A case for conjunction reduction: Object DP conjunction as *v*P conjunction

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Abstract

The conjunction *and* seems to occur in a broad range of syntactic environments: *and* appears to conjoin full clauses, nominals, verbs, and so forth. This distribution is at odds with an intuitive hypothesis about the semantics of *and*: that *and* makes a similar contribution to the $\wedge$ connective of propositional logic and takes truth-values as arguments. A widely accepted solution introduces flexibility into the semantics to allow *and* to compose with different kinds of arguments (e.g. von Stechow 1974, Gazdar 1980, Partee & Rooth 1983, Rooth 1985, Keenan & Faltz 1985, Jacobson 1999, 2014). This paper challenges that approach by undertaking a close study of cases where *and* occurs between object nominals (e.g. *John saw every student and every professor*). I argue that these data are most successfully analyzed with a mechanism of *conjunction reduction* ('CR'): despite appearances, *and* does conjoin constituents of type t, obscured in the surface string. I propose a particular CR analysis which avoids objections to CR raised in the literature. Theoretically, the proposed CR structure "follows for free" from independently needed syntactic mechanisms. Empirically, CR must at least be available to account for a range of data involving the distribution of adverbs, licensing of VP-ellipsis, and scope. In the final part of the paper, I introduce further scope data which are most straightforwardly understood if semantic flexibility is not also available.

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1 Introduction

In propositional logic, the connective $\wedge$ uniformly conjoins expressions associated with truth-values. A formula *(p $\wedge$ q)* is associated with the truth-value 1 just in case *p* and *q* are each associated with 1. In studying *and* in natural language, it is reasonable to ask: to what extent is $\wedge$ a satisfactory model of *and*? Looking myopically at examples like (1), it appears that *and* has just the same properties as $\wedge$. *And* conjoins two full clauses, each of which is associated with a truth-value, and the entire sentence is intuitively true just in case the individual conjuncts are true. The lexical entry for *and* could be (2), by which *and* operates on truth-values, mirroring the characteristic truth-table for $\wedge$.

(1) [John danced] and [John sang].

(2) $[\![\text{and}]\!] = \lambda p_t \,.\, \lambda q_t \,.\, p = q = 1$ *(type <t,<t,t>>)*

When we consider a more full data set, however, *and* starts to look quite different from $\wedge$. Most strikingly, *and* occurs in a broad range of different environments.[1] The data in (3) are illustrative. At a descriptive level, *and* occurs between object nominals in (3-a), subject nominals in (3-b), and verbs in (3-c).

(3) a. John saw [every student] and [every professor].
b. [Every student] and [every professor] arrived.
c. John [hugged] and [petted] the dog.

The most obvious syntax for (3-a)-(3-c) takes the pronounced string of words at face value: *and* conjoins DPs in (3-a) and (3-b), and verbs in (3-c). In that case, if *and* had the lexical entry in (2), (3-a)-(3-c) would be uninterpretable, as quantifiers and verbs are not of type t. The syntax must generate a structure for examples like (3-a)-(3-c) that the semantics can interpret, and the question is: what are the mechanisms which allow such strings to be parsed and interpreted? This paper contributes to addressing this question by undertaking a close study of examples like (3-a), where *and* occurs between object nominals.

The failed analysis sketched above makes two assumptions — a *semantic* assumption (that *and* has a $\wedge$-like meaning of type <t,<t,t>>), and a *syntactic* assumption (that *and* directly conjoins DPs). At least one of these assumptions must be wrong. In the following, I outline one approach which modifies the semantics, and then a different approach which modifies the syntax. This paper constitutes an extended argument for the second approach, which allows *and* to be interpreted as $\wedge$ in these data.

1.1 Semantic flexibility

Suppose first that we accept the most obvious syntax for (3-a), with *and* directly conjoining the DPs *every student* and *every professor*, as in (4). Because the meaning for *and* in (2) cannot compose in (4), if (4) is the right structure, the semantics of *and* must change.

(4) John saw [$_{\&P}$ [$_{DP}$ every student] [and [$_{DP}$ every professor]]]

[1] There are, of course, other respects in which natural language *and* appears not to act like logical conjunction. For instance, while the meaning in (2) is insensitive to the order of the conjuncts ($[\![\text{and}]\!](p)(q) \Leftrightarrow [\![\text{and}]\!](q)(p)$), natural language *and* shows some asymmetries dependent on order (e.g. *The sniper shot him and he died* $\neq$ *He died and the sniper shot him*; Bjorkman 2013). One approach is to attribute such effects to the pragmatics (e.g. Grice 1975, Schmerling 1975, Carston 1993, among others; but, see Txurruka 2003 and Bjorkman 2013 for quite different views). I will assume the pragmatic approach and set this issue aside.

Montague (1973) proposed that *and* can have the lexical entry in (2), but is ambiguous between that and a family of further meanings of different semantic types. In (1), where full clauses are conjoined, *and* is interpreted as (2). In (3-a), a different meaning is invoked, in particular (5), by which *and* does compose with quantificational arguments.[2]

(5) $[\![\text{and}_2]\!] = \lambda F_{ett} . \lambda G_{ett} . \lambda f_{et} . F(f) = G(f) = 1$ *(<ett,<ett,ett>>)*

Although ambiguity between (2) and (5) may seem arbitrary, Partee & Rooth (1983) argue that the stipulation is not as severe as it appears at first blush, as the meaning in (5) can be derived from the basic meaning for *and* in (2). To bring this out, I re-formulate (5):

(6) $[\![\text{and}_2]\!] = \lambda F_{ett} . \lambda G_{ett} . \lambda f_{et} . [\![\text{and}]\!](F(f))(G(f))$ *= (5)*

In (5), the quantifiers F and G are applied to the predicate f to yield truth-values. The result is true just in case these truth-values are each true (F(f) = G(f) = 1). The denotation for *and* in (2) is a function mapping two truth-values to true just in case they are each true (p = q = 1). Accordingly, taking F(f) and G(f) as the arguments of $[\![\text{and}]\!]$, as in (6), yields an equivalent statement to (5).

The notion of deriving higher-type meanings for *and* from the basic meaning in (2) extends further. Partee & Rooth formulate a generalized schema for type ambiguity by which denotations for *and* can be derived from (2) to allow *and* to compose with arguments of any type ending in t (see also von Stechow 1974, Gazdar 1980, Jacobson 1999, 2014). The denotation in (7-a), for instance, allows *and* to compose with verbs in (3-c), and is derived from $[\![\text{and}]\!]$ as in (7-b).

(7) a. $[\![\text{and}_3]\!] = \lambda f_{eet} . \lambda g_{eet} . \lambda x . \lambda y . f(x)(y) = g(x)(y) = 1$ *(<eet,<eet,eet>>)*

b. $= \lambda f_{eet} . \lambda g_{eet} . \lambda x . \lambda y . [\![\text{and}]\!](f(x)(y))(g(x)(y))$

Hence, the first line of analysis rests on *semantic type-ambiguity*.[3] To compose in the range of syntactic environments in which *and* occurs, *and* is associated with a family of meanings of different semantic types, with higher-type meanings derived from a basic meaning. I refer to this approach as the "DP analysis", as it allows *and* in (3-a) to compose with *every student* and *every professor*.

1.2 Conjunction reduction

The second approach — "conjunction reduction" ('CR') — adopts a different syntax for (3-a). Although *and* appears to conjoin DPs, a CR analysis parses (3-a) with *and* conjoining larger constituents of type t. CR was considered in the early literature, and the structures that were entertained had *and* uniformly conjoin full clauses (e.g. Gleitman 1965, Ross 1967, Lakoff & Peters 1969, Hankamer 1979). In that view, (3-a) would derive from (8), with struck out material elided. Given CR, *and* can compose with the original meaning in (2) across its distribution.

(8) [$_{TP}$ John saw every student] and [$_{TP}$ ~~John saw~~ every professor]

[2] Montague's formulation was different, since he introduced meanings for conjunction syncategorematically. Nonetheless, invoking the multiple meanings formulated here is in the spirit of Montague's proposal.

[3] An alternative approach abandons type theory for a Boolean semantics for natural language, and defines *and* as the Boolean "meet" operator (Keenan & Faltz 1985, recently pursued in Winter 2001). Boolean "meet" can compose with both truth-values and sets. Space restrictions prevent me from detailing this alternative here, but the conclusions of the paper bear on this approach in kind.

Most researchers, however, abandoned CR, in face of empirical evidence that *and* does *not* uniformly conjoin full clauses. An underlying structure with full clausal conjunction is plausible in (3-a) because the equivalence in (9) holds:

(9) John saw every student and every professor. = *(3-a)*
⇔ John saw every student and John saw every professor.

There are, however, cases where an apparent conjunction of non-clausal constituents is *not* equivalent to any full clausal conjunction. Partee (1970) noted (10). In (10-a), *few* obligatorily takes scope above *and*, so the meaning is that few rules are both explicit and easy to read at the same time. (10-a) allows that there may be many explicit rules, so long as few of them are also easy to read. This differs from (10-b) and (10-c), where *few* scopes below *and*, and it is entailed that few rules are explicit.

(10) a. Few rules are explicit and easy to read.
b. ~~#~~ Few rules are explicit and few rules are easy to read.
c. ~~#~~ Few rules are explicit and it's easy to read few rules.

A similar point can be made with apparent DP conjunction: whereas (11-a) (adapted from Rooth & Partee 1982) conveys that some one company hired both a maid and a cook (*some* > *and*), (11-b) is compatible with separate companies hiring a maid and a cook (*and* > *some*). Just as (10-a) cannot derive from the full clausal conjunctions in (10-b) and (10-c), (11-a) cannot derive from (11-b).

(11) a. Some company hired a maid and a cook.
b. ~~#~~ Some company hired a maid and some company hired a cook.

While data like (10) and (11) support a move away from CR, I suggest that such a move is premature. Interpreted most conservatively, these data only exclude a particular kind of CR analysis: one based on underlying structures with full clausal conjunction. They do not necessarily undermine the fundamental idea of CR: that *and* may conjoin constituents of type t that are not surface apparent. So long as the structure contains type t nodes other than the top clausal node, CR may still be viable.

With this in mind, the present paper proposes a way to revive CR as a viable hypothesis for examples like (3-a). I propose that the candidate CR structure for (3-a) should not involve a conjunction of full clauses, but rather a conjunction of *verb phrases*. The structure to consider is not (8), but (12):

(12) [$_{TP}$ John$_1$ [$_{vP}$ t$_1$ saw every student] and [$_{TP}$ t$_1$ ~~saw~~ every professor]

According to the VP-Internal Subject Hypothesis (Kitagawa 1986, Koopman & Sportiche 1988, Kuroda 1988) — an idea now widely adopted subsequent to the early CR literature — *v*Ps, like full clauses, denote truth-values.[4] *v*P conjunction is, then, a possible CR analysis, allowing *and* to compose with its basic meaning. I will return to the scope data in (10) and (11) later in the paper and show that the small change from full clausal conjunction to *v*P conjunction successfully diffuses these as counter-arguments to CR.

[4]Note that I ignore contributions of tense and aspect. If *v*Ps must compose with tense and aspect, it is not obvious that they are type t. In the composition provided by von Stechow & Beck (2015), for instance, the *v*P is type <v,t> (i.e. a characteristic function for a set of events). Still, they do posit an aspectual projection just above *v*P which is of type t and it is possible that *and* really conjoins that projection in the data I consider, rather than *v*P. Thanks to Seth Cable, Paul Hagstrom, and David Pesetsky for pointing out the issue.

1.3 The full possibility space

The idea that *and* is type-flexible and the idea that *and* can conjoin constituents of type t that are not surface apparent, though often seen as alternatives, are not mutually exclusive. There are, in fact, three possibilities to dissociate, as in (13):

(13) **Three hypotheses**

H1	*And* is type-flexible	DP conjunction available, CR unavailable
H2		DP conjunction available, CR also available
H3	*And* is not type-flexible	DP conjunction unavailable, CR available

By **H1**, *and* is type-flexible, allowing for direct DP conjunction. At the same time, CR is hypothesized to be unavailable, which amounts to a claim that there is no available syntactic mechanism for CR. By **H2**, *and* is type-flexible, but (3-a) is structurally ambiguous: it allows a parse where *and* directly conjoins DPs and composes with a higher-type meaning, and a CR parse, where *and* composes with its basic meaning. By **H3**, *and* is rigidly interpreted as $\wedge$. As a consequence, direct DP conjunction is not interpretable, leaving just the CR structure viable. The goal in this paper is to dissociate these three hypotheses.

