Deriving Contiguity[*]

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Richards (2016) proposes the principle in (1) (the details of which, including the definition of *Contiguity-prominent*, will be discussed below):

(1)   *Generalized Contiguity*

If α either Agrees with or selects β, α and β must be dominated by a single prosodic

node, within which β is Contiguity-prominent.

The proposal in Richards (2016) is developed in the framework of Match Theory (Selkirk 2009, 2011, Elfner 2012, 2015, Clemens 2014, Bennett, Elfner, and McCloskey 2016), a particular approach to the mapping of syntactic structure onto prosodic structure, which amounts to a series of claims about how certain dominance relations in a syntactic tree are to be mapped onto dominance relations in a corresponding prosodic tree. Contiguity is offered as an exception to the general algorithms of Match Theory: the idea of Richards (2016) is that the proposals of Match Theory are generally correct, except when Agree and selection relations are involved, when Match Theory is overridden by the proposal in (1).

Richards (2016) describes a number of syntactic phenomena, including the distribution of various types of overt movement and of adjacency requirements, which can be made to follow from the principle in (1). Still, even if we find the explanations based on (1) compelling, we are entitled to ask why (1) should hold at all. Why should Agree and selection relations have these

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effects on prosody, rather than some other effect? As always, it could be that this question is premature, or in fact deeply unanswerable; (1) might just be an axiom.

Still, I will spend this paper trying to derive the effects of (1) from other principles. In particular, the idea will be that a rephrased version of Match theory, together with an independently proposed condition on the syntactic representation of Agree relations, will allow us to derive the effects of (1). The result will be that (1) itself will dissolve; the only conditions on prosodic representation will be general conditions, like those which already make up Match Theory, that map syntactic relations of dominance onto corresponding prosodic dominance relations. There will be some differences in empirical predictions between the proposal of this paper and the one in (1), but these will not be the main focus of the paper; rather, I will concentrate on trying to show that (1) is a theorem, rather than an axiom.

In practice, Contiguity affects Agree and selection relations in somewhat different ways (although I argue in Richards (2016) that Contiguity is a single principle governing both kinds of operations). I will spend section 1 discussing how we can derive Contiguity for Agree relations, and section 2 will turn to selection relations.
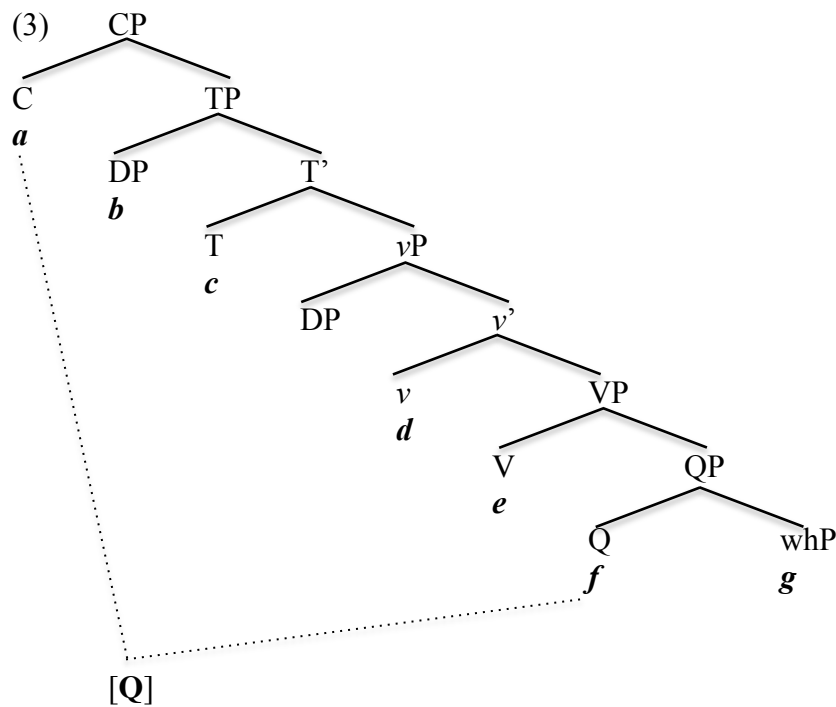
1. Probe-Goal Contiguity

The account of Probe-Goal Contiguity will have two main components. One is a version of Match Theory, which contains statements like the one in (2) (from Bennett, Elfner, and McCloskey 2016):

(2)   Given a maximal projection XP in a syntactic representation S, where XP

         dominates all and only the set of terminal elements {*a*, *b*, *c*, …*n*}, there must be

         in the phonological representation P corresponding to S a ϕ-phrase which

         dominates all and only the phonological exponents of *a*, *b*, *c*, … *n*.

The statement in (2) requires that a given maximal projection XP correspond to a prosodic projection ɸ, in which every terminal element dominated by XP has a corresponding phonological terminal element dominated by ɸ.

The second major component of the account to be developed here is the idea that the Agree operation creates multidominance structures. Frampton and Gutmann 2000, for example, propose that an Agree relation creates a structure in which a single feature is immediately dominated by two heads:

(3)

```
          CP
        /    \
       C      TP
       a     /   \
           DP      T'
           b      /   \
                 T      vP
                 c     /   \
                     DP      v'
                            /   \
                           v      VP
                           d     /   \
                                V      QP
                                e     /   \
                                     Q      whP
                                     f      g
```

[Q]

In (3), a Probe-Goal relation between C and Q has created a structure in which a feature [Q] is immediately dominated by both of these heads. Pollard and Sag (1994), Brody (1997), Sag et al (2003), and Pesetsky and Torrego (2007) argue for similar claims about the structural consequences of Agree relations. Johnson (2012) proposes much more extensive multidominance structures as a result of Agree; Johnson's structures will be compatible with the proposal developed in this paper, but are not necessary, as far as I can see, to make the points I

am trying to make, so I will stick with the more conservative structure in (3). For reasons to posit something like (3), I refer interested readers to the works cited just above; one argument has to do with the observation that there are cases in which it is useful to establish at an early stage of the derivation that two heads bear the same value for a given feature, even before the actual value for that feature has been determined.

A consequence of the structure in (3) will be that, as a result of Agree, the phrase QP dominates, not only the terminals *f* and *g*, but also, in some sense, the terminal *a*; at any rate, QP dominates a feature which makes up part of *a*. Consequently, I will argue, a principle of Match Theory like the one in (2) above will demand, once Agree between C and Q has been established, that the ϕ corresponding to QP dominate, not only the phonological exponents of *f* and *g*, but also the phonological exponent of *a*. This represents one of the two requirements imposed on nodes in Agree or selection relations by (1) above, repeated here as (4):

(4)   *Generalized Contiguity*

If α either Agrees with or selects β, α and β must be dominated by a single prosodic

node, within which β is Contiguity-prominent.

