Deriving Split-Antecedent Relative Clauses

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Abstract

There is difficulty representing relative clauses with split antecedents (Perlmutter & Ross 1970, McCawley 1982, Link 1984, Wilder 1994, a.o.):

(i) Mary met a man and John met a woman who know each other well.

In this paper, I demonstrate that existing analyses, both movement and base generation approaches, have difficulties accounting for split-antecedent relative clauses (SARC) without construction-specific stipulations. Even the most promising accounts do not make predictions about the actual behavior of SARC.

Formally, I propose that traditional approaches have difficulty because of how the notion of chain is represented. I provide a preliminary analysis using a novel system of representing narrow syntax that does not run into the type of problem that traditional approaches do. SARC are naturally predicted from the way I propose to treat coordination within the new system. In doing this, I argue for another direction of our model of narrow syntax (cf. Vergnaud to appear), one which redefines the representation of a chain and instead represents grammatical relationships as local – a generalized form of Multidominance. This approach to syntax makes wide-reaching predictions, which I do not discuss here. But, I show that this direction derives SARC naturally, without construction-specific stipulations.

Deriving Split-Antecedent Relative Clauses

Katherine McKinney-Bock*

1 Introduction

There is difficulty representing relative clauses with split antecedents (Perlmutter and Ross 1970, McCawley 1982, Link 1984, Wilder 1994, a.o.):

(1) Mary met *a man* and John met *a woman* *who know each other well*.

In this paper, I demonstrate that existing analyses, both movement and base generation approaches, have difficulties accounting for split-antecedent relative clauses (SARC) without construction-specific stipulations. Even the most promising accounts do not make predictions about the actual behavior of SARC.

Formally, I propose that traditional approaches have difficulty because of how the notion of chain is represented. I provide a preliminary analysis using a novel system of representing narrow syntax that does not run into the type of problem that traditional approaches do. SARC are naturally predicted from the way I propose to treat coordination within the new system. In doing this, I argue for another direction of our model of narrow syntax (cf. Vergnaud to appear), one which redefines the representation of a chain and instead represents grammatical relationships as local—a generalized form of Multidominance. This approach to syntax makes wide-reaching predictions, which I do not discuss here. But, I show that this direction derives SARC naturally, without construction-specific stipulations.

2 Current and Possible Approaches to SARC

Approaches to relativization can be broken down into three types: head-external approaches, head-raising (movement) approaches, and ellipsis approaches. I examine these approaches and show that a complete account of SARC, without construction-specific stipulations, remains elusive.

2.1 Solution #1: Head-External Approaches

2.1.1 Rightward Movement of Relative Clause

Baltin (2005) uses SARC as an argument against the viability of a rightward movement account, along with Perlmutter and Ross (1970). A derivation generates the antecedents, *a man* and *a woman*, each in their respective clause, *John met a man* and *Mary met a woman*. Then, the relative clause would move rightward to a higher (extraposed) position. But, as Baltin (2005) and Perlmutter and Ross (1970) point out, in the case of SARC it is unclear *in what position* the relative clause could be base generated, as the antecedents are split across two clauses and there is no shared position to base generate the shared relative clause in (a similar problem to the head raising analysis, below). As a solution, Baltin (2005) proposes a Late Merger account of SARC, which I show in the following section has the same issues as an account which base generates the relative clause in its extraposed position.