1.4 A note on sum formation

Before proceeding further, a clarification is in order regarding what exactly I intend to claim. When H3 says that DP conjunction is unavailable, it means that DPs cannot be conjoined with a type-lifted variant of logical *and*. It has been proposed that logical *and* is accidentally polysemous with a sum formation operator, (14-a), which can conjoin DPs of type e (Link 1983). This has been invoked for examples involving collective predication like (14-b). I remain agnostic about whether and_{sum} exists, or should be re-analyzed with logical *and* (as in Winter 2001, Champollion 2015, and Schein 1992, 2017).

(14) a. $[\![\text{and}_{sum}]\!] = \lambda x_e \,.\, \lambda y_e \,.\, x \oplus y$

b. John and Mary met.

It should be noted that a kin to and_{sum} may also be available in quantifier conjunctions, such as (15-a). Despite two occurrences of overt *every*, one analysis would assign (15-a) the LF in (15-b), where a single universal is interpreted, with conjunction inside the restrictor (see Fox & Johnson 2016 and references therein). *And* is then interpreted as (15-c) (Link 1983, Heycock & Zamparelli 2005), which creates in (15-b) a predicate of student-professor sums.

(15) a. every student and every professor

b. [[$\forall$ [student and professor]]

c. $[\![\text{and}_{sum\_pred}]\!] = \lambda f_{et} \,.\, \lambda g_{et} \,.\, \lambda X \,.\, \exists x\, \exists y\, [f(x) \wedge g(y) \wedge x \oplus y = X]$

Fox & Johnson (2016) applied this line of analysis to sentences like (16-a), where a relative clause with a collective predicate co-occurs with an apparent quantifier conjunction. Given a parse with and_{sum_pred}, (16-a) would paraphrase: "for every student-professor sum whose atoms saw one another, the atoms had a nice conversation." (16-b), minimal to (14-b), may receive a parallel analysis: "for every student-professor sum, the atoms of that sum met one another".

(16) a. [Every student and every professor who saw one another] had a nice conversation.
b. [Every student and every professor] met.

Crucially, in examples without a collective predicate, there is still a demonstrably available parse which does *not* involve sums. If the mechanism for introducing sums in apparent quantifier conjunction interprets once a quantifier pronounced twice, a sum-related parse should be unavailable when *different* quantifiers occur in each conjunct. The deviance of (17), based on Moltmann (1992), is supportive. The relative clause must compose with a predicate of sums, but it does not find one.

(17) ?*[Every student and some professor who saw one another] had a nice conversation.

Unlike, as well as like, object quantifiers can occur between *and*, as in (18), furnishing an initial argument that object DP conjunctions allow a parse with logical conjunction, unrelated to sums. More direct evidence for a parse with logical *and* will surface as the paper unfolds. My concern, then, is with *that* parse. By H3, that parse must involve CR, and not direct DP conjunction.

(18) John saw every student and some professor.

Overall, the possibility of sum-forming conjunction operators does not affect the critical arguments in this paper, and I will not consider them further, focusing on parse(s) uncontroversially involving logical *and*.

1.5 Overview of the paper

Over the course of the paper, I will develop a series of theoretical and empirical arguments for CR. These provide conclusive evidence that there is an *available* CR analysis of (3-a), supporting H2 or H3 over H1. The final part of the paper provides evidence for the strengthened H3 over H2: not only is CR available, but a range of data are most straightforwardly understood if the DP analysis is not also available. This subsection previews the plot in a skeletal fashion.

In Section 2, I develop the CR proposal by showing that a *v*P conjunction parse of (3-a) "follows for free" from syntactic mechanisms that have been independently proposed to account for different phenomena. In particular, I combine an idea in Wilder (1994) and Schwarz (1998, 1999, 2000) that CR involves the same mechanism as gapping with Johnson's (1996, 2009) syntax for gapping as *v*P conjunction (as in Toosarvandani 2013). The focus then shifts to three empirical case studies establishing that CR is available. **Case 1** (Section 3) involves apparent DP conjunctions with an adverbial phrase in the second conjunct, as in (19), after Collins (1988):

(19) Harvard invited Labov and, yesterday, Chomsky.

The only possible structure for (19) under the DP analysis is one with *yesterday* adjoined to the DP *Chomsky* in the second conjunct. I will provide evidence that *yesterday* cannot in general adjoin to DPs, supporting CR over the DP analysis for this example. **Case 2** (Section 4) directly diagnoses the presence of an unpronounced VP in a second apparent DP conjunct by demonstrating that this VP can serve as antecedent to license ellipsis of another elided VP. I consider examples like (20):

(20) Harvard invited Labov and, ten years after Brandeis did Δ, Chomsky.

The clause *ten years after Brandeis did* contains an elided VP, which is interpreted as *invited Chomsky*. According to CR, the second conjunct in (20) also contains the VP *invited Chomsky* (*Harvard invited Labov and, ten years after Brandeis ~~invited Chomsky~~, ~~(Harvard) invited~~ Chomsky.*), and this VP is the antecedent for Δ. I demonstrate that no antecedent is available under the DP analysis. **Case 3** (Section 5) argues that CR is available even when an adverbial is not present by demonstrating that scope readings are observed which CR predicts, but which the DP analysis fails to predict: in certain cases, *and* takes scope at a different height than the DPs it apparently conjoins, which is not predicted if *and* directly conjoins those DPs. Each of Cases 1-3 constitutes an argument that CR is available, but they cannot rule out that the DP analysis is available as well. Finally, **Case 4** (Section 6) presents further scope data which are most straightforwardly understood if the DP analysis is unavailable. CR predicts the scope data, while the DP analysis, if available, would prima facie over-generate unattested scope readings.

In building a case for CR, this paper supports a line of investigation in Schein (1992, 2017), which provides a defense for the idea that *and* is uniformly interpreted as ∧. Schein's approach relies on each DP being associated with a type t meaning, and a theory of the syntax/semantics interface where interpretation involves translation into a logical language with event pronouns. Roughly, (3-a) would paraphrase: "for every student x and every professor y, there's an event in which x is a participant and there's an event in which y is a participant and these events are all events of John seeing". The underlined portions are what overt *and* conjoins. This paper attempts to revive CR in a more traditional compositional framework. Of course, Schein's system was designed to account for a broader set of cases than I will be able to address here, including collective predication. If Schein's system proves superior, I believe the conclusions in this paper could be incorporated into that system, as well.

2 From gapping to conjunction reduction

What is the syntactic analysis of (3-a) such that *and* conjoins *v*Ps, and how is the observed surface string derived? As a point of departure, compare the example in (3-a), repeated as (21-b), to the example in (21-a), which involves gapping.

(21) a. John saw every student and Mary every professor. *Gapping*
b. John saw every student and every professor. *(3-a)*

There is a descriptive parallel between (21-a) and (3-a). These examples are interpreted as parallel to (22-a) and (22-b) — but material is left unpronounced.

(22) John saw every student and {(a) Mary, (b) John} saw every professor.

In (21-a), there is only one pronounced occurrence of the verb *saw*, and in (3-a), there is only one pronounced occurrence of both the subject *John* and the verb *saw*. Thus, the only difference is in whether there are two pronounced subjects (21-a), or one (3-a).

In early work on conjunction, gapping was derived via a separate transformational rule from CR (e.g. Ross 1967, 1970). Building on proposals in Wilder (1994) and Schwarz (1998, 1999, 2000), I argue, however, for a uniform analysis of both (21-a) and (3-a). In particular, I propose an explicit syntax for (3-a) based on Johnson's (1996, 2009) mechanism for gapping. This establishes the critical result of this section: that CR "follows for free" as an epiphenomenon of independent syntactic mechanisms.

2.1 Gapping

A number of analyses of gapping share the key proposal of Johnson (1996, 2009, after Siegal 1987) that gapping involves a conjunction of *v*Ps below a shared T (e.g. Coppock 2001, Lin 2001, 2002; see Johnson 2014 for a recent overview). The sentence in (21-a) has the structure in (23), where the *v*Ps *John saw every student* and *Mary saw every professor* are conjoined. The external argument in the first conjunct moves to spec-TP, as in (24).[5]

(23) **Step 1: *v*Ps are conjoined**
[$_{TP}$ T [$_{vP}$ John saw every student] [and [$_{vP}$ Mary saw every professor]]]]

(24) **Step 2: *John* moves to spec-TP out of the left conjunct**
[$_{TP}$ John$_1$ T [$_{vP}$ t$_1$ saw every student] [and [$_{vP}$ Mary saw every professor]]]]

While the remaining steps of the derivation differ between analyses, the choice between alternative proposals does not play a crucial role in the present paper, so I will adopt an analysis which allows for the most straightforward exposition. Following Coppock (2001) and Lin (2002), the derivation of the surface string in (21-a) involves VP ellipsis in the right conjunct. *Every professor* moves out of the VP (Step 3)[6], and the VP elides (Step 4).

(25) **Step 3: *every professor* moves out of the VP**
[$_{TP}$ John$_1$ T [$_{vP}$ t$_1$ saw every student] [and [$_{vP}$ Mary [$_{VP}$ saw t$_2$] every professor$_2$]]]

(26) **Step 4: the VP elides**
[$_{TP}$ John$_1$ T [$_{vP}$ t$_1$ saw every student] [and [$_{vP}$ Mary [$_{VP}$ ~~saw t$_2$~~] every professor$_2$]]]

2.1.1 Spelling out Steps 3 and 4

Before continuing on to discuss CR, two issues about the gapping analysis presented require additional comment. The assumptions I make will recur in exposition throughout the paper. First: what is the nature of the movement in Step 3? I assume that movement to escape the ellipsis domain does not affect semantic interpretation. This is empirically supported by (27), which shows that the remnant DP may contain an NPI (after Weir 2014, who focuses on fragment answers):

[5] The structure in Step 2 appears to violate the Coordinate Structure Constraint (CSC; Ross 1967), but Johnson controversially suggests that A-movement is immune to the CSC. For further discussion of this issue, see e.g. Lin (2001, 2002).

[6] I show movement here as rightward, but if movement targets the VP edge, below *Mary*, it could be leftward.

(27) a. John refused to see any student, and Mary any professor.

b. [$_{TP}$ John$_1$ T [$_{vP}$ t$_1$ refused to see any student]
[and [$_{vP}$ Mary [$_{VP}$ refused to see t$_2$] any professor$_2$]]]

Any professor must move out of the scope of *refuse* to escape the ellipsis domain, as in (27-b), but must be in the scope of *refuse* at LF for the NPI to be licensed. The movement must, therefore, either occur in the narrow syntax and at least optionally reconstruct at LF, or occur at PF. Either way, LF need not see the movement. I adopt the PF approach, building on Weir (2014). Weir's idea is that movement is motivated at PF as a last-resort option to satisfy a constraint prohibiting ellipsis of a focused constituent. Such a constraint may be formulated as (28):

(28) *ELIDEDFOCUS
An F-marked constituent must not be elided.

In (21-a), *every student* and *every professor* are contrastive foci. In order to respect the constraint in (28), *every professor* must move out of the VP to escape ellipsis. Hence, Steps 3-4 both take place at PF.

The second issue has to do with how VP ellipsis is licensed. In general, licensing of VP ellipsis requires the linguistic context to provide an "appropriate antecedent" for the elided VP. The question arises: where is the antecedent for the elided VP in gapping? To address this, we must define what constitutes an "appropriate antecedent". One idea in the ellipsis literature holds that the antecedent for an elided VP must have an identical semantic value to the elided VP under any variable assignment (after Sag 1976, Williams 1977). Recent work has modified this condition in two ways (Rooth 1992, Tancredi 1992, Fox 1999, Takahashi & Fox 2005). First: parallelism is optionally evaluated not relative to VP$_e$ itself, but rather relative to a larger constituent which contains VP$_e$. And, second: the identity requirement is made sensitive to focus. Takahashi & Fox (2005) re-state the Parallelism Condition as (29), based on Rooth (1992):

(29) **Parallelism condition**

a. VP$_e$ can elide if VP$_e$ is reflexively dominated by a constituent PD, and the linguistic context provides an antecedent AC for PD which is semantically identical to PD, modulo focused marked constituents.

b. PD is semantically identical to AC modulo focus if there is a focus alternative to PD, PD$_{Alt}$, such that for every assignment function g, $[\![\text{PD}_{Alt}]\!]^g = [\![\text{AC}]\!]^g$.
(PD = parallelism domain, AC = antecedent constituent)

I will adopt the Parallelism Condition in (29) and assume that, while ellipsis takes place at PF, the Parallelism Condition is checked at LF (in the spirit of Merchant 2001, 2004).

Now, consider gapping.[7] Since parallelism is checked at LF, the relevant structure is (30). *Every student* and *every professor* are QR-ed to positions where they can be interpreted and, to facilitate exposition, *John* is reconstructed into the left *v*P.[8]

[7] Note that Coppock (2001) offers an alternative account for licensing of ellipsis in gapping based on the theory of Merchant (2001, 2004). Again, the choice between proposals is not crucial.

