant (2013a)*

    a. Subextraction: gaps with a complex internal structure allow various types of extraction from within them, atomic gaps do not.

    b. Licensing: gaps with a complex internal structure require a linguistic antecedent, atomic gaps can be licensed by the non-linguistic context.

    c. Vehicle change: gaps with a complex internal structure can repair Condition C violations, atomic gaps cannot.

    d. Missing antecedents: gaps with a complex internal structure can introduce new discourse referents, atomic gaps cannot.

    e. Agreement: proper subconstituents of gaps with a complex internal structure can control agreement morphology on gap-external elements.

Contrary to LaCara's claims, the literature contains a number of arguments to the effect that, out of these four tests, only subextraction and agreement are reliable methods to determine whether a gap has a complex internal structure (LaCara to appear does acknowledge this issue, but still argues that the tests in question are valid indicators of of a complex internal structure). For the purposes of this Appendix, I am going to ignore agreement, as it is inapplicable in English (i.e., unlike in Irish or Russian, English lacks configurations where the agreement controller is internal to an ellipsis site and the target is external), and concentrate on subextraction instead. The logic behind this conclusion is twofold. First, there is the assumption that subextraction correlates with a complex internal structure —by definition, one can't extract a proper subconstituent out of a constituent that doesn't have proper subconstituents. Note that here we are dealing only with a one-way correlation: a successful subextraction does imply the presence of a complex internal structure, but a failed subextraction does not imply the absence of a complex internal structure: as I suggest below, subextraction out of an internally-complex gap may still fail for independent reasons. Second, a line of recent research argues that, unlike subextraction, tests (A.1b) through (A.1d) actually fail to discriminate between complex and atomic gaps. Here I refer the reader to Miller (2011), Miller and Pullum (2012), Merchant (2013a), Thompson (2014), and references therein for data and discussion. Given the unreliability of these three tests, I will concentrate exclusively on subextraction patterns for the remainder of this section.

A.2 Predicate gaps

LaCara's key observation is that matching *as*-clauses with Predicate gaps are compatible with subjects that necessarily originate within the gap and escape it via A-movement. These include subjects of unaccusative predicates (A.2a), subjects of passivized predicates (A.2b), and subjects of raising-to-subject predicates (A.2c).

(A.2)   a. The ship sank, [as I thought it would [$_{Pred}$___]].
       b. The ship was sunk, [as I think the barge also was [$_{Pred}$___]].
       c. Mary seems to be happy, [as she should [$_{Pred}$___]].

The following set of examples shows that A-movement out of the gap is also possible in conjunction-internal *as*-clauses.

(A.3)   a. The ship and, [as I thought it would [$_{Pred}$___]], the barge sank.
       b. The ship and, [as I thought it also would be [$_{Pred}$___]], the barge were sunk.
       c. Mary and, [as she should [$_{Pred}$___]], Nancy seem to be happy.

LaCara further shows that British and Irish dialects, which allow possessive *have* to undergo movement to T and C, also allow possessive *have* to move out of a Predicate gap. As an illustration, he provides the examples in (A.4), culled from the British National Corpus. At present, I have not been able to check whether this pattern is replicable in non-matching *as*-clauses.

(A.4)   a. The FAA has a similar duty in the USA, [as have equivalent organisations in almost every country throughout the world [$_{Pred}$___]].   [BNC CN2 770]
       b. He has experience of leadership at all levels, [as has his possible successor Ashley Metcalfe [$_{Pred}$___]]   [BNC A4B 89]

However, Gary Thoms (p.c. 02/2016) questions the validity of these tests, on the grounds that the extracted DPs fail to reconstruct into the gap site. Consider (A.5): on the assumption that quantifiers in ellipsis sites necessarily have the same scope as the corresponding quantifiers in the antecedent clauses (Fox 2000), the infelicity of this example can be attributed to the inability of *a general* to reconstruct into the gap site. This is unexpected under LaCara's analysis.

(A.5)   # A soldier seemed to die in every battle, [as did a general [$_{Pred}$___]].

I have no substantial remarks about why reconstruction into gap sites seems to be blocked.