2.1.2 Base Generation and Late Merger

Instead, Baltin (2005) proposes applying Late Merger to SARC, utilizing the analysis of relative clause extraposition from Fox and Nissenbaum (1999). The derivation for a single-head relative clause proceeds as follows. First, the head DP raises via a quantifier-raising (QR) process to Spec,

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CP. Then, the relative clause is Late-Merged to the constituent containing the raised relative head (or is licensed in this base-generated position). For SARC, the derivation needs to be more specific with regard to the coordinated DPs. First, the conjunction of two CPs is itself a CP. Then, the two DPs extract Across-the-Board to the Spec, CP of the conjoined clauses, after which the extraposed relative clause is Late-Merged to the conjunction of the two DPs (or has already been base generated as an adjunct to CP). As long as the two DPs in each conjunct can QR out of the clause, in ATB fashion, to Spec, CP, this obeys the constraints on movement noted in the literature. A sample derivation is given below (Baltin 2005, his 85):

a. **(QR from both conjuncts, yielding (b))**	[[a man entered] and [a woman left]] [who were similar]
b. **(merger of the relative clause to the conjoined DP yields (c))**	[[[DP a man] entered] and [[DP a woman] left]] [[DP a man] and [DP a woman]]] [who were similar]
c.	[[[DP a man] entered] and [DP a woman] left]] [DP [DP [DP a man] and [DP a woman]] CP who were similar]]

Table 1: Late Merger Derivation.

An additional complication, not discussed in Baltin (2005), is that the DPs must be moved out of their conjuncts and then additionally coordinated before the relative clause is merged, as represented above.

There is empirical support for this derivation. Baltin illustrates that ATB topicalization of coordinated nominals can occur, and likens this type of ATB to those constructions (his 86):

(2) This book$_i$ and that magazine$_j$ John bought t_i at Borders and Bill bought t_j at Dalton's respectively.

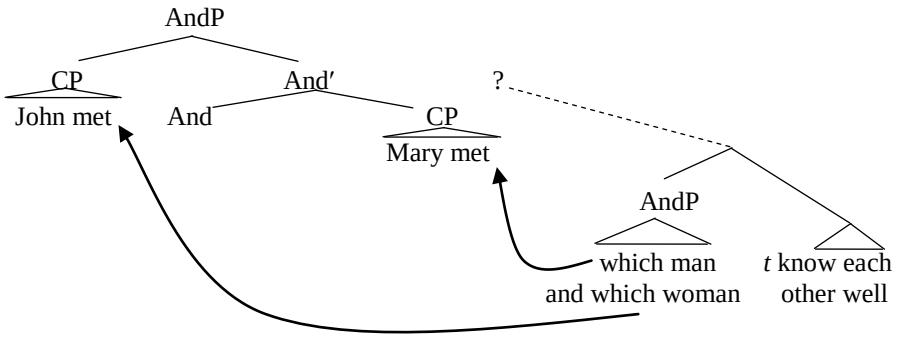
Despite its appeal, an empirical issue remains. A key aspect of the Late Merger and base generation accounts is that they are not head-raising accounts, because the head DPs QR from the main clauses and attach prior to merging the relative clause. This makes a prediction: reconstruction should not be possible. There is, however, evidence of reconstruction with SARC:

(3) Susan met a grad student of his$_j$ and Mary met an undergrad student of his$_j$ that [every professor]$_j$ saw get married to each other.

2.2 Solution #2: Head-Raising Approach

A head-raising derivation of a single-headed relative clause (Vergnaud 1974, Kayne 1994, a.o.) proceeds as follows. First, the head of the relative clause merges into the argument/adjunct position inside the relative clause (Kayne 1994). Then, it extracts to an A′-position in the relative clause, and subsequently moves into the matrix clause. There are three serious problems in taking a possible head-raising approach to SARC. First, two coordinated heads would have to move out of the relative clause and then be split into two separate clauses. The mechanism to do this is specific to coordinated arguments. Second, it is unclear what happens to pronounced *and* within the coordinated DPs once they have been moved. Third, it is unclear where the relative clause would be generated in the structure. Under Kayne (1994), extraposed elements are generated in a very low position in the clause, with the head raising out of the extraposed clause into a higher position. With the conjoined CPs, there is no shared position that is low enough to allow the relative clause to be attached prior to extracting the dual heads.