[8] I assume Heim's (1997) constraint in (i). Applied to (30), this prevents the trace of *every student* in the left conjunct and the trace of *every professor* in the right conjunct from being accidentally co-indexed.

(30) [T [$_{vP1}$ every student$_F$ λ1 [John$_F$ [$_{VP1}$ saw t_1]]]
[and [$_{vP2}$ every professor$_F$ λ2 [Mary$_F$ [$_{VP2}$ saw t_2]]]]]]

Suppose the elided VP itself were the PD. Then, the AC would have to be the VP in the first conjunct, *saw* t_1. But, for any variable assignment g for which g(1) $\neq$ g(2), *saw* t_1 and *saw* t_2 have distinct semantic values — so, ellipsis would not be licensed. Since the VP is reflexively dominated by vP$_2$, vP$_2$ is also a possible PD, however. vP$_2$ is informally *Mary saw every professor* and, with *Mary* and *every professor* focused, alternatives to vP$_2$ are propositions of the form *that x saw y*. *That John saw every student* is such a proposition — and is the one expressed by vP$_1$. With vP$_2$ the PD and vP$_1$ the AC, ellipsis is licensed.

2.2 From gapping to conjunction reduction

We can now bridge gapping and CR. The mechanism for gapping just presented can derive the surface string in (3-a), with one minor modification. The derivation for CR begins as the derivation for gapping did: *v*Ps are conjoined below a shared T. The difference from the gapping derivation lies in the subject of the *v*Ps. In gapping, the left *v*P had *John* as its subject and the right *v*P had *Mary*. Here, the subject of both *v*Ps is *John*.

(31) **Step 1: *v*Ps are conjoined**
[$_{TP}$ T [$_{vP}$ John saw every student] [and [$_{vP}$ John saw every professor]]]]

This difference in subjects impacts the second step of the derivation. In gapping, *John* moved to spec-TP out of the first conjunct, while *Mary* remained in situ in the second conjunct. In the present derivation, *John* undergoes across-the-board ('ATB') movement out of both conjuncts.[9] After ATB movement, the subject is pronounced only once.

(32) **Step 2: *John* ATB moves to spec-TP out of both conjuncts**
[$_{TP}$ John$_1$ T [$_{vP}$ t_1 saw every student] [and [$_{vP}$ t_1 saw every professor]]]]

The PF steps of the derivation then proceed exactly as they did before to derive the surface string. *Every professor* moves out of the VP in the right conjunct (Step 3), and ellipsis takes place (Step 4).

(33) **Step 3: *every professor* moves out of the VP**
[$_{TP}$ John$_1$ T [$_{vP}$ t_1 saw every student] [and [$_{vP}$ t_1 [$_{VP}$ saw t_2] every professor$_2$]]]

(34) **Step 4: the VP elides**
[$_{TP}$ John$_1$ T [$_{vP}$ t_1 saw every student] [and [$_{vP}$ t_1 [$_{VP}$ ~~saw t_2~~] every professor$_2$]]]

(i). **No Meaningless Co-indexing**
If an LF contains an occurrence of a variable *v* that is bound by a node α, then all occurrences of *v* in this LF must be bound by the same node α.

[9] A parallel derivation with ATB-movement was proposed for certain cases of co-ordination with corrective *but* in Toosarvandani (2013) (e.g. *Max does not eat chard but Spinach.*). Johnson (2002, ex. 18) also considered such a derivation for certain coordinations in German, but rejected the analysis for those cases in part because it incorrectly predicts scope facts. Sections 5 and 6 demonstrate, however, that this analysis does correctly capture a range of scope facts for the English apparent DP conjunctions under consideration here. Note that I am not claiming that this analysis is the only CR mechanism across constructions; questions remain as to the full range of CR mechanisms and their distribution (see Section 7.1).

To re-iterate, there is only one mechanical difference between the derivation for gapping given in the preceding subsection and the derivation for CR given here: ATB movement of the subject takes place in the latter derivation, but not the former. Given that ATB movement is a mechanism independently required in the grammar, the CR derivation "follows for free" from the availability of gapping.

2.3 Local summary

Under the proposed CR analysis of (3-a), what appears to be DP conjunction is in fact *v*P conjunction. The subject *John* is pronounced only once due to ATB movement, and the verb *saw* is pronounced only once due to VP ellipsis, with *every professor* a remnant. Given a *v*P co-ordination structure, *and* can compose with its basic meaning. Having established that CR follows for free from independent syntactic mechanisms, the question becomes: is there empirical evidence that CR is, in fact, available? The next three sections identify data that CR can account for, but the DP analysis cannot. In providing empirical arguments that CR is available, this paper adds to observations for different constructions or languages in Schwarz (1998, 2000) on German *und*[10]; Schwarz (1999, 2000) on *either ... or*; Vicente (2010) and Toosarvandani (2013) on corrective *but*; and Aoun, Benmamoun, & Sportiche (1994, 1999) on conjunction in Labanese and Moroccan Arabic; among other work.

3 Case 1: Adverbs

It has been observed that an adverb can occur in a second apparent DP conjunct, as in (35), which involves the temporal adverb *yesterday* (after Collins 1988). This section argues that data such as (35) require CR.

(35) John saw Labov and, yesterday, Chomsky.

3.1 The insufficiency of the DP analysis

Omitting *yesterday*, the DP analysis assigns to (35) the structure in (36), where *and* directly conjoins the DPs *Labov* and *Chomsky*. There are two ways that the adverb could integrate into the structure — and, as we will see, neither is viable.

(36) **Structure for (35) under the DP analysis (adverb omitted)**
[$_{TP}$ John$_1$ [$_{vP}$ t$_1$ saw [$_{\&P}$ [$_{DP}$ Labov] [and [$_{DP}$ Chomsky]]]]]

[10]Schwarz (1998) argued for a gapping analysis of German data like (i), where *Äpfel* fronts in V2 stranding the determiner *drei*.

(i.) Äpfel ißt der Hans drei und zwei Bananen.
apples eats the H. three and two bananas
'Hans eats three apples and two bananas.'

Whereas the present paper adopts a syntax for gapping as *v*P conjunction, Schwarz adopts a syntax for gapping as full clausal conjunction. *Äpfel* undergoes A'-movement to a clause-peripheral position; assuming, as Schwarz argues for, that this movement is sensitive to the CSC, for the CSC to be respected, coordination must be high enough to include the landing site of *Äpfel* in the first conjunct. For an alternative approach which analyzes (i) as lower coordination with obviation of the CSC, see Johnson (2002) with the caveat in fn. 9. I leave reconciling the proposed analyses of coordinations like (i) with the present proposal for future research.

3.1.1 Adverb adjoins to *v*P or TP

The first possibility is that *yesterday* adjoins on the clausal spine to the *v*P or TP, as in (37), where *yesterday* adjoins to the TP. To derive the observed word order, *Chomsky* must extrapose out of the conjunction to adjoin above the adverb.

(37) ***Yesterday* adjoined on the clausal spine**
[$_{TP}$ [$_{TP}$ [$_{TP}$ John saw Labov and t_2] yesterday] [$_{DP}$ Chomsky]$_2$]

We can readily exclude this structure on syntactic and semantic grounds. Syntactically, extraposition violates the Coordinate Structure Constraint, since *Chomsky* moves out of one conjunct.[11] Semantically, the structure in (37) does not derive the right meaning for (35). In (37), *yesterday* takes scope over the entire conjunction, so the predicted meaning is that John seeing Labov and John seeing Chomsky both took place yesterday. That is, (35) should be equivalent to (38), where *yesterday* unambiguously attaches on the clausal spine and both (38-a) and (38-b) are entailed.

(38) Yesterday, John saw Labov and Chomsky.
a. $\Rightarrow$ John saw Labov yesterday.
b. $\Rightarrow$ John saw Chomsky yesterday.

Intuitively, however, (35) says that John saw Chomsky yesterday, but leaves open when in the past John saw Labov. The entailment pattern is the one below, different from (38). To capture this, *yesterday* must scope just over the second conjunct in (35), ruling out (37).

(35) John saw Labov and, yesterday, Chomsky.
a. $\not\Rightarrow$ John saw Labov yesterday.
b. $\Rightarrow$ John saw Chomsky yesterday.

3.1.2 Adverb adjoins to the DP in the second conjunct

To scope over the second conjunct, *yesterday* must attach within that conjunct. Because the second conjunct is just the DP *Chomsky*, this means that *yesterday* must adjoin to that DP. The second possible structure for (35) under the DP analysis is thus:

(39) ***Yesterday* adjoined to the DP in the second conjunct**
[$_{TP}$ John$_1$ [$_{vP}$ t_1 saw [$_{\&P}$ [$_{DP}$ Labov] [and [$_{DP}$ yesterday [$_{DP}$ Chomsky]]]]]]

This structure too can be ruled out, however, since there is syntactic evidence that *yesterday* cannot licitly adjoin to DPs.[12] To establish this, we must consider the distribution of *yesterday* outside of conjunction.

[11] Extraposition is A'-movement, rather than A-movement, so should be subject to the CSC (see fn. 5).

[12] At first blush, (39) may seem straightforward to dismiss on semantic grounds: *yesterday* cannot compose with *Chomsky*, so the DP *invited Chomsky* is uninterpretable. This is not clear, however. For illustration, I will gloss over the details of how temporal adverbs are interpreted and make the simplifying assumption that *yesterday* is a propositional modifier (type <st,st>) in an example like (i). (In this footnote, it is useful to consider the intensions of all nodes, rather than their extensions.)

(i). Yesterday, John invited Chomsky.

In general, *yesterday* has a distributional profile whereby it productively attaches on the clausal spine, but cannot precede a DP, as the data in (40) illustrate:

(40) a. Yesterday, John saw Chomsky. *(on clausal spine)*
b. ??John saw yesterday Chomsky. *(pre-DP)*

(41) a. Yesterday, John saw you.
b. ?*John saw yesterday you.

(42) a. Yesterday, John flew off to Paris.
b. ?*John flew off to yesterday Paris.

Since the (b) examples are deviant, it must be that they cannot be parsed with the structures in (43), where *yesterday* integrates into the DPs *Chomsky*, *you*, and *Paris* as an adjunct. I take this as evidence that *yesterday* is simply unable to adjoin to these DPs.

(43) a. $[_{TP}$ John$_1$ $[_{vP}$ t_1 saw $[_{DP}$ yesterday $[_{DP}$ Chomsky]]]] *(40-b)*
b. $[_{TP}$ John$_1$ $[_{vP}$ t_1 saw $[_{DP}$ yesterday $[_{DP}$ you]]]] *(41-b)*
c. $[_{TP}$ John$_1$ $[_{vP}$ t_1 flew off $[_{PP}$ to $[_{DP}$ yesterday $[_{DP}$ Paris]]]]] *(42-b)*

Of course, there are cases where *yesterday* can precede a DP outside of conjunction, as in (44), but these are amenable to a different analysis where Adv+DP is not a constituent:

(44) a. Yesterday, John saw the happy professor with white hair.
b. John saw yesterday the happy professor with white hair.

As originally proposed in Ross (1967), (44-b) has the derivation in (45), where *yesterday* adjoins on the clausal spine and *the happy professor with white hair* extraposes above it. An extraposition derivation is syntactically and semantically viable in this datum.

(45) $[[[_{TP}$ John saw $t_2]$ yesterday$]$ $[_{DP}$ the happy professor with white hair$]_2]$

Ross and later authors proposed that extraposition is available only under restricted conditions. First, the DP must be sufficiently "heavy", i.e. of sufficient syntactic complexity or prosodic weight (also Kayne 1998 *i.a.*; for experimental evidence, Hawkins 1990, 1994, Stallings & MacDonald 1998, Wasow & Arnold 2003). And second, extraposition must not strand a preposition (also Bresnan 1976, Stowell 1981). Due

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The generalized type-ambiguity of Rooth (1985) makes it possible to define a variant of *yesterday* of type <<est,st>,<est,st>> so that *yesterday* can compose with a generalized quantifier.

(ii). $[\![\text{yesterday}_2]\!] = \lambda Q_{est,st} . \lambda f_{e,st} . \lambda w . [\![\text{yesterday}]\!](Q(f))(w)$

Then, it can compose with *Chomsky* in (39), provided that *Chomsky* shifts from type e to type <est,st> ($[\![\text{Chomsky}_2]\!]$; cf. the "lift" operation; e.g. Montague 1970, Partee & Rooth 1983, Partee 1987). The output of applying $[\![\text{yesterday}_2]\!]$ to $[\![\text{Chomsky}_2]\!]$ is a new quantifier meaning (type <est,st>). To interpret the rest of the structure, *Labov* would also have to lift, and the DP *Labov and yesterday Chomsky* would have to QR:

(iii). $[[_{DP}$ Labov and yesterday Chomsky$]$ $\lambda 2$ $[_{TP}$ John $\lambda 1$ $[_{\&P}$ $[_{vP}$ t_1 saw $t_2]]]]$

The LF in (iii) is interpretable and corresponds to the intuitively correct meaning for the sentence. Since (39) may be semantically viable, I argue against (39) on syntactic, rather than semantic grounds.

to the first constraint, this kind of extraposition has been called "Heavy NP Shift". In (44-b), Heavy NP Shift is licensed, since *the happy professor with white hair* is heavy and there is no preposition stranding. In (40-b), (41-b), and (42-b) above, one or both constraints fail: *Chomsky*, *you*, and *Paris* are all light, and extraposition of *Paris* in (42-b) would strand a preposition. With Heavy NP Shift blocked, the earlier data thus isolate a possible parse where Adv+DP is a constituent and their deviance shows that such a parse is unavailable, as discussed.