The requirement that Probes and Goals be contained in a single prosodic node will follow, I will argue, not from a stipulation about the prosodic representation of Agree relations, but from Match Theory, together with the idea that Agree creates multidominance structures. The proposal in (4) also makes a second claim, namely that the prosodic node dominating the Probe and the Goal must be one in which the Goal is *Contiguity-prominent*: I will explain and derive this part of the condition in (4) below.

It will be important for the theory developed here that we change Match Theory in two ways. The first has to do with expanding the set of relations to which Match Theory makes

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reference: I will elaborate on that point further below. The second has to do with when prosodic structures are built. One of the central ideas in Richards (2016) is that prosodic structures are built cyclically, in tandem with the syntactic cycle, and that some of the operations performed in the narrow syntax can be driven by the need to improve prosodic representations. In what follows, we will need Match Theory to be applied to this early representation of prosodic structure, rather than (as is standardly assumed) building prosodic structure entirely postsyntactically.

Suppose we consider a derivation for a wh-question. We might begin by Merging a wh-phrase with Cable's (2007, 2010a, 2010b) Q:

(5)   QP   (5') ϕ_{QP}

    Q   whP ω_Q ϕ_{whP}
    f   *g*   *f*   *g*

By hypothesis, the creation of the syntactic object in (5) is accompanied by the creation of the corresponding prosodic object in (5'), in accordance with the generalizations of Match Theory.

One way to say that prosodic structure is created cyclically is to say that it must be created as quickly as possible. The Merge operation that creates (5), for example, creates the maximal projection QP; in so doing, it creates an object that can be mapped onto a ϕ, following the core statement of Match Theory given above in (2) and repeated here as (6):
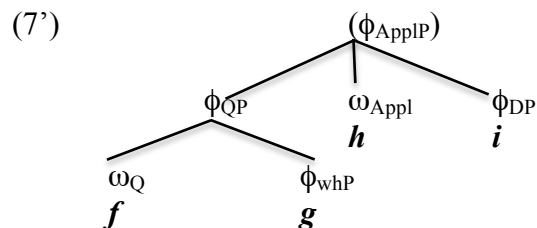
(6)   Given a maximal projection XP in a syntactic representation S, where XP

         dominates all and only the set of terminal elements $\{a, b, c, ...n\}$, there must be

         in the phonological representation P corresponding to S a ϕ-phrase which

         dominates all and only the phonological exponents of a, b, c, ... n.

The statement in (6) was developed in a non-cyclic approach to Match Theory. But if we do apply Match Theory cyclically, we can do away with part of this statement. There is no need to

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specify that the ϕ corresponding to an XP may dominate *only* those terminals that correspond to terminals dominated by the XP. In (5), for example, it is enough to state that ϕ_{QP} must dominate *all* of the terminals dominated by QP. Thanks to the cyclic manner in which prosodic structure is created, there are no terminals in the tree that are *not* dominated by QP, at the point at which QP is mapped onto a prosodic structure. Moreover, the general logic of the cycle will dictate that once ϕ_{QP} has been created, it should not be altered, unless it comes to dominate further material. If the next Merge operation were to create a specifier of QP, for example, then the relevant terminals would have to be introduced in positions dominated by QP, since this is the central claim of Match Theory. But if the next Merge operation introduces, for example, a head taking QP as a complement, then there is no need to make ϕ_{QP} dominate the new material, and general principles of cyclicity should dictate that ϕ_{QP} be left alone. Again, it will generally be true that material not dominated by QP will not correspond to material dominated by ϕ_{QP}, not because of the requirement in (6), but just because of the nature of the cycle. A cyclic process for building up of prosodic structure, then, allows us to exchange (6) for (6'):
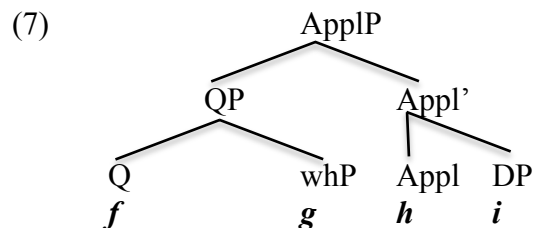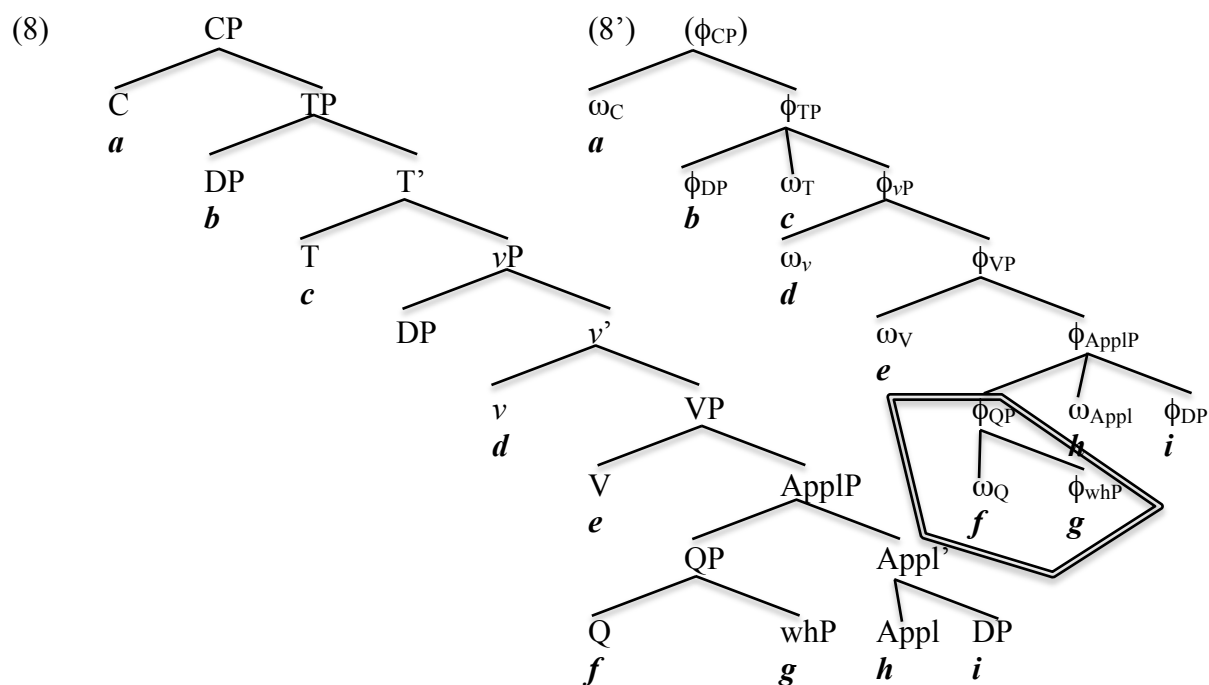
(6')   Given a maximal projection XP in a syntactic representation S, where XP

dominates all and only the set of terminal elements $\{a, b, c, …n\}$, there must be