A.3 CP gaps

The companion question (which LaCara doesn't tackle) is whether CP gaps also allow subextraction. Examples analogous to (A.2) and (A.3) cannot be constructed, though, given that A-movement in English cannot cross (finite) clause boundaries (although presumably languages that Ura (2000) lists as allowing hyperraising will also allow hyperraising out of a CP gap; I have not had the opportunity to check if this is true). Unfortunately, resorting to A-bar movement yields uninformative results. As the following examples show, A-bar extraction out of a CP-gap yields strong ungrammaticality in both matching and non-matching *as*-clauses.

(A.6)   a.   * Chuck borrowed this unicycle, [(just) as Edna asked me which one I thought [$_{CP}$___]].
        b.   * Chuck borrowed this unicycle and [(just) as Edna asked me which one I thought [$_{CP}$___]] this tricycle.

It would be, however, incorrect to conclude from this that CP-gaps are atomic. The examples in (A.7) show that A-bar extraction is also impossible out of Predicate gaps, which we have already seen allow A-extraction. The fact that these examples are ungrammatical is remarkable given that, as we saw in §4.1, A-bar extraction out of ellipsis sites is otherwise possible.

(A.7)   a.   * Chuck borrowed this unicycle, [(just) as Edna asked me which one I had [$_{Pred}$___]].
        b.   * Chuck borrowed this unicycle and, [(just) as Edna asked me which one I had [$_{Pred}$___]], this tricycle.

These patterns can be explained by capitalizing on the fact that, as (A.8) through (A.11) show, *as*-clause gaps cannot appear inside islands (in all cases, the (b) examples are controls with bridge predicates to show that this is not a generalized ban against embedding of the gap). Following Potts (2002b:§2.1.2) and LaCara (2013), we can take this restriction as indication that *as*-clauses feature A-bar movement of the gap constituent to the highest SpecCP within the *as*-clause (effectively, the edge of the complement of *as*).

(A.8)   *Matching CP-as: relative clause island vs. no island*
        a.   * Durians are delicious, [as Nina spoke with a grocer who claimed [$_{CP}$___]].
        b.   Durians are delicions, [as Nina said that the grocer claimed [$_{CP}$___]].

(A.9)   *Matching Predicate-as: relative clause island vs. no island*
        a.   * Nina bought two durians, [(exactly) as Edna met a chef who did [$_{Pred}$___]].
        b.   Nina bought two durians, [(exactly) as Edna says that the chef did [$_{Pred}$___]].

(A.10) *Non-matching CP-as: relative clause island vs. no island*
        a.   * Durians and, [exactly as Nina spoke with a grocer who claimed [$_{CP}$___]], papayas are delicious.
        b.   Durians and, [exactly as Nina said that the grocer claimed [$_{CP}$___]], papayas are delicious.

(A.11) *Non-matching Predicate-as: relative clause island vs. no island*
        a.   * Jim Durrow and, [just as they smiled politely when Edna reported [$_{Pred}$___]], Peter Griffin are blackjack aces.
        b.   Jim Durrow and, [just as they said that Edna reported [$_{Pred}$___]], Peter Griffin are blackjack aces.

The ungrammaticality of (A.7) is now easy to explain: A-bar extraction from the gap, even if licit on its own, creates a wh- island boundary for the subsequent operator movement. The following tree illustrates the relevant configuration.