We now turn back to conjunction. The structure under consideration for (35) is repeated below. Having shown that *yesterday* cannot in general adjoin to DPs, we must conclude that this structure is not viable.

(39) ***Yesterday* adjoined to the DP in the second conjunct: ruled out**
[$_{TP}$ John$_1$ [$_{vP}$ t$_1$ saw [$_{\&P}$ [$_{DP}$ Labov] [and [$_{DP}$ yesterday [$_{DP}$ Chomsky]]]]]]

To make this sharper, compare (40-b) and (35) directly: *yesterday* can precede *Chomsky* in a second conjunct, but not outside conjunction. Since *yesterday* cannot adjoin to *Chomsky* in (40-b), *yesterday* must not be adjoining to *Chomsky* in (35) either.

(46) a. ??John saw yesterday Chomsky. *= (40-b)*
b. John saw Labov and yesterday Chomsky. *= (35)*

Minimal pairs building on (41-b) and (42-b) make the same point. Since Adv+DP is not a licit constituent in (41-b) and (42-b), Adv+DP must not constitute a constituent in the conjunction counterparts either.

(47) a. ?*John saw yesterday me. *= (41-b)*
b. John saw me and yesterday you.

(48) a. ?*John flew off to yesterday Paris. *= (42-b)*
b. John flew off to Marseilles and yesterday Paris.

Overall, the DP analysis does not provide any viable structure for conjunction data with *yesterday*. If *yesterday* attaches on the clausal spine, the wrong meaning results (Section 3.1.1), and if it scopes within the second conjunct, it illictly attaches to a DP (Section 3.1.2).

3.2 The CR analysis

CR attributes to (35) the structure in (49), where the *v*Ps *saw Labov* and *saw Chomsky* are conjoined, and *yesterday* adjoins to the *v*P in the second conjunct:

(49) **CR structure for (35)**
[$_{TP}$ John$_1$ [$_{\&P}$ [$_{vP}$ t$_1$ saw Labov] [and [$_{vP}$ yesterday [$_{vP}$ t$_1$ saw Chomsky]]]]]

Now, the structure is viable. *Yesterday* scopes within the second conjunct, so the right meaning is derived — and it attaches on the clausal spine within that conjunct. With CR, the second conjunct is not just the DP *Chomsky*, but rather contains *v*P structure able to licitly host the adverb. In turn, all of the contrasts in (46)-(48) above are explained. The (a) examples must be parsed with *yesterday* illicitly DP-adjoined, while conjunction in the (b) examples furnishes a hidden *v*P, yielding licit *v*P-adjunction of *yesterday*:

(46) a. *[$_{TP}$ John$_1$ [$_{vP}$ t$_1$ saw [$_{DP}$ yesterday [$_{DP}$ Chomsky]]]]
b. ✓[$_{TP}$ John$_1$ [$_{\&P}$ [$_{vP}$ t$_1$ saw Labov] [and [$_{vP}$ yesterday [$_{vP}$ t$_1$ saw Chomsky]]]]]

(47) a. *[$_{TP}$ John$_1$ [$_{vP}$ t$_1$ saw [$_{DP}$ yesterday [$_{DP}$ you]]]]
b. ✓[$_{TP}$ John$_1$ [$_{\&P}$ [$_{vP}$ t$_1$ saw me] [and [$_{vP}$ yesterday [$_{vP}$ t$_1$ saw you]]]]]

(48) a. *[$_{TP}$ John$_1$ [$_{vP}$ t$_1$ flew off to [$_{DP}$ yesterday [$_{DP}$ Paris]]]]
b. ✓[$_{TP}$ J$_1$ [$_{\&P}$ [$_{vP}$ t$_1$ flew off to Mars.] [and [$_{vP}$ yesterday [$_{vP}$ t$_1$ flew off to Paris]]]]]

3.3 Local summary

This section argued that certain examples with an adverb preceding a DP in conjunction must be analyzed with CR: the adverb scopes over the second conjunct, and the *v*P structure associated with CR is required to provide a suitable host for the adverb within that conjunct.

4 Case 2: VP-Ellipsis

To re-iterate, the most fundamental syntactic difference between CR and the DP analysis has to do with how much structure is present in a second apparent DP conjunct. For the example in (50), the CR structure is (50-a), with a *v*P present in the second conjunct, while the structure under the DP analysis is (50-b), with only a DP present.

(50) Harvard invited Labov and Chomsky.
a. [$_{TP}$ Harvard$_1$ T [$_{vP}$ t$_1$ invited Labov] [and [$_{vP}$ t$_1$ invited Chomsky]]]
b. [$_{TP}$ Harvard$_1$ T [$_{vP}$ t$_1$ invited [$_{\&P}$ [$_{DP}$ Labov] [and [$_{DP}$ Chomsky]]]]]

The goal now is to directly probe for *v*P structure in the second conjunct using an ellipsis-based diagnostic. As discussed in Section 2, VP ellipsis is licensed only when an appropriate antecedent for the elided VP is present in the linguistic context. I will demonstrate that the VP in the second conjunct in the CR structure — *invited Chomsky* in (50-a) — can serve as antecedent to license ellipsis of another VP. If *invited Chomsky* is an available antecedent, the extra structure associated with CR must be available.

4.1 VP ellipsis supportive of CR

Consider the data in (51). These examples bear a similarity to those in Section 3 in that an adverbial is present in the second conjunct. Instead of a *simple adverb*, however, there is now a *complex adverbial clause*. The critical feature is that the VP in the adverbial clause is elided. (51-a) is a minimal counterpart to (50), and (51-b) has a parallel profile.[13]

(51) a. Harvard invited Labov and, ten years after Brandeis did Δ, Chomsky.
b. John resembles his mother and, though he would rather not Δ, his father.

[13] I am indebted to Irene Heim and David Pesetsky (p.c.) for their help constructing these data.

Observe that the elided VP in the adverbial clause in each example (Δ) is most naturally interpreted as the result of adding a verb to the second apparent DP conjunct. In (51-a), Δ is most naturally interpreted as *invited Chomsky*, and in (51-b), Δ is most naturally interpreted as *resembles his father*. This is captured in the paraphrases in (52) and (53).

(52) Harvard invited Labov and — ten years after Brandeis invited Chomsky — Harvard invited Chomsky, too.

(53) John resembles his mother and his father — though he would rather not resemble his father.

Intuitively, the sentences in (51) do not require an *extra-sentential* antecedent to license ellipsis of *invited Chomsky* or *resembles his father*: the sentences are perfectly felicitous out of the blue. It must be, therefore, that an appropriate antecedent is present *intra-sententially*, just like in gapping. The VP in the second conjunct in the CR structures for (51-a) and (51-b) provides the necessary intra-sentential antecedent.

Illustrating with (51-a), the CR-based LF is (54), where the *v*Ps *invited Labov* and *invited Chomsky* are conjoined, and the adverbial clause adjoins to the *v*P in the second conjunct. The internal structure of the adverbial clause is shown separately in (54-b).

(54) **CR structure for (51-a)**

a. $[_{TP}$ H λ1 $[_{\&P}$ $[_{vP}$ t_1 invited L] [and $[_{vP}$ $[_{CP}$ ...(54-b)...] $[_{vP}$ t_1 $[_{VP}$ ~~invited~~ Chomsky]]]]

b. $[_{CP}$ ten years after $[_{TP}$ Brandeis_F λ2 $[_{vP}$ t_2 $[_{VP}$ ~~invited Chomsky~~ Δ]]]]

As in Section 2, I assume that ellipsis is licensed according to the Parallelism Condition in Takahashi & Fox (2005) (cf. (29)). Suppose in (54) that Δ itself — *invited Chomsky* in (54-b) — is the PD. Since *invited Chomsky* elides in its entirety, given *ELIDEDFOCUS, it must be that *invited Chomsky* does not contain a focused element. The only focus alternative to *invited Chomsky* is, therefore, itself. It is no mystery, then, where the AC comes from: the AC is the VP *invited Chomsky* present in the second conjunct in (54-a). Accordingly, the VP *invited Chomsky* elides in the adverbial clause under identity with the VP *invited Chomsky* in the second conjunct. Assuming, as I have, that CR involves ellipsis of the VP in the second conjunct, note that the VP that serves as antecedent for Δ is itself elided with *Chomsky* its only pronounced remnant. On the assumption made in Section 2 that parallelism is evaluated at LF and ellipsis takes place at PF, ellipsis does not affect satisfaction of parallelism.

4.2 The DP analysis cannot account for observed VP ellipsis

To make clear that data like (51) constitute an argument for CR, we must consider how (51) would be treated under the DP analysis. Omitting the adverbial clause, the DP analysis attributes to (51-a) the structure in (55), repeated from (50-b):

(55) **Structure for (51-a) under the DP analysis**
Harvard $[_{VP}$ invited $[_{\&P}$ $[_{DP1}$ Labov] [and $[_{DP2}$ Chomsky]]]]

As seen in Section 3 with *yesterday* in (35) (*John saw Labov and, yesterday, Chomsky*), there are, in principle, two possibilities for where the adverbial clause in (51-a) could attach given the structure in (55): the adverbial clause could adjoin to the *v*P or TP on the clausal spine, or it could adjoin to the DP in the

second conjunct. I argued in Section 3 that neither analysis was viable and the arguments extend without modification to (51-a). Nevertheless, I here provide an additional independent argument against the DP analysis for (51-a) by focusing on the observed ellipsis in the adverbial clause: the interpretation of Δ as *invited Chomsky* is incompatible with the DP analysis. Without the extra structure associated with CR, there is no appropriate antecedent to license ellipsis of *invited Chomsky*.[14]

4.2.1 The adverbial clause adjoins to *v*P or TP

A possible structure for (51-a) with the adverbial clause adjoined on the clausal spine is (56). The adverbial clause is adjoined to the TP above the conjunction, and *Chomsky* extraposes out of the conjunction to adjoin above the adverbial clause, deriving the right word order.

(56) a. $[_{TP}\ [_{TP}\ [_{TP}$ Harvard invited Labov and $t_1][_{CP}$ ...(56-b)...]] Chomsky$_1$]
b. $[_{CP}$ ten years after $[_{TP}$ Brandeis$_2$ T $[_{vP}\ t_2$ ~~invited Chomsky~~ Δ]]]

Ellipsis of *invited Chomsky* is not licensed in (56). The LF is (57), under the assumption that *Chomsky* reconstructs into the matrix VP:

(57) a. $[_{TP}\ [_{TP}$ Harvard $\underline{[_{VP}$ invited Labov and Chomsky$]}[_{CP}$ ...(57-b)...]]]
b. $[_{CP}$ ten years after $[_{TP}$ Brandeis$_F$ $\underline{[_{VP}$ invited Chomsky$]}$]]]

Take the PD to be the VP *invited Chomsky*. The only VP present which can serve as the AC is the matrix VP containing the conjunction: the VP *invited Labov and Chomsky*. Since *invited Labov and Chomsky* is not semantically identical to *invited Chomsky*, parallelism is not satisfied and ellipsis of *invited Chomsky* is not licensed. A similar problem arises for any other PD that could be chosen.[15]

Note that there is also a second, empirical way of showing that ellipsis in (51-a) is incompatible with (56). Consider a counterpart to (51-a) with the adverbial clause clearly taking scope above the conjunction:

[14]The argument from Section 3.1 against the adverbial clause adjoining on the clausal spine does carry over to (51-a) — but note that it does not carry over to (51-b). To illustrate, suppose that Δ could be interpreted as *invited Chomsky* in (51-a) and *resembles his father* in (51-b). With the adverbial clause scoping above the conjunction, (51-a) would be predicted to be equivalent to (i), where the adverbial clause takes wide scope.

(i). Ten years after Brandeis invited Chomsky, Harvard invited Labov and Chomsky.

(i) is not, however, parallel to (51-a): whereas (i) says that Harvard invited each of Labov and Chomsky ten years after Brandeis invited Chomsky, (51-a) leaves open when in the past Labov was invited and says only that Chomsky was invited ten years after his Brandeis invitation. The adverbial must take scope in the second conjunct. (51-b) is not, however, clearly distinguishable from:

(ii). Though John would rather not resemble his father, he resembles his mother and his father.