in the phonological representation P corresponding to S a ϕ-phrase which

dominates all ~~and only~~ the phonological exponents of *a*, *b*, *c*, … *n*.
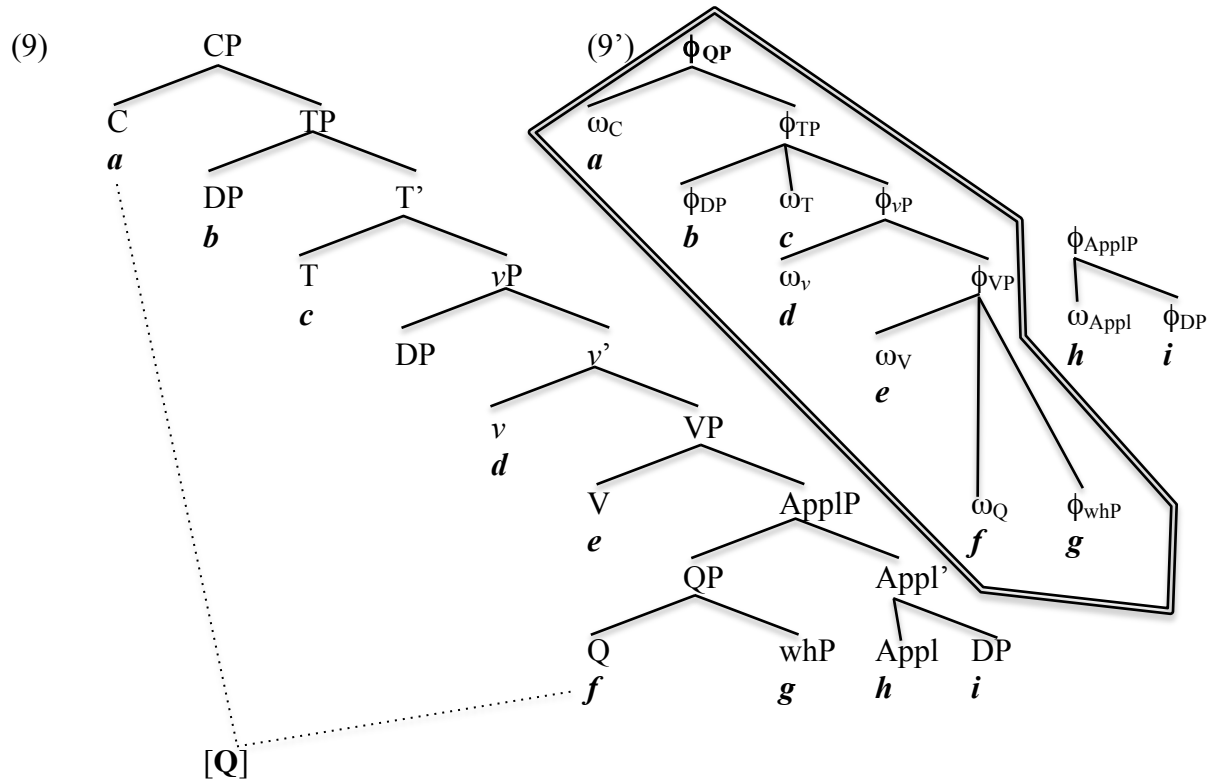
Next, the syntactic derivation might continue by making the structure in (5) part of a larger structure under construction, as in (7), simultaneously building the corresponding prosodic structure in (7'):

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(7)
```
            ApplP
         /         \
       QP          Appl'
      /  \         /    \
     Q   whP    Appl    DP
     f    g      h       i
```

(7')
```
            (φApplP)
         /     |      \
       φQP    ωAppl    φDP
      /  \      h       i
    ωQ   φwhP
     f    g
```

Merge might then go on to create the syntactic tree in (8), with the corresponding prosodic tree in (8') (here I have marked the φ corresponding to QP, for ease of comparison with the next tree to be created):

(8)
```
        CP
      /    \
     C      TP
     a     /  \
         DP    T'
         b    /  \
            T      vP
            c    /   \
               DP     v'
                    /    \
                   v      VP
                   d    /    \
                       V      ApplP
                       e     /      \
                           QP        Appl'
                          /  \       /    \
                         Q   whP   Appl    DP
                         f    g     h       i
```

(8')
```
        (φCP)
      /      \
    ωC        φTP
    a       /   |   \
         φDP   ωT    φvP
          b    c    /   \
                  ωv      φVP
                  d     /     \
                      ωV       φApplP
                      e      /       \
                          φQP      ωAppl   φDP
                         /  \        h       i
                       ωQ   φwhP
                        f    g
```

In a derivation like this one, in which no Agree relations are represented, there is no obvious difference in output between a derivation in which the prosodic tree is built cyclically, as here, and one in which the prosodic tree is built all at once after the syntactic derivation has completed, as is standardly assumed. But now let us consider what happens when C and Q Agree:

(9)

CP
C *a*
TP
DP *b*
T'
T *c*
vP
DP
v'
v *d*
VP
V *e*
ApplP
QP
Q *f*
whP *g*
Appl'
Appl *h*
DP *i*

[**Q**]

(9')

φ_{QP}
ω_C *a*
φ_{TP}
φ_{DP} *b*
ω_T *c*
φ_{vP}
ω_v *d*
φ_{VP}
ω_V *e*
ω_Q *f*
φ_{whP} *g*
φ_{ApplP}
ω_{Appl} *h*
φ_{DP} *i*

The Agree relation in (9), as I mentioned above, creates a syntactic tree in which QP dominates, not only *f* and *g*, but also (part of) *a*. I want to suggest that the proper mapping of such a tree onto prosodic structure is the one in (9'), in which the φ corresponding to QP now dominates, not only *f* and *g*, but also *a* (along with *b*, *c*, *d*, and *e*).

The mapping of (9) onto (9') is the best possible one under a particular interpretation of Match Theory. I proposed above that, since prosodic structure is to be derived cyclically, there is no need to stipulate that the φ corresponding to a maximal projection must dominate *only* those terminals corresponding to the ones dominated by the maximal projection; we need merely state that *all* of the corresponding terminals become part of the corresponding φ. In (9'), it is crucial that φ_{QP} dominate all of *a*, *f*, and *g*. Since it is impossible for a φ to dominate a linearly non-contiguous set of terminals (see Johnson (2012) for important discussion of this point), in order for φ_{QP} to dominate *a*, *f*, and *g*, it must also dominate material that QP does not dominate (*b*, *c*, *d*,

and *e*); as long as we do not stipulate that a corresponding φ should not dominate material not dominated by the corresponding XP, this is the expected result.

I have also drawn the tree in (9') with ϕ_{ApplP} extraposed, so that it is not dominated by the new ϕ_{QP}. We will see the reasons for this shortly; they will have to do with the relation of *Contiguity-prominence*, alluded to above and defined below.