(4)



2.3 Solution #3: Deletion/Ellipsis

2.3.1 Backward Deletion (Wilder 1994)

Wilder (1994) proposes a deletion analysis for SARC, from the following structure (his 143):

(5) [John met a man [~~who knew each other well~~]] and [Mary met a woman [who knew each other well]].

There are two issues with Wilder's account. First, this analysis requires an explanation as to how this structure is interpretable at LF, since the surface form **a man who knew each other well* is ungrammatical. Wilder suggests that this is syntactically well-formed, but semantically not possible. In doing this, he pushes the collective interpretation into a discourse model, and not into the syntax, which threatens a general syntactic account of agreement and a straightforward syntax-semantics interface.

Second, this account makes incorrect predictions regarding Principle C. Baltin (2005) points out that Wilder's analysis of extraposition as deletion predicts Principle C effects (cf. Fox and Nissenbaum 1999), but this is not the case for relative clause adjuncts:

(6) I gave him$_j$ an argument yesterday that supports John$_j$'s theory.

Wilder's prediction (^{P} = predicted) of Principle C effects for SARC:

(7) ^{P}*John gave her$_i$ an argument ~~that (both) support Mary$_i$'s theory~~ and Bob gave her$_i$ a linguistic judgment that (both) support Mary$_i$'s theory.
(8) ^{P}*We talked about Mary$_i$'s claim ~~that they$_{i,j}$ told each other about~~ and they talked about John$_j$'s claim that they$_{i,j}$ had also told each other about.

But, the examples are grammatical. SARC show alleviation of Principle C effects:

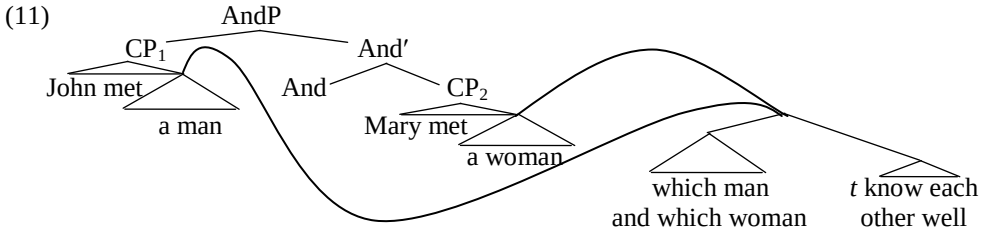
(9) John gave her$_i$ an argument and Bob gave her$_i$ a linguistic judgment that (each/both) support Mary$_i$'s theory.
(10) We talked about Mary$_i$'s claim and they talked about John$_j$'s claim that they$_{i,j}$ had also told each other about.

2.3.2 The Most Promising Approach: Deletion-Under-Identity with Multidominance

Perhaps the most promising analysis of the possibilities discussed here would be to apply Citko's (2001) deletion-under-identity of the head noun, in combination with Multidominance of the relative clause (cf. McCawley 1982). Under this approach, both head DPs are generated, *a man* and *a woman*, as well as a *wh*-phrase, *which man and which woman*, which moves from the position inside the relative clause to the A′-position above the relative clause (cf. Citko 2001, adding the necessary coordinate structure). Then, *a man* and *a woman* merge with their respective CPs, and the relative clause is 'multiply dominated' by both CPs (c-commanded by the content of

both respective CPs).

(11)



a. Merge internal coordinated heads	[[which man and which woman] know each other well]
b. Merge external coordinated heads	[a man and a woman [which man and which woman] know each other well]]
c. Merge [a man] to CP_1, [a woman] to CP_2, Multidominance	John knows [a man] and Mary knows [a woman] [which man and which woman know each other well]]
d. PF Deletion-under-identity; pronounced linear order	John knows [a man] and Mary knows [a woman] [~~which man and which woman~~] know each other well]]
d′. LF pronoun binding by the quantifier with the internal head; reconstruction	John knows [~~a man~~] and Mary knows [~~a woman~~] [which man and which woman] know each other well]]

Table 2: Deletion-Under-Identity Derivation.