(A.12)
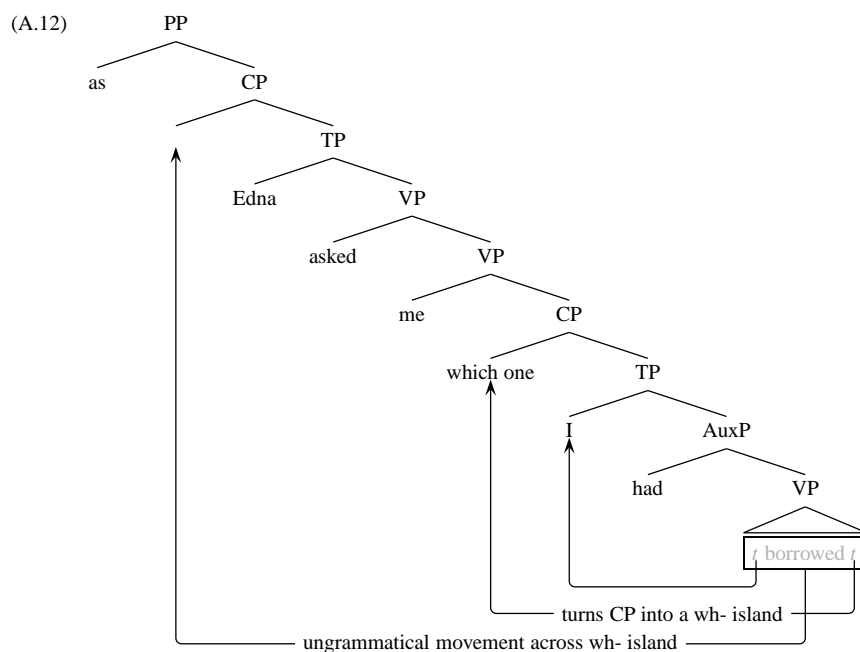
Unfortunately, this restriction entails that subextraction tests (both overt subextraction and the inverse scope test listed by Merchant (2013a), assume that inverse scope requires Quantifier Raising) are uninformative as to the internal syntax of CP gaps. Here I am going to tentatively assume (following the suggestion of an anonymous reviewer) that CP gaps do have an articulate internal structure, in the same way as Predicate gaps, largely because it simplifies the discussion in §4.2.

A.4 But what if CP gaps are atomic?

Some readers might rightly complain that the conclusion of the previous subsection is unreasonable, in the sense that the lack of evidence against a complex internal structure for CP gaps does not entail that this type of internal structure actually obtains. These readers might want to reframe the discussion in the terms of Barker (2013), Charlow (2014), and references, who offer an analysis where morphosyntactically atomic ellipsis sites can receive a semantics that contains externally-bound variables. Currently, it is unclear to me whether accepting this analysis for CP gaps entails that it should also be extended to Predicate gaps (or rather, whether we can have an eclectic system where Predicate gaps are internally complex and CP gaps are atomic).

B Evidence that conjunction-internal *as*-clauses feature genuine DP-level coordination

The goal of this Appendix is to provide arguments to the effect that examples with the surface format [DP and [*as*-clause] DP] are best analyzed as involving genuine DP-level conjunction, rather than clause-level conjunction that has undergone some process of conjunction reduction (e.g., ellipsis, Right Node Raising, or some other). In principle, the same arguments can be applied to analogous cases involving coordination of APs, NPs, and other subpropositional objects. The argumentation is straightforward: I identify a series of environments where DP-level and clause-level conjunctions behave differently, and then I show that conjunctions containing an *as*-clause invariably pattern together with DP-level conjunctions.

B.1 Distribution

Coordinate structures containing an *as*-clause exhibit the same distribution as regular DP coordinations, which is turn is the same distribution as regular uncoordinated DPs. This includes not only the preverbal subject position, of which several examples have already been given, but also the associate position of expletive *there* (B.1a), the direct object position (B.1b), the indirect object position (B.1c), the subject position of raising predicates (B.1d), the subject position of passivized predicates (B.1e), the object position of ECM predicates (B.1f), the complement position of a preposition (B.1g), and the possessor position of a genitive DP (B.1h). The examples in (B.2) illustrate the same distribution with Predicate gaps. The fact that we observe this particular distribution is very suggestive and fully consistent with the hypothesis that the conjuncts are bare DPs.

(B.1) a. There is a pigeon and, [as Edna just pointed out [$_{CP}$___]], a sparrow in the tree.

    b. Ames learned to speak Russian and, [as the New York Times reported [$_{CP}$___]], Chinese.

    c. Ames sold the Soviets and, [as some have speculated [$_{CP}$___]], the Chinese many important documents.

    d. Ames and, [as Edna just told me [$_{CP}$___]], Hanssen are both likely to be KGB double agents.

    e. Ames and, [as the New York Times reported [$_{CP}$___]], Hanssen, have both been accused of being KGB double agents.

    f. Edna believes both Ames and, [as Harvey suspected [$_{CP}$___]], Hanssen to be KGB double agents.

    g. The FBI gathered detailed information about both Ames and, [as Edna just confirmed [$_{CP}$___]], Hanssen.

    h. The FBI tapped Ames and, [as the New York Times reported [$_{CP}$___]], Hanssen's phone line.