The new argument provided below is illustrated with (51-a), but extends to (51-b): the DP analysis is not, in fact, compatible with Δ being interpreted as *invited Chomsky* in (51-a) or *resembles his father* in (51-b).

[15]In principle, parallelism could be satisfied if the DP *Labov and Chomsky* QR-ed out of the matrix VP and the DP *invited Chomsky* QR-ed out of the VP in the adverbial clause:

(i). a. $[_{TP4}\ [_{TP3}\ [\underline{_{TP2}\ [_{TP1}}$ Harvard $[_{VP}$ invited $t_1]]\ \lambda 1]\ [_{DP}$ Labov and Chomsky]] $[_{CP}$ ...(57-b)...]]
b. $[_{CP}$ ten years after $[_{TP7}\ \underline{[_{TP6}\ [_{TP5}}$ Brandeis$_F$ $[_{VP}$ invited $t_2]]\ \lambda 2]\ [_{DP}$ Chomsky]]]

The PD would be TP_6 (focus alternatives of the form λx . *y invited x*, where *y* is a replacement of *Brandeis*) and the AC would be TP_2 (denoting λx . *Harvard invited x*). If this strategy were available, however, it would be unclear how to constrain the interpretation of Δ: ellipsis of any VP of the form *invited y* could similarly be licensed by QR-ing *y* out of the VP in the adverbial clause at LF. I will assume the following correspondence between ellipsis at PF and evaluation of parallelism at LF: any element which elides at PF must be included in the PD at LF. Since *Chomsky* in (51-a) elides, it must be included in the PD, contrary to the case in (i).

(58) Ten years after Brandeis did Δ, Harvard invited Labov and Chomsky.

There is a strong preference for Δ in (58) to be interpreted as *invited Labov and Chomsky*, rather than just *invited Chomsky*, contrary to the intuition in (51-a). In fact, there appears to be a generalization that when the adverbial clause scopes above the antecedent and the antecedent contains a conjunction, Δ is most naturally interpreted as also containing that conjunction. The intuition replicates with *v*P conjunction:

(59) Ten years after Brandeis did Δ, H. fired its president and dismissed its chancellor.

This example conveys that Harvard fired its president and dismissed its chancellor ten years after Brandeis did the same two things: there is a preference for Δ to be *fired its president and dismissed its chancellor*, rather than just *fired its president* or just *dismissed its chancellor*.[16] Given the intuition in (58) and the broader generalization, the readily available interpretation of Δ as *invited Chomsky* in (51-a) is not consistent with the adverbial clause taking scope above the conjunction.

4.2.2 The adverbial clause adjoins to the DP in the second conjunct

The remaining option under the DP analysis has the adverbial clause adjoin within the second conjunct to DP_2. Given the structure in (60), there is a problem of antecedent containment.

(60) **Adverbial clause adjoined within the second conjunct**

a. Harvard$_1$ [$_{VP}$ invited [$_{\&P}$ [$_{DP1}$ Labov] [and [[$_{CP}$ ...(60)...] [$_{DP2}$ Chomsky]]]]]

b. [$_{CP}$ ten years after [$_{TP}$ Brandeis [$_{VP}$ ~~invited Chomsky~~ Δ]]]

To illustrate, suppose that the PD is the elided VP. The only VP available to serve as antecedent for Δ is again the matrix VP. With the adverbial clause adjoined within the &P, however, the matrix VP is now *invited Labov and, ten years after Brandeis did* Δ*, Chomsky*, and so properly contains Δ. Since two VPs cannot be identical if one properly contains the other, the matrix VP cannot serve as antecedent for Δ.

The problem of antecedent contained ellipsis (ACE) is familiar from examples like (61). The elided VP is contained in a relative clause (*which Eric did* Δ), which itself is contained within the DP object (*every town which Eric did* Δ) in the only VP available to serve as antecedent for the elided VP (*visited every town which Eric did* Δ).

(61) Polly visited every town (which) Eric did Δ. *(ex. due to Kennedy 1994)*

Since ellipsis is clearly licensed in (61), the grammar must make available ways to resolve ACE. One approach involves movement (e.g. Sag 1976). In (62), the DP *every town which Eric did* QRs to a position external to the matrix VP (movement is shown as rightward for convenience):

[16] Note that, at first blush, the observation in (58) appears inconsistent with CR, which attributes to (58) the structure in (i) and thus predicts *invited Chomsky* to be an available antecedent for Δ.

(i). a. [$_{TP}$ [$_{CP}$ ... (i-b) ...] [$_{TP}$ Harvard$_1$ T [$_{vP}$ t$_1$ invited Labov] [and [$_{vP}$ t$_1$ invited Chomsky]]]]

b. [$_{CP}$ ten years after [$_{TP}$ Brandeis$_1$ T [$_{vP}$ t$_1$ ~~invited Chomsky~~ Δ]]]

The broader generalization supported by (59) resolves this apparent objection to CR: even when *v*Ps are overtly conjoined, Δ includes the conjunction when the adverbial clause takes highest scope.

(62) **ACE resolves with QR**
[$_{TP3}$ [$_{TP2}$ [$_{TP1}$ Polly$_F$ [$_{VP}$ visited t$_1$]] λ1] [$_{DP}$ every town which Eric did Δ]]

The relative clause has the structure in (63), where *which* moves from the complement of *visit* to its pronounced position. *Eric* contrasts with *Polly* in the matrix clause, so is focused.

(63) **Structure for the relative clause**
[$_{CP}$ which [$_{TP5}$ λ2 [$_{TP4}$ Eric$_F$ [$_{VP}$ ~~visited~~ t$_2$]]]]

Take the PD to be TP_5, in which the trace in the elided VP is bound. Focus alternatives to TP_5 are predicates of the form λx . *y visited x*, where *y* is some replacement of Eric. TP_3 — the node in the matrix clause just below the landing site of the QR-ed DP — is an appropriate AC, as it denotes the predicate λx . *Polly visited x*. ACE is resolved, and ellipsis is licensed.

Is there a viable way to likewise resolve ACE in (60) to yield an interpretation of the elided VP in the adverbial clause as *invited Chomsky*? In fact, there is not. It is possible to resolve ACE by moving the DP *Labov and, ten years after Brandeis did* Δ*, Chomsky* to a position external to the matrix VP:

(64) **ACE resolves with QR of the &P**
a. [$_{TP}$ [$_{TP1}$ Harvard [$_{VP}$ invited t$_1$]] λ1 [$_{\&P}$ Labov and [$_{CP}$ ...(64-b)...] Chomsky]]
b. [$_{CP}$ ten years after [$_{TP}$ Brandeis$_F$ [$_{VP}$ ~~invited Chomsky~~ Δ]]]

This is not, however, sufficient to license ellipsis. Supposing that the PD is the elided VP, the only candidate AC remains the matrix VP, which is now *invited* t_1. This is not, however, an appropriate AC, since *invited* t_1 is not equivalent to *invited Chomsky* under any variable assignment g where g(1) $\neq$ Chomsky. A parallel problem arises with any other PD that could be chosen.

4.3 Local summary

The observed VP ellipsis in (51) directly supports CR: the VP in the right conjunct in the CR structure is necessary to provide an intra-sentential antecedent to license the observed VP ellipsis. The DP analysis, regardless of where the adverbial clause attaches — on the clausal spine, or to the DP in the second conjunct — is not compatible with the data.

5 Case 3: Split scope

Cases 1 and 2 both argue for CR by considering examples with an adverbial in the second conjunct, either a simple adverbial (*yesterday* in Case 1), or a complex adverbial clause (*ten years after Brandeis did* in Case 2). This leaves open the question: is CR generally available in the absence of an adverbial? I now argue that it is using a semantic diagnostic involving scope. I demonstrate that the conjunction *and* can take scope above an operator while the DPs *and* apparently conjoins scope below that same operator. These "split scope" readings are predicted with CR, but are not viably derived with direct DP conjunction.

5.1 The split scope signature

The sentence in (65) contains four scope-bearing operators: the conjunction (*and*), the two quantifiers (*any city in Europe* and *any city in Asia*), and the intensional predicate *refuse*. Of particular interest is the scope of the conjunction and the quantifiers relative to *refuse*.

(65) John refused to visit any city in Europe and any city in Asia.

The sentence in (65) is acceptable and has two entailments: (i) that John refused to visit any city in Europe, and (ii) that John refused to visit any city in Asia. This paraphrases as (66-a), and is stated more formally in (66-b), where *refuse* is a modal operator quantifying over worlds compatible with what John is willing to do in the evaluation world, W(John)(w_0).

(66) a. J refused to visit any city in Europe and he refused to visit any city in Asia.

b. $\neg\exists$w' $\in$ W(John)(w_0) [$\exists$x [x is a city in Europe in w' $\wedge$ J visits x in w']]
$\wedge \neg\exists$w" $\in$ W(John)(w_0) [$\exists$y [y is a city in Asia in w" $\wedge$ J visits y in w"]]

Under this reading, *and* and the quantifiers scope at different heights relative to *refuse*. On the one hand, *and* scopes above *refuse*, as the modalization contributed by *refuse* occurs separately in each conjunct. On the other hand, the quantifiers scope below *refuse*. This is required for NPI *any* to be licensed, and is clear from (66-b), as the existentials contributed by the quantifiers are interpreted de dicto within the scope of the universal modal in each conjunct. Hence, scope is "split": *and* > *refuse* > *any city in Europe, any city in Asia*. The split scope signature can be stated more generally:

(67) **Split scope signature**
And scopes above some operator, and the DPs *and* apparently conjoins scope below that same operator.

The split scope signature is not restricted to examples with NPIs, but rather recurs with a range of embedded nominals. Another datum is (68), due to Irene Heim (p.c.):

(68) This plant is easy to take care of! It needs little water and little sunlight.

Based on Büring (2007) and Heim (2007, 2008), I take it that the DPs decompose into a negation component and an existential component. Consider first (69), which isolates just the first conjunct of (68):

(69) This plant needs little water.

The most natural reading is (70-b). N(p)(w_0) is the set of worlds compatible with what the plant needs in the evaluation world, μ is a function mapping a mass to its quantity, and *n* is the contextual threshold for what minimally qualifies as a neutral amount of water. Paraphrasing, the sentence says: "the plant does *not* receive at least a neutral amount of water at every need-world". As is clear in (70), the negation scopes above *need*, while the existential component is de dicto, below *need*.

(70) $\neg\forall$w' $\in$ N(p)(w_0) [$\exists$x [x is water in w' $\wedge$ μ(x) $\geq$ n $\wedge$ the plant receives x in w']]

The original sentence in (68), then, is most naturally interpreted as (71). *And* takes scope above *need*, and within each conjunct, negation also scopes above *need*, while the existential component scopes below. That is, *and* takes highest scope, and the individual conjuncts each have the same profile as (70): "the plant does not receive at least a neutral amount of water at every need-world, and it does not receive at least a neutral amount of sunlight at every need-world."

(71) $[\neg\forall$w' $\in$ N(p)(w$_0$) [$\exists$x [x is water in w' $\wedge$ μ(x) $\geq$ n $\wedge$ p receives x in w']]
$\wedge$ [$\neg\forall$w" $\in$ N(p)(w$_0$) [$\exists$y [y is sunlight in w" $\wedge$ μ(y) $\geq$ n' $\wedge$ p receives y in w"]]

This reading, once again, instantiates the split scope signature: *and* scopes above *need* while a component of the DPs *and* seems to conjoin scopes below *need*.

Rooth & Partee (1982) observe a parallel sort of split scope with the disjunction in (72), which can be interpreted as (73). In (73), *or* scopes above *look for*, while *a maid* and *a cook* are interpreted de dicto in the scope of *look for*.

(72) John is looking for a maid or a cook.

(73) a. John is looking for a maid or he is looking for a cook.

b. $\forall$w' $\in$ L(j)(w$_0$) [$\exists$x [x is a maid in w' $\wedge$ John finds x in w']]
$\wedge$ $\forall$w" $\in$ L(j)(w$_0$) [$\exists$y [y is a cook in w" $\wedge$ John find y in w"]]

Rooth & Partee, however, suggested that conjunction does not allow split scope on the basis of (74-a), which lacks the reading in (74-b), where *and* scopes above *hope* and *a maid* and *a cook* scope below. An empirical contribution of this paper is to demonstrate that conjunction does in fact exhibit split scope. I will explain the absence of a split scope reading in example (74) later in the paper.

(74) a. John hopes that some company will hire a maid and a cook.
b. John hopes that some co. will hire a maid and he hopes that some co. will hire a cook.

5.2 The CR account

What is needed to derive split scope is a mechanism for the conjunction to take scope at a higher position than the quantifiers. CR offers such a mechanism. I illustrate with (65). For *and* to scope above *refuse*, the conjoined *v*Ps are *refused to visit any city in Europe* and *refused to visit any city in Asia*.