What makes this approach promising is that it accounts for Principle C alleviation and reconstruction effects, as there are different deletion patterns for PF (Principle C) and LF (reconstruction).

Unfortunately, there is a conceptual issue with respect to the pronounced coordination. *And* coordinates the two DPs as a (plural) head of the relative clause. But, instead of being pronounced as a DP coordinator, *and* is pronounced as a linker for the two matrix CPs, and also interpreted as one, shown by asymmetric c-command relationships between the two CPs, as in (13):

(12) Every $child_i$ met a man and his_i friend met a woman who know each other well.

Cf. Citko 2005, it seems some *and*-phrase should antisymmetrically link the two CPs that are coordinated at the top of the tree, rather than using the lower *and* that links the multiply-dominated DP structure. Now, this requires a stipulation that two *and*s are present in the structure– that of the two DPs for the relative clause, and of the two matrix CPs. However, why is only one *and* pronounced (that of the CPs) and the second (of DPs) not pronounced? Construction-specific stipulations are required for interpretation and pronunciation of the (one? two?) coordinated structure(s).

3 Chains

I argue that the overarching issue with the head-raising, head-external, and ellipsis approaches is that all involve multiple occurrences of the head in a chain (indexed and/or copied) in the structure that is used at the syntactic module of language, and sent to the interfaces. The Deletion-Under-Identity approach is the most promising with respect to SARC because LF and PF deletion of occurrences in a chain occurs separately. These issues arise because the representation at narrow syntax sent to PF and LF contains the transformational history, and so 'remnants' of what is needed at the other interface remain.

I take a different route and argue that different trees are used at PF and LF, that are derived from the same representation at narrow syntax, and narrow syntax represents all grammatical relationships locally. This approach is inspired by Vergnaud (to appear), and mirrors certain properties of TAG. The revision to the grammatical architecture takes syntax to be a more abstract representation: chains are items in (local) grammatical contexts. The 'interface trees' are classical

Phrase-markers – trees that do not represent movement chains – and only have a single occurrence of an item in a single context from the chain. Then, different occurrences may be used at PF and LF, which allows for reconstruction (at LF) and Principle C alleviation (as a PF phenomenon of co-occurrence of an R-expression and a pronoun). This leads to generalized multidominance (discussed below): a *graph representation* of narrow syntax. Then, more broadly, Graph Theoretic Syntax (McKinney-Bock and Vergnaud 2010, Liao and Vergnaud 2010, Vergnaud to appear) is shown to predict SARC as part of a family of coordinated structures, rather than the anomaly that it must be treated to be in current theory.

4 Graph Theoretic Syntax and Analysis

4.1 Graph Theoretic Syntax

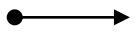
A derivation of narrow syntax is represented as a graph with directed edges (cf. Vergnaud to appear, McKinney-Bock and Vergnaud 2010). The edge $(f_i, f_j)_x$ with end points/vertices f_i and f_j, f_i and f_j grammatical formatives, represents Merge(f_i, f_j). Such a derivational graph will be referred to as an M(erge)-graph (a notion akin to that of T-marker (cf. Chomsky 1975), where the transformational 'history' is shown as a representation). Assuming labeling, an M-graph is a directed graph, with headedness represented directionally. For example, the one-edged graph should be oriented as shown in (17) if f_j is the head of (f_i, f_j). If (17) is a checking (agreement) relationship, f_i is in the relation Specifier-of to f_j.