We must assume that at the point in the derivation in (9), the most important consideration in the construction of the corresponding prosodic tree (9') is the prosodic representation of QP. The tree in (9') is one in which ϕ_{QP} dominates all (though not only) the terminals dominated by QP, including *a*. The Agree relation which allowed Q to (partly) dominate *a* also creates a dominance relation between, for example, VP and *a*, by the same token—but this dominance relation is not reflected in the prosodic tree. In other words, the tree in (9') corresponds to the syntactic structure of QP more faithfully than it does to the syntactic structure of VP. We can understand this as another consequence of the cyclic derivation of the structure. The derivational step that converted the tree in (8) into the tree in (9) involves an Agree relation with a feature on Q, and the prosodic representation of QP is therefore the grammar's main priority at this point. We might imagine that QP gets this special status by virtue of being the maximal projection of the head bearing the feature participating in the Agree relation (perhaps because the feature in question, like the label of the head that contains it, actually percolates to QP). Alternatively, perhaps the φ corresponding to QP is simply the smallest prosodic unit that can be made to Match its corresponding syntactic structure once the Agree operation has taken place, and something like Minimal Search therefore compels the grammar to focus on the prosodic representation of QP, to the exclusion of all other projections.

With these assumptions in place, we can use Match Theory to guarantee that if X and Y are in an Agree relation, they must be dominated by a single φ; not because any condition on the mapping of prosody onto syntax makes specific reference to Agree relations, but because of an independently offered proposal about the syntactic representation of Agree relations, together with a certain interpretation of Match Theory (in particular, one in which Match Theory is applied cyclically as the derivation proceeds, and in which ϕ_{XP} merely need dominate *all* the terminals dominated by XP, and not necessarily *only* those terminals). This was one of the requirements imposed by Generalized Contiguity:

(10) *Generalized Contiguity*

If α either Agrees with or selects β, α and β **must be dominated by a single prosodic node**, within which β is Contiguity-prominent.

Let us now turn to the second half of Generalized Contiguity. Why must β be Contiguity-prominent?

In Richards (2016), I offered a definition of Contiguity-prominence that made reference to the distribution of *prosodic activity* in a given language. Prosodic activity, I claimed, can be any phenomenon that is sensitive to prosodic structure. Japanese, for example, exhibits Initial Lowering, a low tone that appears at the left edge of φ (Selkirk and Tateishi 1988 and much other work); we can therefore say that Japanese has prosodic activity on the left edge of φ. Georgian φ ends with a high boundary tone (Jun, Vicenik, and Löfstedt 2007, Vicenik and Jun 2014); in other words, Georgian φ has prosodic activity on the right.

For our purposes, we can define Contiguity-prominence as follows:

(11) Given two φ, F and G, with F contained in G, F is *Contiguity-prominent* in G if there is a prosodically active edge of G from which F is not linearly separated by any other φ.

Consider the tree in (12), for example, featuring a ϕ_G with prosodic activity on its left (represented by a left bracket):

(12)
$$
\begin{array}{c}
[\,\phi_G \\
\diagup \quad \diagdown \\
\omega \qquad \phi_F \\
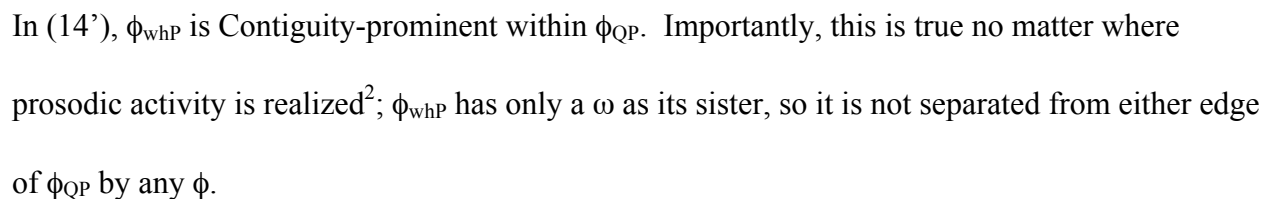\diagup \quad \diagdown \\
\phi_E \qquad \phi_D
\end{array}
$$
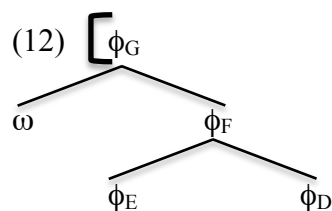
In the tree in (12), ϕ_F and ϕ_E are both Contiguity-prominent; both are separated from the prosodically active left edge of ϕ_G by a ω, but not by a ϕ. ϕ_D, on the other hand, is not Contiguity-prominent, since it is separated from the prosodically active left edge of ϕ_G by a ϕ (namely, ϕ_E). I hope that the notion of Contiguity-prominence may eventually be made to map onto some more general notion of prosodic prominence, but for the time being I will continue to use the technical term *Contiguity-prominence,* defined as in (11).

To derive the requirement of Contiguity-prominence in (10), I propose that we expand Match Theory in two ways. First, let us allow Match Theory to constrain, not only the relation between syntactic trees and their corresponding prosodic trees, but the relation between prosodic trees created by successive derivational steps. In terms of the trees under consideration here, we will allow Match Theory to constrain, not only the relation between (9) and (9'), but also the relation between (8') and (9').