(75) **Ingredient 1 for split scope: *and* > *refuse***
[$_{TP}$ John λ1 T [$_{\&P}$ [$_{vP1}$ t$_1$ refused PRO to visit any city in Europe]
[and [$_{vP2}$ t$_1$ refused PRO to visit any city in Asia]]]]

The second ingredient for split scope is for the quantifiers to scope below *refuse*. This straightforwardly obtains if *any city in Europe* QRs to a position below *refuse* in the first conjunct and *any city in Asia* QRs to a position below *refuse* in the second conjunct.

(76) **Ingredient 2 for split scope: *refuse* > *any city in Europe, any city in Asia***
$[_{TP}$ J λ1 T $[_{\&P}$ $[_{vP1}$ t_1 refused $[_{TP}$ $[_{DP}$ any city in Europe] λ2 $[_{TP}$ PRO to visit $t_2]]]$
[and $[_{vP2}$ t_1 refused $[_{TP}$ $[_{DP}$ any city in Asia] λ3 $[_{TP}$ PRO to visit $t_3]]]]]]$

5.3 The insufficiency of the DP analysis

The DP analysis attributes to (65) the structure in (77), where *and* directly conjoins the two DPs, *any city in Europe* and *any city in Asia*:

(77) John refused to visit $[_{\&P}$ $[_{DP}$ any city in Europe] [and $[_{DP}$ any city in Asia]]]

Let us assume that *any city in Europe* and *any city in Asia* denote run of the mill quantifiers of type <et,t>. Then, *and* is interpreted as $[\![and_2]\!]$, repeated in (5) from the beginning of the paper, and the &P itself is interpreted as in (78). $[\![and_2]\!]$ composes with two quantifiers to output a new quantifier.

(5) $[\![and_2]\!] = \lambda F_{ett} . \lambda G_{ett} . \lambda f_{et} . F(f) = G(f) = 1$

(78) $[\![and_2]\!]([\![\text{any city in Europe}]\!]^w)([\![\text{any city in Asia}]\!]^w)$
$= \lambda f_{et} . \exists x$ [x is a city in Europe in w $\wedge$ f(x)] $\wedge \exists y$ [y is a city in Asia in w $\wedge$ f(y)]

Being a quantifier, the &P takes scope via QR. Because the &P contains both *and* and the DPs and QRs as a constituent, *and* necessarily scopes at the same height relative to *refuse* as *any city in Europe* and *any city in Asia*. A first possibility is that the &P QRs to a position above *refuse*, for instance, by adjoining to the matrix TP, as in (79). The predicted interpretation given this structure is the one in (80) where *and* and the quantifiers all scope above *refuse*.

(79) **QR targets a position above *refuse***
$[_{TP}$ $[_{\&P}$ any city in Eur. and any city in As.] λ1 $[_{TP}$ J refused $[_{TP}$ PRO to visit $t_1]]]$

(80) **Predicted: *and* > *any city in Europe, any city in Asia* > *refuse***
$[\![(79)]\!]^w = 1$ iff $\exists$x [x is a city in Europe in w $\wedge \neg\exists$w' $\in$ W(j)(w) [J visits x in w']]
$\wedge \exists$y [y is a city in Asia in w $\wedge \neg\exists$w" $\in$ W(j)(w) [J visits x in w"]]

The reading in (80) is distinct from the target split scope reading, as the quantifiers are interpreted de re. Paraphrasing, (80) says that John refused to go to particular places, at least one of which happens to be a city in Europe and at least one of which happens to be a city in Asia. This reading is, in fact, unavailable in (65), due to the licensing requirements of the NPI *any*. In order to be licensed, *any* must be in the scope of *refuse* at LF, and in (79)-(80), *any* is out of the scope of *refuse*.

The second possibility has the &P QR to a position below *refuse*, as in (81), where the &P adjoins to the embedded TP. This yields the reading in (82), where *and* and the quantifiers all scope below *refuse*.

(81) **QR targets a position below *refuse***
$[_{TP}$ J refused $[_{TP}$ $[_{\&P}$ any city in Eur. and any city in As.] λ1 $[_{TP}$ PRO to visit $t_1]]]$

(82) **Predicted: *refuse* > *and* > *any city in Europe, any city in Asia***
$[\![(81)]\!]^w = 1$ iff $\neg\exists$w' $\in$ W(j)(w) [$\exists$x [x is a city in Europe in w' $\wedge$ J visits x in w']
$\wedge$ $\exists$y [y is a city in Asia in w' $\wedge$ J visits y in w']]

As with split scope, the quantifiers in (82) are de dicto in the scope of *refuse*. The difference from split scope is that *and* also scopes below *refuse*. The result: (82) says that John refused for there to be both a city in Europe that he visits and a city in Asia that he visits together. This is compatible with John being willing to visit a city in Europe so long as he does not also visit a city in Asia, and vice versa. The reading in (82) is logically weaker than the split scope reading — and is again not available due to the licensing requirements of NPI *any*. In (81)-(82), *and* takes scope between *refuse* and the quantifiers, and *and* is an intervener for NPI licensing (Linebarger 1987, Guerzoni 2006). Intervention is established:

(83) *I didn't drink a cocktail and any soda. *(Guerzoni 2006:360)*

In this example, the negation is above *v*P, so regardless of whether the string is parsed under the DP analysis, as in (84-a), or with CR as *v*P conjunction, as in (84-b), negation takes scope over the conjunction, so *and* intervenes between negation and NPI *any*. The ungrammaticality of (83) shows that *any* is not licensed in an intervention configuration.

(84) a. I didn't drink [$_{\&P}$ [$_{DP}$ a cocktail] [and [$_{DP}$ any soda]]]
b. [$_{TP}$ I didn't [$_{\&P}$ [$_{vP}$ t_1 drink a cocktail] [and [$_{vP}$ t_1 drink any soda]]]]

Hence, whether the &P QRs above *refuse* or below *refuse*, the split scope reading is not derived. Either the conjunction operator and the conjoined DPs all scope above *refuse*, or they all scope below. Neither reading is split scope and, in fact, neither reading is available due to the requirements of NPI *any*.

5.3.1 Lifting the quantifiers?

The discussion so far has assumed that *any city in Europe* and *any city in Asia* are of type <et,t>. There is, however, another possibility to consider: *any city in Europe* and *any city in Asia* could be type-lifted from <et,t> to <<ett,t>,t> via the "lift" operation in Montague (1970) and Partee (1987). By invoking lift, it is in principle possible to derive split scope. To do so, we need to consider intensional versions of the quantifiers: type <s,ett>.

(85) a. $[\![$any city in Europe$]\!] = \lambda$w . λf_{et} . $\exists$x [x is a city in Europe in w $\wedge$ f(x)]
b. $[\![$any city in Asia$]\!] = \lambda$w . λf_{et} . $\exists$x [x is a city in Asia in w $\wedge$ f(x)]

These quantifier intensions lift to meanings of type <<<s,ett>,t>,t>. The quantifiers' lifted meanings are defined based on their basic meanings in (86-a) and (86-b). If *and* directly conjoins the type-lifted quantifiers, the &P is interpreted as (86-c). The LF to derive split scope is, then, (87).

(86) a. $[\![\text{any city in Europe}_2]\!] = \lambda f_{<<s,ett>,t>}$. f($[\![$any city in Europe$]\!]$)
b. $[\![\text{any city in Asia}_2]\!] = \lambda f_{<<s,ett>,t>}$. f($[\![$any city in Asia$]\!]$)
c. $[\![\&P]\!] = \lambda f_{<<s,ett>,t>}$. f($[\![$any city in Europe$]\!]$) $\wedge$ f($[\![$any city in Asia$]\!]$)

(87) $[_{TP}$ **&P** [λ2 $[_{TP}$ J refused **[[t_2 w']** [λ1 $[_{TP}$ PRO to visit t_1]]]]]]]

The &P QRs first to a position within the scope of *refuse*, and then to a position above *refuse*. The trace left with the first step of movement (t_1) is of type e, so as to allow the verb to compose with the trace. The trace left by the second step of movement (t_2) is of higher type: type <s,ett>. The second step of movement, therefore, derives a predicate of quantifier intensions. That predicate is taken as the argument of the conjunction in (86). The effect is that *and* takes widest scope and, within each conjunct, the basic meaning of type <s,ett> ([[any city in Europe]], [[any city in Asia]]) is semantically reconstructed to the position of t_2, below *refuse*. The critical final piece is that the world argument w' is provided at the trace position, and w' is bound by *refuse*. In this way, *and* takes widest scope and the quantifiers end up being interpreted below *refuse*, de dicto.[17]

Although split scope is predicted, there are reasons to reject the derivation. First, it has been controversially proposed that type-shifting is available only as a last-resort to resolve a type-mismatch (Partee & Rooth 1983). Lifting *any city in Europe* and *any city in Asia* to type <<sett,t>,t> does not contribute to resolving a type-mismatch, so would be blocked. More compellingly, there is empirical counter-evidence to (87). It is critical to note that the derivation relies on disentangling syntactic position and semantic scope for the quantifiers: the entire &P is syntactically above *refuse*, but type-lifting and high-type traces conspire so that [[any city in Europe]] and [[any city in Asia]] end up being interpreted de dicto below *refuse*. Fox (1999) observes Condition C data which rule out this profile (also Romero 1998):

(88) a. A new theory by him_1 seems to $Quine_1$ to be needed.
b. *A new theory by $Quine_1$ seems to him_1 to be needed.

A new theory by him/Quine has A-moved to the matrix subject position, but is interpreted de dicto below *seem* and *need*. The unacceptability of (88-b) — due to Condition C — shows that the quantifier cannot receive a de dicto interpretation without also syntactically reconstructing below *him*. A derivation with high-type traces and semantic reconstruction, like that entertained for split scope, would make it possible for the quantifier to be semantically de dicto, but still be syntactically in the matrix subject position. So, the empirical fact seems to be that a quantifier *cannot* be interpreted de dico without also being syntactically below the intensional operator — ruling out derivations like (87).

Given its theoretical and empirical shortcomings, I conclude that the derivation in (87) is not a viable means of deriving split scope under the DP analysis. As far as I can see, the derivations for split scope considered in this subsection exhaust the possibility space under the DP analysis — and split scope is not captured in an adequate way.

5.4 Local summary

The possibility of split scope in (65) and related examples furnishes an argument that CR is an available analysis of apparent DP conjunction: the split scope reading does not derive in a viable way under the DP analysis, but receives a straightforward account under CR.

[17] We must assume that NPI *any* is licensed so long as the quantifiers are interpreted in a downward entailing environment, even if they are not in the syntactic scope of the licenser.

6 Case 4: A missing scope reading

Cases 1-3 have provided evidence that a CR parse is available for apparent DP conjunction: CR is required to host adverbs like *yesterday* in a non-initial conjunct, to license VP ellipsis, and to capture split scope. It remains an open possibility, however, that CR and the DP analysis co-exist, as in H2 in the space of three hypotheses introduced back in (13). In this section, I consider further scope data, which are most straightforwardly understood if the DP analysis is *unavailable*, as in H3.

6.1 A missing scope reading

Consider the example in (89), which is adapted from Rooth & Partee's (1982) example (74-a) above. The scope-bearing operators are the subject quantifier (*some company*), the conjunction (*and*), and the object quantifiers (*a maid*, *a cook*).

(89) Some company hired (both) a maid and a cook.

Since the subject and the objects are all existential, their relative scope does not affect interpretation: existentials are commutative with respect to one another. The critical scope relation is between *some company* and the conjunction. There is an available reading of (89) where *some company* takes scope above *and*. On this reading, (89) conveys that some single company hired both a maid and a cook:[18]

(90) **Available reading: *some* > *and***
∃x [company(x) ∧ ∃y [maid(y) ∧ x hired y] ∧ ∃z [cook(z) ∧ x hired z]]

The inverse interpretation where *and* scopes above *some company* is, however, unavailable. That reading would convey that some company hired a maid and some potentially different company hired a cook:

(91) **Unavailable reading: *and* > *some***

a. Some company hired a maid and some company hired a cook.

b. ∃x [company(x) ∧ ∃y [maid(y) ∧ x hired y]
∧ ∃x' [company(x') ∧ ∃z [cook(z) ∧ x hired z]

6.2 The DP analysis over-generates

The DP analysis attributes to (89) the structure in (92), where *and* directly conjoins the DPs *a maid* and *a cook*. The &P, interpreted as type <et,t>, takes scope via QR, and both the available and unavailable readings can be derived by QRing the &P to different positions.