(13)

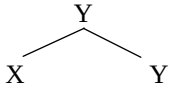
4.2 To (PF and LF) Phrase-markers

Phrase-markers (used here only at the interfaces) can be read from M-graphs at narrow syntax. If one were to construct a tree based on Merge of (X, Y), Y the head of X, a Phrase-marker is 'read' from the following M-graph as follows:

(14) Narrow syntax

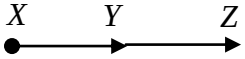


(15) P-marker:

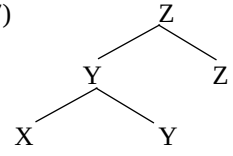


The merging of 'non-terminal nodes' (what *projects* in P(hrase)-markers) arises from headedness/labeling. As a result, Merge must allow for overlapping applications. For example, to generate the X-bar schema, to allow heads to project multiple times to generate a phrase with both a complement and a specifier for the head – we must allow two applications of Merge to that head, one to Merge the complement to the head and another Merge the specifier, as in (36). This is synonymous with being in multiple grammatical relationships, or Multidominance. For example:

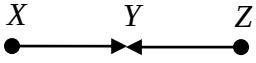
(16)



(17)



(18)



(19) Y

Z Y

Y X

OR

(20) Y

X Y

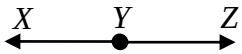
Y Z

If, however, we allow unbounded Merge to apply at the level where Phrase-markers are 'read' and used at the interfaces, then issues arise. To restrict the generation of P-markers, an issue to which I return shortly, a condition on Phrase-markers is required. The following condition adequately describes the standard workings of such derivations:

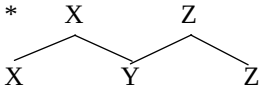
(21) **Condition on Phrase-markers**
Let *P* be some classical Phrase-marker and let (f_i, f_j), (f_i, f_k), f_i, f_j, f_k distinct formatives in *P*, be a pair of grammatical relations in *P* which share the formative f_i. At least one of the two relations is labeled/headed by f_i.

Then, *P* is a tree (in the graph theoretic sense – a simple graph without cycles),[1] and *P* obeys the condition in (26) immediately above. This condition rules out Phrase-markers containing the following, with Merge(X, Y), Merge(Y, Z):

(22) M-graph



(23) Phrase-marker



This configuration, commonly discussed in the literature on Multidominance, creates problems for both interfaces. At PF, there is a problem with linearization (conflicting ordering relations, see Wilder 2008), at LF, with interpretation. However, we *do* see this configuration arise in M-graphs, and it turns out to be natural for the linguistic relationships we observe. It will become evident that the condition we propose will be useful, and natural, for constraining certain P-markers with displaced items such as the head of a relative clause. I return to this in the analysis of SARC.

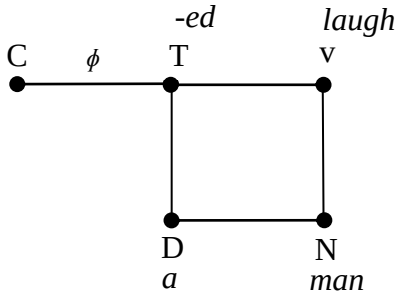
4.3 Analysis of SARC

Given the basics of Graph Theoretic Syntax above, this section is organized as follows. First, I present an analysis of regular relative clauses. Then, I present how coordination works, followed by an account for SARC.

4.3.1 Regular Relative Clauses

I return to the basic notion of M-graph and begin with a similar configuration for the higher (subject) phase, (28)), given some clause. Cf. Chomsky 2008, T inherits the agreement (phi)-features from C (Chomsky 2008: 143).

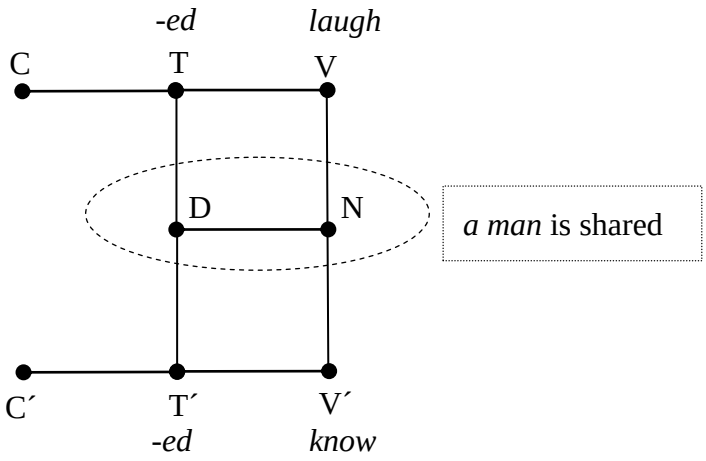
(24) A man laughed.