The second change I want to make to Match Theory is to allow it to require the grammar to maximally preserve, not only existing dominance relations, but also existing relations of Contiguity-prominence:
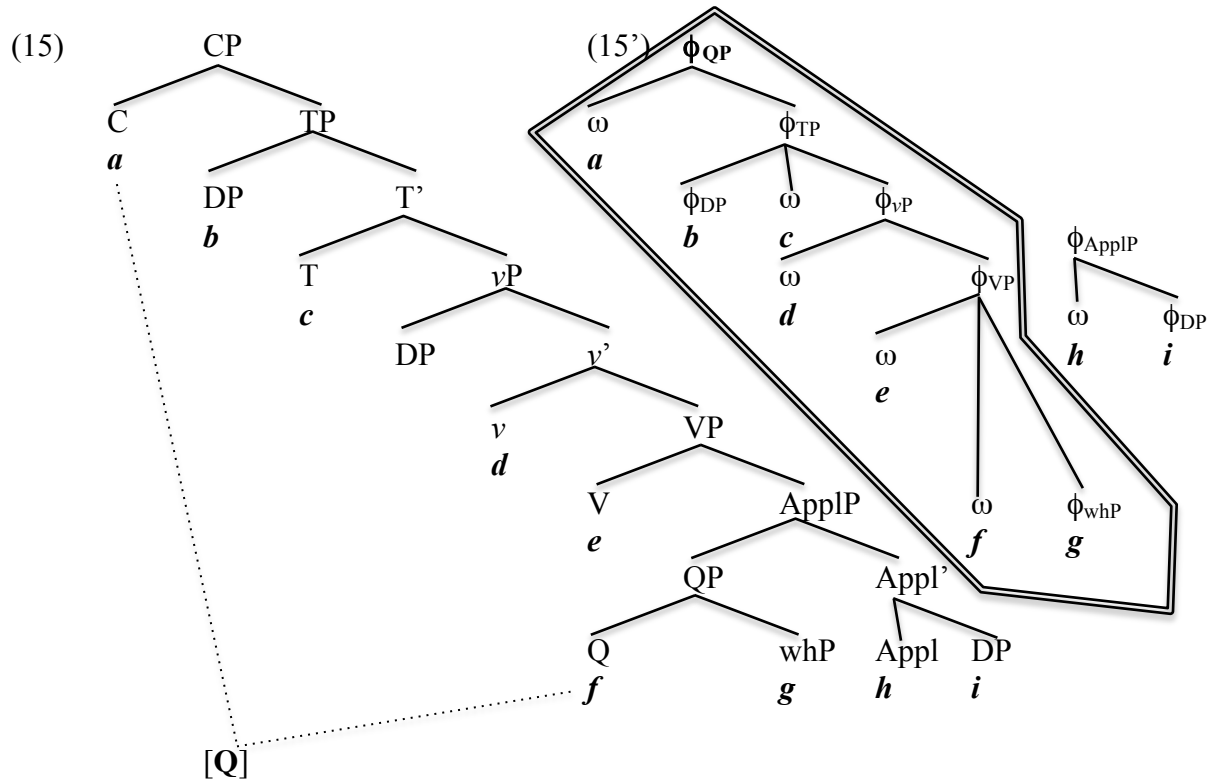
(13)   Given a ϕ, F, in a tree T, and a corresponding ϕ, F', in a corresponding tree T',

any ϕ, G, which is Contiguity-prominent in F must correspond to a ϕ, G', which is

Contiguity-prominent in F'.

This view of Match Theory makes it into a general condition that derivational steps be 'conservative'; we might imagine a grammar that can in principle apply any operation to a tree, but is constrained by a need to preserve certain relations if possible[1]. We are entitled to ask, of course, what makes those particular relations the special ones to be preserved, but I will not try to address that question here.

How does this extended version of Match Theory give us the desired result? Consider again the trees in (8-8'), repeated as (14-14'):

In (14'), ϕ_{whP} is Contiguity-prominent within ϕ_{QP}. Importantly, this is true no matter where prosodic activity is realized[2]; ϕ_{whP} has only a ω as its sister, so it is not separated from either edge of ϕ_{QP} by any ϕ.

Next we can consider how the trees in (14) change once C Agrees with Q:

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[1] We could see this version of Match Theory as a cousin of the Minimal Link Condition, which requires the grammar to preserve (total) dominance relations as much as possible in the derivational steps linking syntactic trees.

[2] …as long as it is realized somewhere. If there are languages that lack prosodic activity, then the theory as stated seems to predict that the considerations under discussion here will never trigger movement in such languages. I leave the question of whether this is a problematic prediction for future research.

(15)

```
              CP
        ┌──────┴──────┐
        C            TP
        a       ┌─────┴─────┐
               DP          T'
               b      ┌─────┴─────┐
                      T          vP
                      c     ┌─────┴─────┐
                           DP          v'
                              ┌─────────┴─────────┐
                              v                  VP
                              d            ┌──────┴──────┐
                                           V           ApplP
                                           e       ┌─────┴─────┐
                                                  QP          Appl'
                                             ┌────┴────┐    ┌───┴───┐
                                             Q        whP  Appl   DP
                                             f         g    h      i
        [Q]
```

(15')

```
              φ_QP
        ┌──────┴──────┐
        ω            φ_TP
        a       ┌─────┴─────┐
              φ_DP   ω     φ_vP
               b     c  ┌───┴───┐
                       ω       φ_VP
                       d    ┌───┴───┐          φ_ApplP
                           ω      ┌─┴─┐     ┌────┴────┐
                           e      ω  φ_whP  ω       φ_DP
                                  f    g    h        i
```

In (15'), the φ corresponding to QP has been expanded to include the terminal *a* as well as the terminals *f* and *g*, for reasons discussed above. Does the shift from (14') to (15') preserve the Contiguity-prominence of ϕ_{whP} within ϕ_{QP}, as the extended version of Match Theory requires?

The answer to this question depends on the location of prosodic activity in the language in question. If the language is one that realizes prosodic activity on the right edge of φ, then ϕ_{whP} is still Contiguity-prominent within ϕ_{QP}; there is no φ intervening linearly between ϕ_{whP} and the right edge of ϕ_{QP}. On the other hand, if the language has prosodic activity on the left edge of φ, then ϕ_{whP} is no longer Contiguity-prominent within ϕ_{QP}; ϕ_{DP}, dominating the terminal *b*, linearly intervenes between ϕ_{whP} and the left edge of ϕ_{QP}.

Note that the prosodic extraposition of ϕ_{ApplP} is crucial for this result; if *h* and *i* were part of the expanded ϕ_{QP}, then Contiguity-prominence could not be preserved. No similar operation of extraposition can save the structure if prosodic activity is on the left; since the φ dominating *b*
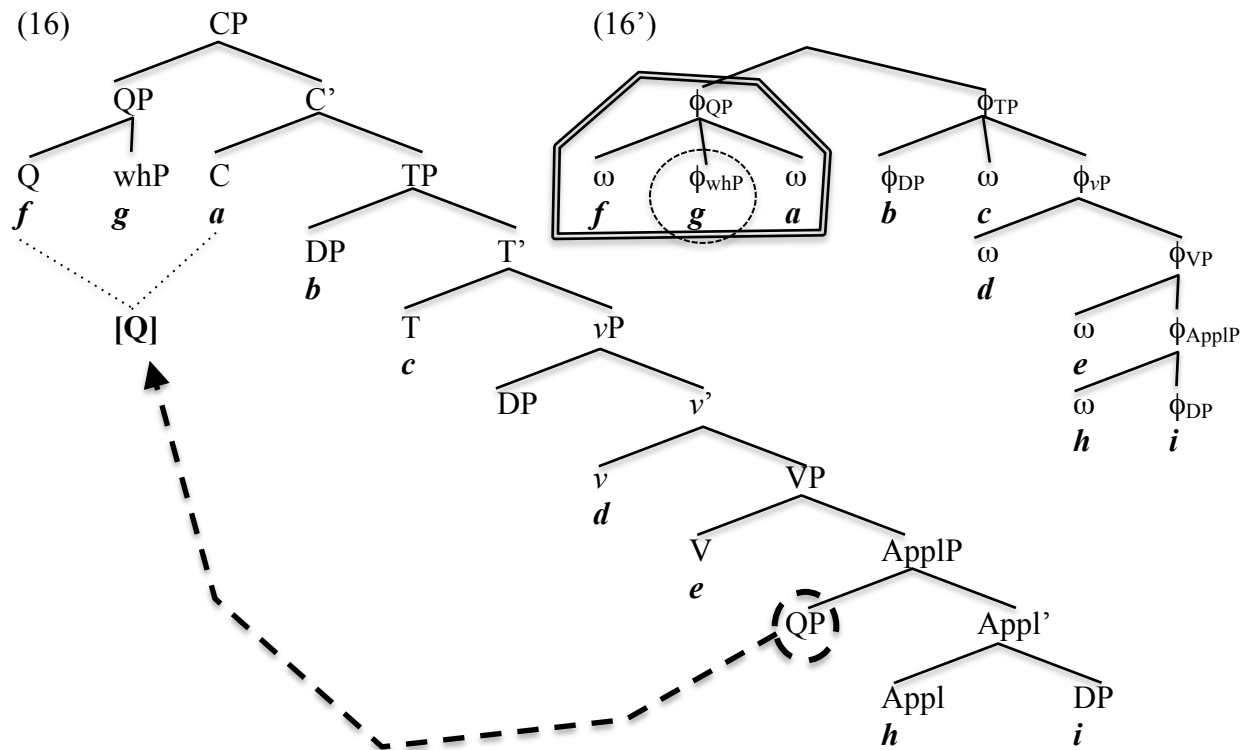
intervenes linearly between **a** and **f**, any ϕ containing both **a** and **f** will necessarily contain **b**, and Contiguity-prominence for ϕ_{whP} will therefore be impossible.