(92) **Structure for (89) under the DP analysis**
[$_{TP}$ some company hired [$_{\&P}$ [$_{DP}$ a maid] [and [$_{DP}$ a cook]]]]

(93) **The &P is interpreted as a quantifier**
$[\![\&P]\!] = \lambda f_{et}$. ∃x [maid(x) ∧ f(x)] ∧ ∃y [cook(y) ∧ f(y)]

[18] I will omit worlds to streamline the formulae that follow, since there are no longer intensional predicates involved.

If the &P QRs below *some company*, as in (94-a), the attested scope reading, *some* > *and*, obtains. Yet, the unattested scope reading, *and* > *some*, can obtain just as easily by QRing the &P above *some company*, as in (94-b). In this way, the DP analysis over-generates the unattested reading.

(94) **QR targeting different positions**

a. $[_{TP}$ some company $\lambda 1$ T $[_{vP2}$ $[_{\&P}$ a maid and a cook] $\lambda 2$ $[_{vP1}$ t_1 hired $t_2]]]$

b. $[_{TP2}$ $[_{\&P}$ a maid and a cook] $\lambda 1$ $[_{TP1}$ some company $\lambda 2$ $[_{vP}$ t_2 hired $t_1]]]$

If the DP analysis is available, there must be some constraint preventing the &P from scoping over the subject. Let us consider: are there known constraints which would prevent that possibility? As far as I can see, there are not. Among run-of-the-mill quantifiers, many, though not all, are able to take wide scope. Beghelli & Stowell (1997) provide a taxonomy of quantifiers, incorporating insights from Szabolcsi (1994, 1997). The relevant categories are these four:

(95) **Taxonomy of quantifier types**

(i) Negative quantifiers (e.g. *no NP*)

(ii) Distributive universals (e.g. *every NP*)

(iii) Counting quantifiers (e.g. *few*, *more than five NP*)

(iv) Group-denoting quantifiers (e.g. *a book*, *some NP*)

The quantifier provided by the &P in (93) most naturally fits into the class of distributive universals.[19] The similarity between conjunction and universals has been noted in various places in the literature. Recently, in a dynamic setting, Bumford (2015) proposed to analyze universal quantification as iterated conjunction. In the compositional system of the present paper, we can bring out the basic point by re-formulating a universal such as *every applicant* as in (96), if the applicants are John, Mary, and so forth. 'Every applicant f'ed' is equivalent to 'John f'ed, and Mary f'ed, and and so forth'.

(96) ⟦every applicant⟧

a. $= \lambda f_{et}$. $\forall x$ [applicant(x) $\rightarrow$ f(x)]

b. $= \lambda f_{et}$. f(John) $\wedge$ f(Mary) $\wedge$ ...

Importantly, distributive universals *are* able to take wide scope from object position. The example in (97), minimal to (89), illustrates. (97) can say that some single company hired all the applicants (*some* > *every*), but also that every applicant was hired, potentially by different companies (*every* > *some*).

(97) Some company hired every employee.

a. $\exists x$ [company(x) $\wedge$ $\forall y$ [employee(y) $\rightarrow$ x hired y]] *(✓some > every)*

b. $\forall y$ [employee(y) $\rightarrow$ $\exists x$ [company(x) $\wedge$ x hired y] *(✓every > some)*

Departing from variants of Rooth & Partee's particular example, the pairs in (98) corroborate, since each exhibits a contrast between conjunction and a universal. Whereas (98-a) says that some single prince married multiple people, (98-b) allows for multiple princes having each married one pauper. Likewise,

[19] A reviewer questions whether it is right to draw a parallel between conjunction and distributive universals, because conjunction allows for collective readings. As noted earlier, I allow that collective readings may involve operators unrelated to logical ⟦and⟧.

(99-a) implausibly says that some single book is in multiple locations, while (98-b) says that each shelf has a book on it. The fact that object universals can take wide scope makes scope freezing with conjunction very unexpected under the DP analysis, in so far as the conjunction is universal-like.

(98) a. Some prince married (both) a royal and a pauper.
b. Some prince married every pauper.

(99) a. Some book is on (both) a shelf and a table.
b. Some book is on every shelf.

To sharpen the problem further, note that the &P does not in any obvious way form a natural class with those quantifiers which do exhibit scope rigidity. At least under certain circumstances, negative quantifiers from class (ii) in (95) and counting quantifiers from class (iv) fail to take wide scope. Example (100) has a negative quantifier object and existential subject. In this case, the subject quantifies over pairs of students. (100) says that there is a pair of students who read no books ($\exists > no$), and cannot say that the books were all so unpopular that none were read by a pair of students ($no > \exists$).

(100) Two students read no book. ($\exists > no$, *$no > \exists$)

Example (101), due to Beghelli (1995), shows the same fact with a counting quantifier object, again relative to an existential subject. (101) says that some one student read more than five books (*some* > *more than five*), not that more than five books were read by potentially different students (*more than five* > *some)*.

(101) Some student read more than five books. (*some* > *more than five,* **more than five* > *some*)

The quantifier the &P would provide does not contain negation as *no NP* does, nor does it count the elements in the intersection of its restrictor and scope as *more than five NP* does.

Hence, the over-generation problem is, I believe, bona fide. The &P resembles a distributive universal, which can take wide scope, and does not share relevant properties with any quantifiers known not to take wide scope. If the DP analysis is available, a *new* constraint would have to be imposed specifically to prevent wide scope of an &P. On the other hand, if the DP analysis is unavailable, no new constrain is required: the data are *predictable* from CR.

6.3 The CR analysis does not over-generate

As discussed in the introduction, if examples apparently involving non-clausal conjunction were derived under CR from structures involving full clausal conjunction, scope in (89) would be a prima facie argument against the availability of CR. (89) is repeated in (102-a), together with (91-a), the counterpart to (89) with full clausal conjunction:

(102) a. Some company hired a maid and a cook. *(89)*
b. Some company hired a maid and some company hired a cook. *(91-a)*

Whereas *and* > *some* is unavailable in (89), *and* > *some* is the only available reading in (91-a), indicating that (89) cannot be derived from (91-a). We are now ready to see how the syntactic proposal for CR as

involving *v*P conjunction resolves this prima facie objection. To see what is predicted for (89), suppose that CR as proposed were the only available analysis of apparent DP co-ordination.[20] The prediction for scope is then as in (103):

(103) **Conjunction Scope Prediction ('CSP')**
Scope possibilities in apparent (logical) DP conjunction should track scope possibilities in overt *v*P conjunction.

The pattern of scope judgments in (89) is consistent with the CSP. The baseline is (104), which involves a conjunction of *v*Ps, both of which are overt (*hired a maid*, *fired a cook*):

(104) Some company hired a maid and fired a cook. *(✓ some > and, *and > some)*

Like (89), (104) conveys that a single company both hired a maid and fired a cook (*some > and*), and is incompatible with potentially different companies hiring a maid and firing a cook (*and > some*). Scope in overt *v*P conjunction is restricted in exactly the same way as scope in apparent DP conjunction.

We can ask: how does the available reading of (89) derive? (89) involves a conjunction of the *v*Ps *hired a maid* and *hired a cook*, as in (105). *Some company* occurs in spec-TP, having undergone ATB movement out of both of the conjoined *v*Ps.

(105) **Structure for (89) under CR**
$[_{TP}$ some company $\lambda 1$ T $[_{\&P}$ $[_{vP1}$ t_1 hired a maid] [and $[_{vP2}$ t_1 hired a cook]]]]

This available reading is directly predicted from this structure. Because *some company* ATB moves, there is a single occurrence of *some company*, which takes wide scope over the conjunction: *some company* in spec-TP scopes over *and*, which conjoins *v*Ps.

We can further understand why the unattested reading fails to derive. Given the CR structure in (105), deriving *and > some* relies on ATB reconstruction of *some company* into its base position within each conjunct, as in (106).

(106) **Structure <u>with ATB reconstruction</u>**
$[_{TP}$ T $[_{\&P}$ $[_{vP1}$ some co. hired a maid] [and $[_{vP2}$ some co. hired a cook]]]]

[20] I qualify with 'logical' in recognition that there may be an additional parse of (93) with and_{sum_pred} (discussed in Section 1.4). Although and_{sum_pred} is not required in the absence of a collective predicate, it should not be blocked either. For (89), the alternative LF with and_{sum_pred} would parse the conjunction as (i): a single existential quantifier over maid-cook sums.

(i). [[∃ [maid and cook]]

Note that, if the quantifier over sums could distributively take scope over *some company*, a reading that mimics unavailable *and > some* would derive, paraphrased: "For some maid-cook sum, every atom of that sum was hired by some (potentially different) company." In fact, the intuition in (89) is consistent with the availability of (i), given an independent fact: that plurality-denoting object DPs *cannot* in general distribute over a subject existential. The baseline is constructed with a definite plural object:

(ii). Some company hired these two employees.
  a. "Some one company hired both employees."
  b. *"For every atom x in 'these two employees', some company hired x."

The availability of a sum formation analysis has no bearing on the key argument in this section which has to do with parses where *a maid* and *a cook* are each generalized quantifiers. For full discussion, see Hirsch (2017), Chapter 3, Sections 1.2, 5.4.2, and 6.3.1.

The baseline example (104) independently establishes that ATB reconstruction is blocked in this configuration (Moltmann 1992). (104) wears on its sleeve the proposed CR structure for (89), as in (107).

(107) **Structure for (104) under CR**
[$_{TP}$ some company λ1 T [$_{\&P}$ [$_{vP1}$ t_1 hired a maid] [and [$_{vP2}$ t_1 fired a cook]]]]

Just like with the CR structure for (89), to derive *and* > *some* in (107), *some company* would have to ATB reconstruct to its base position internal to the *v*Ps. Since (104) cannot be interpreted with *and* > *some*, it is independently shown that ATB reconstruction is blocked. The question of how ATB reconstruction is constrained has been treated in the literature, for instance, in Fox (1995, 2000). Applying Fox's idea to (89) and (104), reconstruction is subject to an economy constraint which allows *some company* to ATB reconstruct into the two *v*Ps only if, within each *v*P, *some company* reverses its scope relation relative to another operator with which *some* is non-commutative. The only other scopal operator within vP_1 is *a maid*, and the only other scopal operator within vP_2 is *a cook*. Since two existentials are commutative, the economy condition is not met.

So, the CR proposal is sufficiently restrictive to account for the observed lack of *and* > *some* in (89), and reduces this fact to the same lack of *and* > *some* in (104). In conjunction with an independently needed theory of when ATB reconstruction can(not) occur, CR thus predicts the missing scope reading in (89).

6.4 Extending to further data

In the remainder of this section, I show that CR, on the logic discussed in the preceding subsection, not only predicts scope in (89), but also in a range of further examples.

6.4.1 Predicting where *and* > *some* is available

CR is consistent not only with cases where *and* > *some* is unavailable, like (89), but also with cases where *and* > *some* is available. Fox's economy constraint does allow ATB-reconstruction of *a guard* in (108), where the two conjoined *v*Ps are *standing in front of every church* and *standing in front of every mosque*.

(108) A guard is standing in front of every church and sitting beside every mosque.

Because the existential *a guard* is non-commutative with the universals *every church* and *every mosque*, ATB reconstruction is licensed, provided that *a guard* scopes below *every church* in the left conjunct and below *every mosque* in the right conjunct. That is, Fox predicts (108) to allow the reading in (109), which he observes is, in fact, available.

(109) **Available reading: *and* > *every church, every mosque* > *a guard***
$\forall$x [church(x) $\rightarrow$ $\exists$y [guard(y) $\wedge$ y is standing in front of x]]
$\wedge$ $\forall$x' [mosque(x') $\rightarrow$ $\exists$z [guard(z) $\wedge$ z is sitting beside x']]

The counterpart example in (110) with apparent DP conjunction similarly allows a reading with *a guard* taking narrowest scope, consistent with the CSP. The relevant reading is one where for every church, a guard is standing in front of it, and for every mosque, a guard is standing in front of it, where all the guards are potentially different (*and* > *every church, every mosque* > *a guard*).

(110) A guard is standing in front of every church and every mosque.

Zamparelli (2011) observes that *and* > *some* is available with the apparent DP conjunction in (111): (111) can convey that potentially different bullets killed the two victims.

(111) A 9mm bullet killed both the first victim and the last victim.

The availability of *and* > *some* in (111) is not immediately predicted by Fox's economy constraints, since the existential subject (*a 9mm bullet*) and the definite objects (*the first victim, the second victim*) are not commutative. The point of this section does not, however, crucially depend on economy. The critical point is that *whatever* restricts ATB reconstruction in overt *v*P conjunction, the same observed restrictions obtain with apparent DP conjunction, per the CSP. (111) is consistent with this, since the counterpart in (112) with overt *v*P conjunction similarly allows *and* > *some*.

(112) A 9mm bullet eliminated the first victim and disposed of the second victim.
(Then, a 10mm bullet took care of everyone else.)