[1]The definition is that of standard graph theory; see, e.g., Balakrishnan and Ranganathan (2000). A 'cycle,' following graph theory, is created when one can trace a 'path' through the edges of the graph, beginning at some vertex and ending at that same vertex (if no vertices are repeated in this path, sometimes this is called a 'simple cycle').

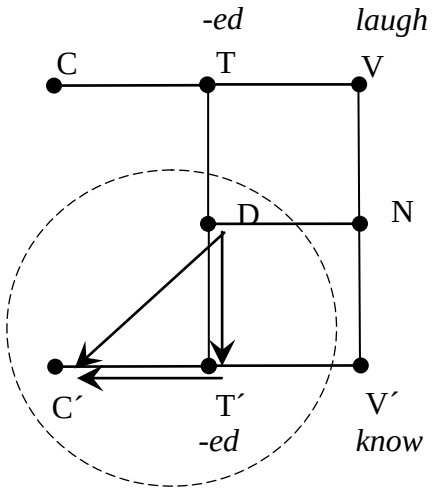
The relative clause is built like the matrix clause, and the pair (*D*, *N*) is shared, in the subject position of both verbs:[2]

(25) A man that knew Mary laughed.[3]



Following the standard raising analysis of relative clauses (cf. Kayne 1994), D is in a relationship with the C′ that is the relative clause. This relationship is a checking relationship between C′ and the nominal domain. C′ is the head/label of the pair (*D*, *C´*). This represents the asymmetry between relative/matrix clauses. Returning to the condition on classical Phrase-markers, we see that the pairs (D, C′) and (D, T´) are ruled out from the same Phrase-marker, because T′ is the head of D, but C′ is also the head of D (D is multiply dominated). This rules out a Phrase-marker containing multiple occurrences of D (see immediately below):

(26)

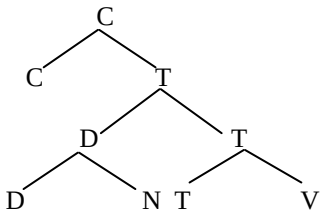


With the condition in place, some relevant maximal Phrase-markers are (due to space considerations, we leave it to the reader to work out derivations):

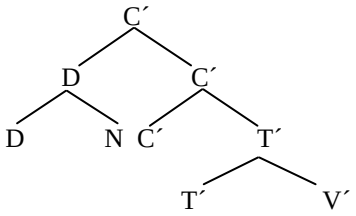
[2] Technically, at narrow syntax it is not *a man* that is shared, but *D man*, where D appears as *a* or a *wh*-word in the Phrase-markers. What generates M-graphs are lexical items and functional elements, whose exact content is specified in the Phrase-markers. I leave a detailed analysis of this particular implementation for further research.

[3] Here, I have used an unergative verb *laugh* for one of the CPs, and I have used a subject relative clause for the other CP. The structure I draw is simplified to only show subject phases, for purposes of this presentation. The directedness of the edges (headedness) is as in standard analyses; and so I simplify arrows in the following graphs.

(27)

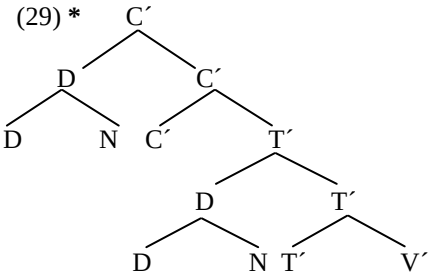


(28)



Importantly, we rule out Phrase-markers that contain multiple occurrences of the D-N pair:

(29) *****



Then, PF and LF interpret a restricted family of Phrase-markers, for example, containing the larger phrase-marker created by intersecting (49)-(50), above.