Here, again, it is important that Match Theory apply cyclically. In a language with prosodic activity on the right, the prosodic tree in (15') preserves the Contiguity-prominence of ϕ_{whP} within ϕ_{QP} that was established in (14'), but destroys the Contiguity-prominence, for example, of ϕ_{DP} (the one dominating the terminal **i**) within ϕ_{VP}. At this point in the derivation, thanks to cyclicity, the derivation's primary concern is the prosodic status of ϕ_{QP}; in particular, making sure that any ϕ that was Contiguity-prominent in ϕ_{QP} previously still retains that status outweighs all other considerations[3].

Movement of QP to a specifier of CP will always create a structure that preserves Contiguity-prominence for ϕ_{whP}:

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[3] Interestingly, the grammar is not equally concerned that ϕ_{QP} continue to *be* Contiguity-prominent in whatever domains it was previously Contiguity-prominent in. Wh-movement of QP out of VP, for example, will prevent ϕ_{QP} from being Contiguity-prominent within ϕ_{VP}; we do not want this to be a consideration preventing the use of movement. Match Theory is concerned, at this point, with QP's relations (of dominance and Contiguity-prominence) with its *contents*, and not with its relations with material outside it.

(16)

CP
├─ QP
│ ├─ Q
│ │ *f*
│ └─ whP
│   *g*
└─ C'
   ├─ C
   │ *a*
   │ [Q]
   └─ TP
      ├─ DP
      │ *b*
      └─ T'
         ├─ T
         │ *c*
         └─ vP
            ├─ DP
            └─ v'
               ├─ v
               │ *d*
               └─ VP
                  ├─ V
                  │ *e*
                  └─ ApplP
                     ├─ QP
                     └─ Appl'
                        ├─ Appl
                        │ *h*
                        └─ DP
                           i

(16')

ϕQP
├─ ω *f*
├─ ϕwhP *g*
└─ ω *a*

ϕTP
├─ ϕDP *b*
├─ ω *c*
└─ ϕvP
   ├─ ω *d*
   └─ ϕVP
      ├─ ω *e*
      └─ ϕApplP
         ├─ ω *h*
         └─ ϕDP *i*

In (16'), not only does ϕQP dominate all and only the terminals corresponding to those dominated by QP in (16), but ϕwhP is Contiguity-prominent within ϕQP, as it was in (14'), again regardless of the location of prosodic activity: ϕwhP is linearly separated from the edges of ϕQP only by ω, not by any instance of ϕ. We should expect the option in (16') to be available, then, regardless of the position of prosodic activity. Languages with prosodic activity on the left should only have the option of movement, represented in (16'); languages with prosodic activity on the right should have both the movement option in (16') and the in-situ option in (15'). And this is indeed one of the generalizations offered in Richards (2010, 2016), for languages with initial C.

The reasoning outlined above derives this result, not from any specific conditions on the prosodic representation of Agree relations, but from an expanded version of Match Theory, applied cyclically to the derivation as it proceeds, together with an independently supported proposal about the syntactic effects of Agree. The approach developed above has the virtue, as compared to the approach of Richards (2016), of being relatively restrictive. In a theory in

which mapping to prosody may make specific reference to Agree relations and assign special prosody to them, there is no clear reason why Agree relations should be associated with one type of prosodic effect rather than another. In the theory developed here, by contrast, the mapping to prosody is comparatively simple and uniform, and what look like deviations from classic Match theory, if they are not to be explained by the interface with phonology, must arise from properties of the syntactic structure itself, which must then be independently argued for. In this particular case, the starting point for the account was the proposal (Brody 1997, Frampton and Gutmann 2000, Pesetsky and Torrego 2007, and others) that Agree involves the creation of multidominance structures; what looked like a special prosody for Agree relations was in fact the result of general principles of Match Theory, applied to structures with comparatively complex dominance relations.

2. Selectional Contiguity

As its name is intended to suggest, Generalized Contiguity is supposed to apply, not just to Agree relations, but also to relations of selection:

(17)   *Generalized Contiguity*

If α either Agrees with <u>or selects</u> β, α and β must be dominated by a single prosodic node, within which β is Contiguity-prominent.

It is important in Richards (2016) that Generalized Contiguity functions somewhat differently for selection than it does for Agree. As we have just seen, Agree relations require adjacency between the participants in some cases but not in others, depending on the position of prosodic activity in the language in question. Selection relations, by contract, are supposed to invariably require adjacency. In Richards (2016), I try to explain why Agree and selection differ in this
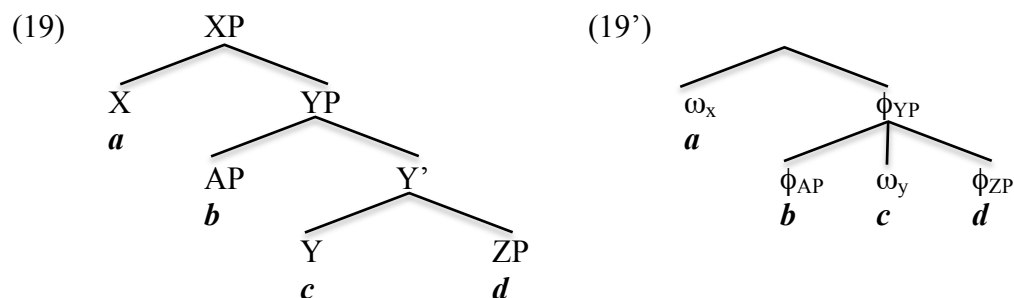
way, and while the account there seems to get the desired result in the framework developed in the book, I will try a different tack here.