(B.2) a. There is a pigeon and, [as Edna predicted there would be [$_{CP}$___]], a sparrow in the tree.

    b. Ames learned to speak Russian and, [as Edna claimed she also had [$_{CP}$___]], Chinese.

    c. Ames sold the Soviets and, [as some predicted he would [$_{CP}$___]], the Chinese many important documents.

    d. Ames and, [as Edna thought he could be [$_{CP}$___]], Hanssen are both likely to be KGB double agents.

    e. Ames and, [as the New York Times anticipated he would be [$_{CP}$___]], Hanssen, have both been accused of being KGB double agents.

    f. Edna believes both Ames and, [as Harvey suspected he could be [$_{CP}$___]], Hanssen to be KGB double agents.

    g. The FBI gathered detailed information about both Ames and, [as Edna just confirmed they have [$_{CP}$___]], Hanssen.

    h. The FBI tapped Ames and, [as the New York Times reported they have [$_{CP}$___]], Hanssen's phone line.

I appreciate that some of the examples above could in principle be given an alternative parse in terms of clausal conjunction supplemented with Right Node Raising and/or ellipsis. Consider, for example, a potential such derivation for (B.1a). Note that both Right Node Raising and ellipsis are independently possible in this particular case (B.4)/(B.5), which legitimates a derivation along these lines.

(B.3) a. *Base structure*
There is a pigeon in the tree and, [as Edna just pointed out [$_{CP}$___]], there is a sparrow in the tree.

    b. *Right Node Raising of 'in the tree'*
There is a pigeon and, [as Edna just pointed out [$_{CP}$___]], there is a sparrow in the tree.

    c. *Ellipsis of 'there are'*
There is a pigeon and, [as Edna just pointed out [$_{CP}$___]], a sparrow in the tree.

(B.4) *Right Node Raising of 'in the tree' without ellipsis of 'there are'*
There is a pigeon and, [as Edna pointed out [$_{CP}$___]], there is a sparrow in the tree.

(B.5) *Ellipsis of 'there are' without Right Node Raising of 'in the tree'*
There is a pigeon in the tree and, [as Edna pointed out [$_{CP}$___]], a sparrow on the ground.

However, we will see in the following subsections that this analysis cannot be generalized to all cases of conjunction-internal *as*-clauses. Therefore, it becomes necessary to acknowledge that a non-trivial subset of these class of clauses actually require a DP-coordination analysis.

B.2 Multiple *as*-clauses

The first hurdle that a conjunction reduction alternative has to overcome is the fact that, as (B.6) illustrates, each separate DP conjunction in a single sentence may have its own conjunction-internal *as*-clause.

(B.6) Ames and, [as the New York Times reported [$_{CP}$___]], Hanssen learned to speak Russian and, [as Edna always says she should have [$_{Pred}$___]], Chinese.

    a. Main clause = Ames and Hanssen learned to speak Russian and Chinese.

    b. i. Subject *as*-clause = the New York Times reported that Hanssen learned to speak Russian and Chinese.

       ii. Subject *as*-clause ≠ the New York Times reported that Ames and Hanssen learned to speak Russian and Chinese.

    c. i. Object *as*-clause = Edna always says that she should have learned to speak Chinese.

       ii. Object *as*-clause ≠ Edna always says that she should have learned to speak Russian and Chinese.

In order to maintain an analysis in terms of clausal conjunction, (B.6) would have to be derived from a base along the lines of (B.7). Note that the three separate clausal conjunctions in (B.7) are necessary to ensure that each *as*-clause is scopally independent from the other and from the main clause (cf. the paraphrases of (B.6).

(B.7) [$_{CP_1}$ Ames learned to speak Russian and Chinese], and [$_{CP_2}$ [as the New York Times reported [$_{CP}$___]], Hanssen learned to speak Russian and Chinese], and [$_{CP_3}$ [as Edna always says she should have [$_{Pred}$___]], Edna learned to speak Chinese].

One can potentially define a set of ellipsis and/or RNR processes that derive (B.6) from (B.7) without over-generating illicit surface strings. However, I do not know of any theory of ellipsis or RNR that could derive this result in a non-stipulative way.

B.3 Reciprocal binding

A coordination of two singular DP in subject position can bind a reciprocal pronoun in object position (B.8). Reciprocal binding becomes impossible if each singular DP is the subject of a different coordinate clause (B.9a). This impossibility persists under VP Ellipsis (B.9b), *do it* and *do so* anaphora (B.9c), and Right Node Raising (B.9d). This pattern is easy to explain: reciprocal pronouns require a plural c-commanding antecedent, and (B.8) is the only example where this configuration obtains.