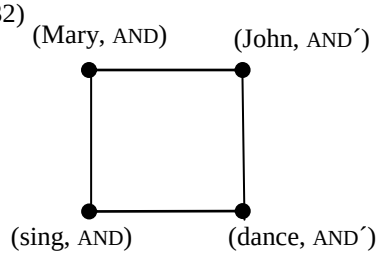
4.3.2 The "family of coordination"

Here, we show that the SARC structure is not unique. From narrow syntax, a family of structures arises from a general notion of coordinating sets of grammatical formatives. The family of coordinated structures is derived using a representation of *and* as a binary grammatical connective (*and, and´*). For two clauses containing {John, Mary, sing, dance}, there are two possibilities, at first glance:

(30) Mary sings and John dances.
(31) Mary and John sing and dance (respectively).

To coordinate these clauses, I incorporate a notion of *binary grammatical connective* (generalized in Vergnaud to appear), such that a binary pair of logical connectives occurs across the nominal-verbal (here, DP-CP) domain, with (*and, and´*) spanning a Specifier-Head pair:[4]

(32)



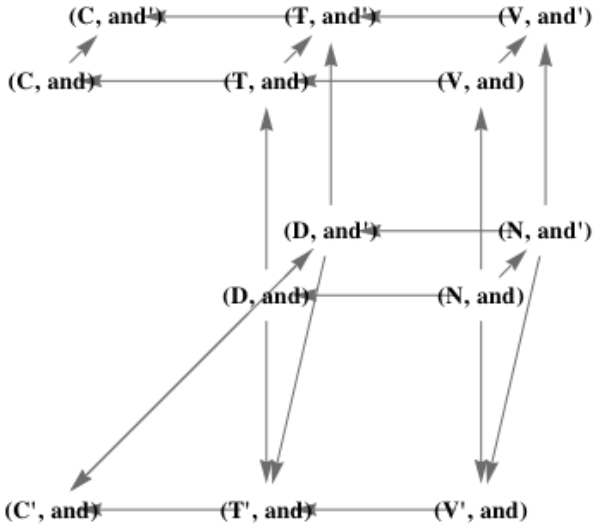
[4] A condition on Spell-out that it must go by *dimension* (pairs of edges) will prevent overgeneration, i.e., *Mary and John and sing and dance*. The details are not given here (but see McKinney-Bock 2011).

Then, two Phrase-markers can be read from the graph and used to linearize (53) or (54). To account in more detail for SARC, let's start by looking at the three CPs that belong to the two structures:

(33) a. Mary met a man.
b. John met a woman.
c. A man and a woman know each other well.

The two coordinated objects appear as follows, with the (plural) relative clause linked with both of these objects. For SARC, the structure has a single pair (D, C´) which relativizes the plural sentence:

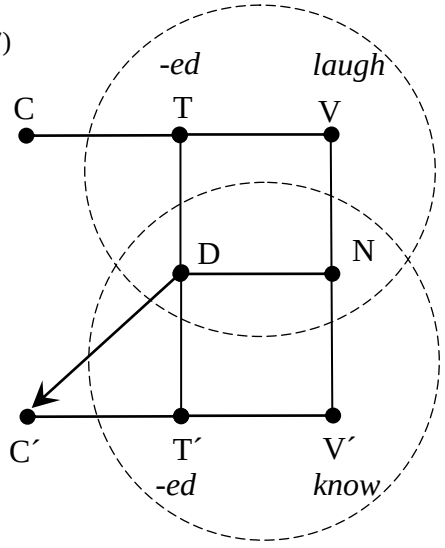
(34) Mary met a man and John met a woman who know each other well.