Consider a selection relation between X and Y in (18), linearly interrupted by the specifier of Y:
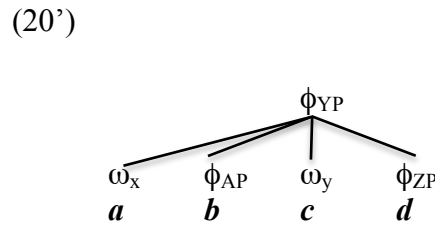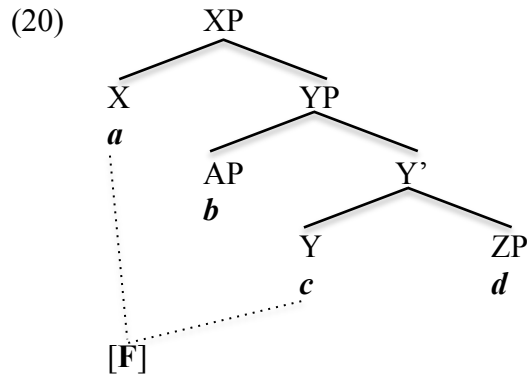
(18)

```
        XP
      /    \
     X      YP
          /    \
        AP      Y'
              /    \
             Y      ZP
```
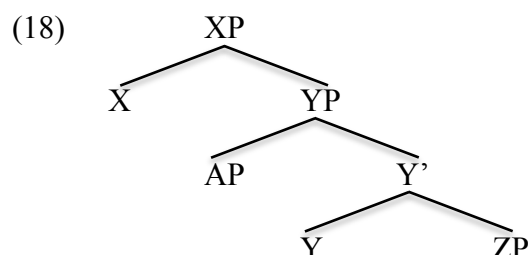
If X selects Y, Generalized Contiguity requires the two heads to become linearly adjacent at some point in the derivation. They could achieve this, for example, by head-movement of Y to X, or by making X and Y both head-final, or by moving AP out from in between the two heads. In Richards (2016) I try to show that all of these techniques are applied to achieve Contiguity, depending on various other factors that constrain their use (for example, Y can only head-move to X if X is an affix).

If the relation between X and Y were one of Agree, the tree in (18) could easily satisfy the considerations outlined in the previous section. Prior to Agree, the tree in (19) could have a prosodic tree like the one in (19'):

(19)

```
        XP
      /    \
     X      YP
     a    /    \
        AP      Y'
        b     /    \
             Y      ZP
             c      d
```

(19')

```
        /    \
      ω_x     φ_YP
      a     /  |  \
        φ_AP  ω_y  φ_ZP
         b    c     d
```

An Agree relation between X and Y would then simply trigger the extension of the ϕ matching YP, so that it dominates not only the terminals **b**, **c**, and **d**, as above, but also the terminal **a**:

(20)
```
              XP
            /    \
          X       YP
          a      /   \
          :    AP     Y'
          :    b     /  \
          :        Y     ZP
          :        c     d
          :       /
         [F]·····
```

(20')
```
           φ_YP
         / / | \
      ω_x φ_AP ω_y φ_ZP
       a   b   c   d
```

The tree in (20') satisfies all the conditions introduced in the last section. ϕ_{YP} dominates all the terminals that YP dominates in (20) (including *a*, a terminal which YP dominates only a feature of). Any ϕ that was Contiguity-prominent in (19') is still Contiguity-prominent in (20'), since all that has been added to ϕ_{YP} is a ω, which by definition cannot interrupt Contiguity-prominence. Dominance and Contiguity-prominence relations are therefore preserved in the derivational step from (19-19') to (20-20').

All of our discussion of Match conditions so far has concentrated on the status of ϕ. Suppose we now turn our attention to the status of ω. In the tree in (20), the Agree relation between X and Y causes YP to dominate the terminal *a* (or, at any rate, part of the terminal *a*), which has been the engine of the explanation so far. But by the same token, the Agree relation in (20) also creates a dominance relation between the head Y and the terminal *a*—and, for that matter, between the head X and the terminal *c*. How are these dominance relations to be reflected in the prosodic tree?

Suppose we state a Match condition relating heads to ω, parallel to the condition mapping maximal projections onto ϕ that was borrowed above from Bennett, Elfner, and McCloskey (2016):

(21)   Given a head X in a syntactic representation S, where X dominates all and only

the set of terminal elements {*a*, *b*, *c*, …*n*}, there must be in the phonological

representation P corresponding to S a ω which dominates all the phonological

exponents of *a*, *b*, *c*, … *n*.

In trees with no Agree relations, a head will generally only dominate a single terminal element,

but in trees like the one in (20), the heads X and Y, thanks to the Agree relation, each dominate

(portions of) each other's terminals. The condition in (21) is therefore violated in (20'), since the

ω corresponding to X and Y each only dominate a single terminal.

If X and Y were string-adjacent in (20), it would be easy to obey (21). Consider what

would happen, for example, if YP lacked a specifier:

(22)   XP   (22')

X   YP ϕ_{YP}
a
        Y   ZP $\omega_{x, y}$ ϕ_{ZP}
        c   *d*   *a c*   *d*

[**F**]
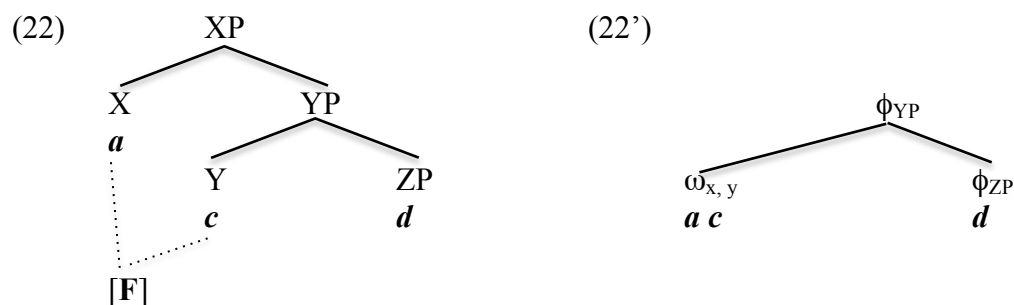
In (22'), a single ω corresponds to both X and Y, and dominates the terminals dominated by both

of these heads in (22). (21) is therefore satisfied: there is a ω that corresponds to Y and

dominates the terminals it dominates (*a* and *c*), and there is a ω that corresponds to X and

dominates the terminals it dominates (also *a* and *c*)—and these ω's are in fact the same ω. Since

a prosodic node cannot dominate a linearly discontinuous string, a representation like the one in

(22') is impossible for (20), where a specifier intervenes between the two heads. If we were to

create a structure like (22') for (20), with a single ω dominating the terminals *a*, *b*, and *c*, there

would no longer be a φ corresponding to the specifier AP at all.