(B.8) Alan and Rudy talked to each other.

(B.9) a. * Alan talked to each other, and Rudy talked to each other.

    b. * Alan talked to each other, and Rudy did [$_{VPE}$___] too.

    c. * Alan talked to each other, and Rudy {did it/did so} to.

    d. ?* Alan talked, and Rudy talked to each other.

If conjunction-internal *as*-clauses involved a reduced clausal coordination, we would expect them to pattern with the examples in (B.9) in not being able to license a reciprocal expression in object position. In reality, they pattern with (B.8), regardless of whether the gap is CP-sized or Predicate-sized. This suggests that they involve DP-level coordination in their anchor.

(B.10) a. Alan and, [as Edna said [$_{CP}$___]], Rudy talked to each other.

    b. Alan and, [as Edna said he did [$_{Pred}$___]], Rudy talked to each other.

B.4 Agreement

As already illustrated in (19a) and (19b), repeated below, the second conjunct of the coordinate structure can, in combination with the first conjunct, produce cumulative plural agreement on the verb. Non-cumulative singular agreement is highly degraded. This pattern follows straightforwardly from an analysis where coordination happens at the DP level. On the other hand, a clausal-coordination-plus-conjunction-reduction analysis predicts the opposite pattern: given that the first DP would be properly contained in a clausal conjunct separate from the conjunct the overt verb appears in, it would be unable to combine with the second DP to produce cumulative plural agreement.

(B.11) a.   Ames and, [as the FBI suspected [$_{CP}$___]], Hanssen were spies.   [= (19a)]

       b. * Ames and, [as the FBI suspected [$_{CP}$___]], Hanssen was a spy.

(B.12) a.   Ames and, [as the FBI believed he had [$_{CP}$___]], Hanssen have stolen important documents.
                                                                                            [= (19b)]

       b. * Ames and, [as the FBI believed he had [$_{CP}$___]], Hanssen has stolen important documents.

Importantly, agreement idiosyncracies in regular DP conjunctions hold also in conjunctions containing an *as*-clause. The triplet below illustrates this effect with a coordinate associate of expletive *there*, with disallows plural agreement (B.13a). As (B.13b) and (B.13c) illustrate, insertion of a conjunction-internal *as*-clause doesn't disrupt this pattern. This makes it difficult to treat plural agreement in (B.11) and (B.12) above as default agreement with coordinate structures, as agreement attraction, or as a speech error.

(B.13) a.   There { ✓ is / *? are } a pigeon and a sparrow in the tree.

       b.   There { ✓ is / *? are } a pigeon and, [(just) as Edna predicted [$_{CP}$___]], a sparrow in the tree.

       c.   There { ✓ is / *? are } a pigeon and, [(just) as Edna predicted there would be [$_{Pred}$___]] a sparrow in the tree.

The same argument can be made with the German long passive, which (for speakers who accept it) triggers cumulative plural agreement with nominative subjects and default singular agreement with accusative subjects (B.14). As expected under a DP conjunction analysis, insertion of a conjunction-internal *as*-clause doesn't disrupt this asymmetry (B.15). I only provide examples with CP gaps, as German is one of the languages where Predicate gaps are generally not possible.

(B.14) a. Der   Traktor und der   Wagen { ✓ wurden / * wurde } zu verkaufen versucht.
           the.NOM tractor and the.NOM car   were   was   to sell   tried
           "Someone tried to sell the tractor and the car"

       b. Den   Traktor und den   Wagen { * wurden / ✓ wurde } zu verkaufen versucht.
           the.ACC tractor and the.ACC car   were   was   to sell   tried
           "Someone tried to sell the tractor and the car"

(B.15) a. Der   Traktor und, [wie Oskar gerade herausgefunden hat [$_{CP}$___]], der   Wagen { ✓
           the.NOM tractor and as Oskar just   found.out   has   the.NOM car
           wurden / * wurde } zu verkaufen versucht.
           were   was   to sell   tried
           "Someone tried to sell the tractor and, as Oskar just found out, the car"

       b. Den   Traktor und, [wie Oskar gerade herausgefunden hat [$_{CP}$___]], den   Wagen { *
           the.ACC tractor and as Oskar just   found.out   has   the.ACC car
           wurden / ✓ wurde } zu verkaufen versucht.
           were   was   to sell   tried
           "Someone tried to sell the tractor and, as Oskar just found out, the car"