The binary connective (*and, and´*) can apply to either clausal domain (either circle pictured below). This results in a coordination of matrix clauses, or a coordination of relative clauses, as in the following examples:

(35) **Mary met a man** and **John met a woman** who know each other well.
(36) **A man who Mary met** and **a woman who John met** know each other well.

(37)



The family of coordination arises when *and* coordinates seemingly more than just a clause:

(38) A man who Mary met and a woman who John met danced and sang.
(39) A man and a woman who Mary met and who John met danced and sang.
(40) A man and a woman who Mary met danced and sang.
etc.

5 Conclusion

The interaction of coordination and relativization under Graph Theoretic Syntax, the analysis given here, naturally predicts SARC as part of a family of coordinate structures rather than treating it as anomalous. It shows an advantage for a new, strongly Minimalist approach to syntax.

References

Balakrishnan, R. and K. Ranganathan. 2000. *A Textbook of Graph Theory*. New York: Springer.
Baltin, Mark. 2005. Extraposition. In *The Blackwell Companion to Syntax*, ed. M. Everaert and H. van Riemsdijk, 237–271. Blackwell Publishing. Blackwell Reference Online. 01 September 2011.
Chomsky, Noam. 1975. *The Logical Structure of Linguistic Theory*. Chicago: University of Chicago Press.
Chomsky, Noam. 1981. *Lectures on Government and Binding.* Dordrecht: Foris.
Chomsky, Noam. 1995. *The Minimalist Program*. Cambridge, MA: MIT Press.
Chomsky, Noam. 2001. Derivation by Phase. In *Ken Hale: A Life in Language*, ed. M. Kenstowicz. Cambridge, MA: MIT Press.
Chomsky, Noam. 2008. On Phases. In *Foundational Issues in Linguistic Theory: Essays in Honor of Jean-Roger Vergnaud*. Cambridge, MA: MIT Press.
Citko, Barbara. 2005. On the Nature of Merge: External Merge, Internal Merge, and Parallel Merge. *Linguistic Inquiry* 36.4:475–496.
Fox, Danny and Jon Nissenbaum. 1999. Extraposition and Scope: A case for overt QR. In *Proceedings of the 18th West Coast Conference in Formal Linguistics*, ed. S. Bird, A. Carnie, J. Haugen, and P. Norquest, 132–144. Somerville: Cascadilla Press.
Gracanin-Yuksek, Martina. 2007. About Sharing. Doctoral dissertation, MIT.
Kayne, Richard. 1994. *The Antisymmetry of Syntax*. Cambridge, MA: MIT Press.
Liao, W.-W. Roger and Jean-Roger Vergnaud. 2010. Of NPs and Phases. Paper presented at GLOW in Asia 8. August 12–16.
Link, G. 1984. Hydras. On the Logic of Relative Clause Constructions with Multiple Heads. In *Varieties of Formal Semantics*, ed. F. Landman and F. Veltman, 151–180. Dordrecht: Reidel.
McCawley, James. 1982. Parentheticals and Discontinuous Constituent Structure. *Linguistic Inquiry* 13:91–106.
McKinney-Bock, Katherine and Jean-Roger Vergnaud. 2010. Grafts and Beyond. Paper presented at GLOW 33, Wrocław, Poland. April 14–16.
Perlmutter, David M. and John R. Ross. 1970. Relative Clauses with Split Antecedents. *Linguistic Inquiry* 1:350.
Ross, John R. 1967. Constraints on Variables in Syntax. Doctoral Dissertation, MIT.
Wilder, Chris. 1994. Coordination, ATB and Ellipsis. *Groninger Arbeiten zur Germanistischen Linguistik* 37:291–331.
Wilder, Chris. 2008. Shared Constituents and Linearization. In *Topics in Ellipsis*, ed. Kyle Johnson. Cambridge University Press.
Vergnaud, Jean-Roger. To appear. Some Explanatory Avatars of Conceptual Necessity: Elements of UG. Ms., University of Southern California.

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