6.4.2 Predicting Rooth & Partee's (1982) example

Let us now return to Partee & Rooth's actual example in (74-a), upon which (89) was based, and fully address why (74-a) lacks a reading with *and* > *some*.

(74-a) John hopes that some company will hire a maid and a cook.

There are two ways to derive *and* > *some* in this example. First, since the embedded clause in (74-a) is identical to (89), *and* > *some* could derive by QRing *a maid and a cook* as a DP conjunction above *some company* within the embedded clause, as in (89). If direct DP conjunction is unavailable, this parse is blocked for (74-a), just as for (89).

(113) *[$_{TP}$ J hopes that [$_{TP}$ [$_{\&P}$ a maid and a cook] λ2 [$_{TP}$ some company will hire t_2]]]]

The second way to derive *and* > *some*, which looks consistent with CR, is to conjoin the matrix *v*Ps, as in (114). Yet, it has been observed that gapping is degraded across a finite clause boundary, as in (115). In a parallel way, (114) should also be unavailable.[21]

(114) *[$_{TP}$ John λ1 [$_{\&P}$ [$_{vP}$ t_1 hopes that some company will hire a maid]
[and [$_{vP}$ t_1 hopes that some company will hire a cook]]]

(115) ??John hopes that this company will hire a maid and Bill a cook.

6.4.3 Predicting Partee's (1970) example

To take a brief excursion beyond apparent DP conjunction, the approach presented in this section extends to account for Partee (1970) paradigm discussed at the outset of the paper:

[21] Recall that conjunction of matrix *v*Ps embedding non-finite clauses is deployed in (65) (*John refused to visit any city in Europe and any city in Asia*) to derive split scope. Gapping can occur across non-finite clause boundaries, as in the counterpart *John refused to visit any city in Europe and Mary any city in Asia*.

(116) a. Few rules are explicit and easy to read.
b. Few rules are explicit and few rules are easy to read.
c. Few rules are explicit and it's easy to read few rules

The profile of these data resembles (89) and (104). The sentence in (116-a) conveys that few rules are both explicit and easy to read (*few* > *and*), while in (116-b) and (116-c), *and* scopes above *few*. According to the perspective on CR adopted in this paper, (116-a) may be analyzed as a conjunction of *v*Ps or even APs, as in (117). *Few rules* originates as an argument of *explicit* in the first conjunct, and separately as an argument of *read* in the second conjunct. Both APs are of type t.

(117) [$_{TP}$ T are [$_{AP}$ few rules explicit] [and [$_{AP}$ easy to read few rules]]]

Few rules undergoes *tough*-movement within the second conjunct to the edge of the AP[22], and then *few rules* undergoes ATB movement out of both conjuncts to spec-TP.

(118) [$_{TP}$ few rules T are [$_{AP}$ t$_1$ explicit] [and [$_{AP}$ t$_1$ easy to read t$_1$]]]

Due to ATB-movement, the structure in (118) derives the available *few* > *and* reading. *And* > *few* cannot derive since *few rules* is blocked from reconstructing. In Fox's approach, because there is no scopal operator internal to either conjunct, ATB-reconstruction cannot satisfy economy. It thus follows that (116-a) is not equivalent to (116-b) or (116-c).

6.5 Local summary

This section has demonstrated that the DP analysis over-generates scope readings, while CR is adequately restrictive to block scope readings that are not attested, but still derive those that are. The data presented here are thus most straightforwardly understood if CR is available — *and the DP analysis unavailable*.[23]

7 Conclusion

This paper has undertaken a close study of examples where *and* appears to conjoin object quantifiers. In doing so, I have built a case for CR based on a structure with *v*P conjunction, rather than full clausal conjunction. Support for CR has come from the following theoretical and empirical arguments:

- CR follows for free from independently proposed syntactic mechanisms, in particular Johnson's mechanism for gapping as *v*P conjunction, combined with ATB movement of the subject out of the conjoined *v*Ps.
- CR provides structure to host adverbs like *yesterday* in a non-initial conjunct, which is needed to account for differing constraints on *yesterday DP* order in a non-initial conjunct as compared to other environments.

[22] I assume a movement analysis of *tough*-constructions, but this is controversial and not crucial.

[23] Note that the intuitions in this section accord with the vast majority of informants I consulted. But, a couple of informants did allow *some* > *and* in (89). With some inter-speaker variability in scope intuitions, CR makes a further predicted that could be tested in a larger scale experiment: that individual participants' intuitions about scope in apparent DP conjunction should track their intuitions about scope in overt *v*P conjunction.

- The extra *v*P structure associated with CR is required in certain cases to furnish an intra-sentential antecedent to license VP ellipsis.
- CR provides the only viable account of split scope, where *and* scopes above some operator and the DPs that *and* apparently conjoins scope below that same operator.
- The DP analysis over-generates unattested scope readings. CR not only derives split scope readings which the DP analysis fails to derive, but also is adequately restrictive to not over-generate scope readings. With CR, missing scope readings are unavailable due to independently motivated constraints on ATB-reconstruction.

By providing evidence that CR is available and the DP analysis unavailable, this paper imbues several questions with new urgency. First: can CR account for *all* instances of apparent DP conjunction and, more generally, can CR account for all instances of *apparent non-type t conjunction*?

Moreover, if type-ambiguity is unavailable for *and*, a still broader question arises. *And* is not the only operator which appears to compose with constituents of different semantic types. Rooth (1985), for instance, discusses the focus operators *only* and *even* which, like *and*, appear at different positions.

(119) a. John only saw one student. *('only' adjoined to vP)*
b. John saw only one student. *('only' adjoined to DP)*

This paper provides motivation to re-visit the question of whether type-ambiguity is an available mechanism to analyze these other cross-categorial operators, as well.

The goal of this paper is, of course, not to answer all of these questions, but rather to provide new reason to ask them. In conclusion, I flag two more specific issues which should be considered in addressing the first of the questions raised: is CR sufficient to account for all cases of apparent DP conjunction?

7.1 The mechanisms question

I have argued that an analysis of CR after Johnson's derivation for gapping can account for all cases of apparent DP conjunction discussed in this paper. However, if CR is to be extended across cases (at least in the traditional compositional framework I have adopted), there must be additional CR mechanisms, as well. To illustrate, consider the example in (120), where *and* occurs linearly between *subject* DPs, rather than object DPs.

(120) Every student and every professor played canasta.

In (120), *played canasta* is left unpronounced in the first conjunct, as in (121-a). Since gapping is restricted to occur only in a second conjunct, as shown in (121-b)-(121-c), (120) must be analyzed differently.

(121) a. Every student played canasta and every professor played canasta.
b. John saw Mary and Bill Sue.
c. *John Mary and Bill saw Sue.

Importantly, there are again independently proposed syntactic mechanisms which can derive the observed surface string, in particular, Right Node Raising ('RNR'):

(122) Every student played and every professor was a master at canasta. *RNR*

The DP *canasta* in (122) is interpreted as though it were present in both conjuncts, but is only pronounced once, at the right edge of the sentence. The VP *played canasta* in (120) has a similar profile. Although the mechanism for RNR is contested[24], whatever mechanism derives (122) should also derive (120). The success of extending CR across examples depends on the extent to which independently justifiable syntactic mechanisms can generate the diversity of observed surface strings.

Given that CR must involve a plurality of mechanisms, the question does arise as to how their distribution is constrained. A version of this question particularly relevant to discussion in the present paper is: *why* can apparent object DP conjunction be analyzed with *v*P conjunction, but not full clausal conjunction? An analysis with full clausal conjunction could obtain with independently proposed syntactic mechanisms, as shown in (123):

(123) a. John saw every student and every professor.

b. [$_{TP}$ John saw every student] [and [$_{TP}$ [$_{TP}$ ~~John saw t$_1$~~] every professor$_1$]]]

In (123-b), *every professor* moves to a position peripheral to the TP, and the TP then elides, deleting *John saw* from the pronounced string. TP ellipsis has been argued to be involved in a variety of constructions, including fragment answers and sluicing (Merchant 2004), and stripping (Wurmbrand 2013). A possible account for the restriction to *v*P conjunction would be to introduce a principle whereby a string apparently involving conjunction of constituents not of type t is parsed as involving conjunction of the minimal larger constituents that are of type t (after Schein 2017). *v*Ps and TPs are each of type t, and *v*P is smaller than TP. Hence, it would follow that a TP conjunction parse is unavailable. The laws governing the full set of possible CR mechanisms and constraints on their distribution, both in English and cross-linguistically, is a rich domain for further inquiry.

7.2 The collective predication question

This paper has focused on cases where *and* may function as logical conjunction (basic type <t,<t,t>>) and has addressed the question of whether type-shifting of *and* is required to account for its distribution in a subset of such cases. Yet, as noted at the outset, *and* might also be ambiguous in its basic meaning with additional entries introducing mereological sums, as apparently required for collective predicates:

(124) John and Mary met.

In exploring the hypothesis that *and* is uniformly logical conjunction of type <t,<t,t>>, we should also consider the question of whether sum-forming *and* variants can be re-analyzed in this way. In fact, the recent literature has made important advances in this direction.

One point of departure is Winter (2001), which re-analyzes sum-forming *and* in (124) as logical *and*, but with a shifted type. Winter proposes that *John* and *Mary* in (124) are each interpreted as existential quantifiers and, in turn, logical *and* conjoins *John* and *Mary* with the shifted type <ett,<ett,ett>>.[25]

[24] RNR in (122) may involve rightward ATB movement of *canasta*, backward ellipsis of *canasta* in the first conjunct, a multi-dominance structure, or be ambiguous between multiple of these (see e.g. Sabbagh 2012 for an overview of the different analyses).

[25] Winter's idea is roughly as follows. I illustrate with sets, rather than their characteristic functions. *John* denotes the set of sets which contain John, and *Mary* denotes the set of sets which contain Mary. *And* conjoins these to deliver the set of sets which contain

Champollion (2015) extends Winter's approach to NP conjunction, and Fox (2015) proposes a modification to Champollion's proposal. Reintegrating that modification into the analysis of (124), Fox in effect shows that *John* and *Mary* can be analyzed as first-order predicates, rather than quantifiers.[26] Accordingly, logical *and* is still invoked in a shifted type, this time <et,<et,et>>, rather than <ett,<ett,ett>>. To go from *John* and *Mary* denoting predicates to them containing type t meanings for *and* to conjoin in its basic type requires just one addition to the structure: *John* and *Mary* must each contain a covert argument which saturates the predicate (cf. Heim 1997 for a related proposal). I leave working out this proposal and evaluating of its consequences to the future.

A second point of departure which could be taken in analyzing (124) with CR is that of Schein (1992, 2017). In Schein's system of event translation, (124) roughly paraphrases as in (125). *And* corresponds to the underlined operator conjoining type t meanings.

(125) $\exists$e [John is a participant in e $\underline{\&}$ Mary is a participant in e & e is a meeting event]

Further work is necessary to incorporate Schein's approach into the syntactic and semantic framework I have assumed, or to incorporate the ideas in this paper into his framework.

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both John and Mary. In turn, a minimization operator applies which yields the singleton set: {{John, Mary}}. For Winter, {John, Mary} is the counterpart to John+Mary in Link's system with sum formation.

(i.) a. $[\![\text{John and Mary}]\!] = \{X : \text{John} \in X \ \& \ \text{Mary} \in X\}$ (X ranges over sets)
b. $[\![\text{MIN John and Mary}]\!] = \{\{\text{John, Mary}\}\}$

Winter defines *met* also as a set of sets: *met* contains all sets of which every member met every other member. An additional operator allows (i-b) and *met* to compose with the result that the sentence is true iff the sole member of (i-b), i.e. {John, Mary}, is in the set denoted by *met* — i.e. just in case John and Mary met.

[26] Fox's modification — as extended to (124) — is to allow *John* and *Mary* to denote first-order predicates, i.e. sets, and maintain mereological sums in the system. *John* denotes the singleton set {John} and *Mary* denotes the singleton set {Mary}. An operator converts these to the set of all individuals (atomic or sum) which contain John as an atom {John, John+Mary, John+Sue, John+Mary+Sue, ...} and the set of all individuals (atomic or sum) which contain Mary as an atom {Mary, John+Mary, Mary+Sue, John+Mary+Sue, ...}. *And* conjoins these to deliver the set of all sums which contain both John and Mary as atoms:

(i.) $[\![\text{Op John and Op Mary}]\!] = \{X : \text{John} \leq X \ \& \ \text{Mary} \leq X\}$ (X ranges over mereological sums)
$= \{\text{John+Mary, John+Mary+Sue ...}\}$

Met, as originally assumed, denotes a predicate of sums, true of a sum just is case every atom in that sum met every other atom. Additional operators predict the sentence to be true iff the minimal element in (i) is in the extension of met. John+Mary is the minimal element, and the sentence is thus true iff John+Mary is in the extension of met — i.e. just in case John met Mary.

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