To complete this particular argument against a clausal conjunction analysis, we must take into account the fact that Right Node Raising also exhibits cumulative agreement with singular conjuncts, despite the fact that here we are arguably dealing with clause-level coordination. Grosz (2015) offers the pair below an illustration. Note, however, that these judgments are idealized: as Yatabe (2003) reports, there is considerable idiolectal variation in this phenomenon, with a non-trivial number of speakers exhibiting a preference for singular over cumulative agreement (although this kind of variation doesn't hold for (B.11) and (B.12), as far as I know).

(B.16)   Annie is happy that Bob, and Claire is proud that Daniel, {✓ have / ?? has} travelled to Cameroon.

Importantly, Grosz (2015) argues that cumulative agreement requires (i) that the agreement target be located inside the RNRed constituent, and (ii) that the agreement controllers be located outside. The reverse config-uration fails to produce cumulative agreement. This prediction can be easily tested in languages that have some type of object agreement. Here I will use Spanish dative objects, which are necessarily doubled by a number-agreeing clitic. If an *as*-clause is inserted inside a coordinated dative object, clitic number agreement remains necessarily plural, contrary to the predictions of a RNR analysis. In contrast, a DP-coordination anal-ysis predicts the correct type of agreement unproblematically. Given that Spanish doesn't generally allow Predicate gaps, I only present examples with CP gaps.

(B.17)   a.   Alicia { ✓ le   / ∗ les   } ha traído   un regalo a Beatriz.
             Alicia   CL.SG   CL.PL   has brought a   present to Beatriz

         b.   Alicia { ∗ le   / ✓ les   } ha traído   un regalo a Beatriz y   a Carla.
             Alicia   CL.SG   CL.PL   has brought a   present to Beatriz and to Carla

(B.18)   Alicia { ∗ le   / ✓ les   } ha traído   un regalo a Beatriz y,   [como había sugerido Diana
         Alicia   CL.SG   CL.PL   has brought a   present to Beatriz and as   had   suggested Diana
         [$_{CP}$___]], a Carla.
                        to Carla

B.5 Scope of coordination

Example (B.19) below is based on the fact that the Old Testament forbids garments that combine wool and linen, even though garments made of wool alone or linen alone are allowed (Deuteronomy 22:11: "Do not wear clothes of wool and linen woven together"). The reading of (B.19) that is consistent with this ban is the one where *and* takes scope below *can't* —i.e., coordination at the DP level, embedded below negation and the modal.

(B.19)   Jews can't wear garments made of wool and linen.
         [✓ *can't > and* / # *and > can't*]

In (B.20), Alan's final utterance is an acceptable answer to Rudy's question, which suggests that the avail-ability of the [*can't > and*] reading is not affected by the insertion of an *as*-clause inside the coordinate structure.

(B.20)   *Context: Rudy and Alan are playing Trivial Pursuit. Edna, who is just walking by, overhears this*
         part of the game.
         Rudy: According to Deuteronomy, Jews aren't allowed to wear garments that combine which two
                fabrics?
         Alan: I know that one of them is wool, but I can't remember the other.
         Edna: *(Leans closer to Alan and whispers:)* Psst! The other fabric is linen.
         Alan: That's it! Jews can't wear garments made of wool and, [as Edna just reminded me [$_{CP}$___]],
                linen!
                [✓ *can't > and* / # *and > can't*]

If one were to analyze (B.20) as a case of clausal coordination, the [*can't > and*] reading would require covert ATB extraction of *can't* to some position outside the coordinate structure. There are number of factors that contraindicate an analysis along these lines, among them the fact that modals do not seem to be able to undergo this type of QR (Lechner 2007), or that covert ATB extraction seems to be generally disallowed (Citko 2003). On the other hand, under a DP-coordination analysis, the availability of the [*can't > and*] reading follows without stipulation.

B.6 Variable binding

In regular DP coordinations, a quantifier heading the first conjunct can bind a pronoun the second (B.21a). This much follows from a structure for coordination along the lines of Munn (1993) *et seq*, where the first conjunct asymmetrically c-commands the second. In contrast, this type of cross-conjunct binding is not possible in clausal coordinations, as the quantifier cannot take scope over the second conjunct.

(B.21) a.   Every$_i$ runner and his$_i$ coach have to attend the race information meeting.

       b. * Every$_i$ runner has to attend the race information meeting and his$_i$ coach has to attend the race information meeting.

This pattern remains unaltered if an *as*-clause is inserted in a conjunction-internal position, irrespective of whether the *as*-clause contains a CP gap (B.22a) or a Predicate gap (B.22b). This parallelism follows if these examples feature DP-level coordination. If, on the other hand, they featured reduced clausal coordination, these examples would be predicted to be ungrammatical, because *every runner* would be embedded within a clausal first conjunct and wouldn't be able to bind *his coach* in the second conjunct (B.23).

(B.22) a.   Every$_i$ runner and, [as Edna just announced [$_{CP}$___]], his$_i$ coach have to attend the race information meeting.

       b.   Every$_i$ runner and, [as Edna announced he would have to [$_{Pred}$___]], his$_i$ coach have to attend the race information meeting.

(B.23) a.   Every$_i$ runner has to attend the race information meeting and, [as Edna just announced [$_{CP}$___]], his$_i$ coach has to attend the race information meeting.

       b.   Every$_i$ runner has to attend the race information meeting and, [as Edna announced he would have to [$_{Pred}$___]], his$_i$ coach has to attend the race information meeting.

B.7 Generalized quantifiers

Barwise and Cooper (1981:194ff) note that "it seems difficult" to use *and* to conjoin two generalized quantifiers if their monotonicity differs. They offer the following examples as illustration.

(B.24) a.   [Several men and a few women] arrived on time.   *[both increasing]*

       b.   [No man and few women] arrived on time.   *[both decreasing]*

       c. * [Few men and a few women] arrived on time.   *[mixed]*

Importantly, they also point out that this restriction only holds of DP-level conjunctions. Clausal conjunctions may contain generalized quantifiers of different monotonicity. The following pairs illustrate this asymmetry.

(B.25) a.   John was invited and no woman was, so he went home alone.

       b. * John and no woman was invited, so he went home alone.

(B.26) a.   Few mathematicians have worked on natural language conjunction and a few linguists have, so I don't think you have the right to make these unfounded statements.

       b. * Few mathematicians and a few linguists have worked on natural language conjunction, so I don't think you have the right to make these unfounded statements.

This asymmetry can be employed to determine if conjunction-internal *as*-clauses feature DP-level or clausal conjunction. Specifically, if they former is the case, then examples with generalized quantifiers of mixed monotonicity are predicted to be ungrammatical. As the following examples show, this is correct, both for CP gaps (B.27) and Predicate gaps (B.28).

(B.27) a.   Several men and, [as Edna pointed out [$_{CP}$___]] a few women arrived on time.

                                                [both increasing]

       b.   No man and, [as Edna pointed out [$_{CP}$___]] few women arrived on time.

                                                [both decreasing]

       c. * Few men and, [as Edna pointed out [$_{CP}$___]] a few women arrived on time.

                                                   [mixed]

	Reduced clausal conjunction	DP-level conjunction	Conjunction-internal *as*-clauses
DP-like distribution	??	yes	yes
multiple instances	??	yes	yes
reciprocal binding	no	yes	yes
cumulative agreement	no	yes	yes
low scope of coordination	no	yes	yes
cross-conjunct binding	no	yes	yes
monotonicity restrictions on GQs	no	yes	yes

Table 1: properties of conjunctions

(B.28) a.   Several men and, [as Edna predicted they would [$_{CP}$___]] a few women arrived on time.*[both increasing]*

   b.   No man and, [as Edna predicted they would [$_{CP}$___]] few women arrived on time.   *[both decreasing]*

   c. * Few men and, [as Edna predicted they would [$_{CP}$___]] a few women arrived on time. *[mixed]*

B.8 Summary

The data presented in the previous pages, and summarized in Table 1, indicate that conjunction-internal *as*-clauses feature genuine coordination at the DP level, rather than a reduced clausal conjunction. Therefore, we can safely conclude that the tree in (72), repeated below, represents the correct syntax for this kind of clauses.

(72)