If selection is like Agree in creating structures in which a single feature is immediately dominated by the participating heads, and if it generally holds only locally, perhaps for reasons having to do with the semantics of selection, then we arrive at something like the result argued for in Richards (2016); the grammar will attempt to convert representations like the one in (20), in which heads in a selection relation are not adjacent, into ones like the one in (22), in which they are. Richards (2016) posited a condition on the prosodic representation of selection, but this paper allows us to view that condition as part of the general Match algorithm for mapping syntactic structures onto prosodic structures, represented here by the condition in (21).

Richards (2016) explores various limits on the ways in which linear adjacency can be created between selecting heads. For example, as mentioned above, head-movement of Y to X across the specifier of Y could create linear adjacency between the two heads, as desired, but we should expect this only to be possible if X is an affix. Similarly, I posit a version of Chomsky's (1993) Greed, called Hippocratic Altruism, which generally guarantees that a specifier like the AP in (20), which intervenes between selecting heads, cannot be driven to move out from in between them by the need to create a prosodic relation in which it will not itself participate.

These limitations on the way that adjacency can be created between heads can be taken to be responsible, I think, for the fact that (21) is routinely violated in structures involving Agree relations between heads that are distant from each other in the tree. Consider again the trees in (15) and (15'), repeated here as (23) and (23'):

(23)

CP
C
a
TP
DP
b
T'
T
c
vP
DP
v'
v
d
VP
V
e
ApplP
QP
Q
f
whP
g
Appl'
Appl
h
DP
i

[**Q**]

(23')

φ_QP
ω
a
φ_TP
φ_DP
b
ω
c
φ_vP
ω
d
φ_VP
ω
e
ω
f
φ_whP
g
φ_ApplP
ω
h
φ_DP
i
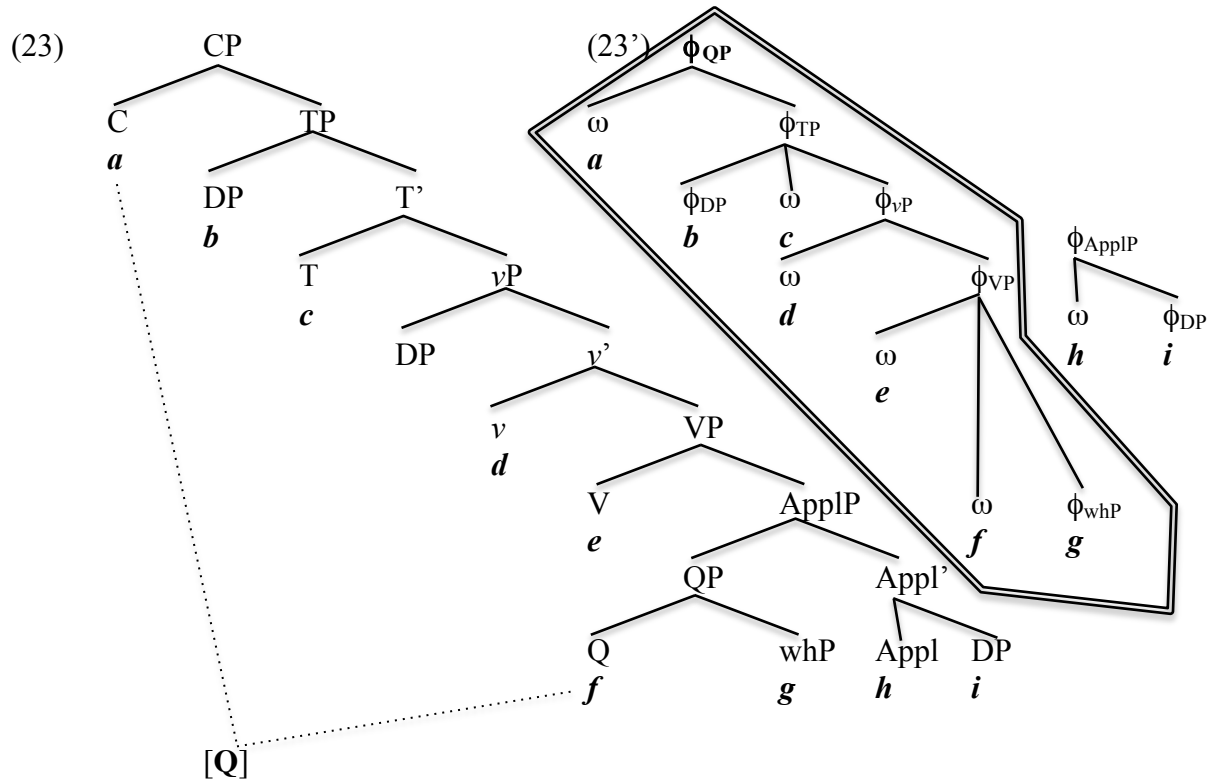
In (23), the φ corresponding to QP correctly dominates all the terminal nodes dominated by QP (including *a*, the terminal that QP dominates because of the Agree relation between C and Q). The ω corresponding to Q, on the other hand, does not dominate both *a* and *f*, and neither does the ω corresponding to C: the Match condition on ω is violated here. But in this particular case, a combination of Hippocratic Altruism and the syntactic conditions on head movement can guarantee that these violations of Match are unavoidable. Q is syntactically unable to head-move to C, and the material intervening between Q and C is constrained by Hippocratic Altruism from obligingly moving out of the way just to make Q and C adjacent. In fact, QP itself must be constrained by Hippocratic Altruism; movement of QP to a position just below C would make adjacency between Q and C possible, but because the prosodic tree in (23') is one in which

Match is satisfied for QP, Hippocratic Altruism prevents QP from moving, even for the sake of its own head[4].

We therefore arrive at a result that resembles the one proposed in Richards (2016): heads in Agree and selection relations must become adjacent just if it is syntactically possible for them to do so. In Richards (2016), selection was taken to be syntactically different from Agree in ways that enforced adjacency for selection but not for Agree. The reasoning above does not have this character; what makes selection special, on this account, is that it is generally constrained, possibly for semantic reasons, to occur between heads that are quite local to each other, and which are therefore capable of satisfying the Match conditions on ω by becoming adjacent. One difference between the account sketched above and the one in Richards (2016), then, has to do with very local Agree relations. If two heads that are structurally very local were to Agree with each other, we would expect them to be required to become adjacent. We would also expect such an Agree relation to be unable to trigger movement of the kind described in this paper, if no φ intervened between the Probe and the Goal. The account here could therefore be used to derive a version of Anti-locality (Abels 2003, Grohmann 2003, Bošković 2005, Erlewine 2016, Brillman and Hirsch to appear).

Another potential difference between this account and that of Richards (2016) has to do with cases in which Selectional Contiguity fails. The account developed here makes it conceivable that there could be such cases; the grammar is simply required to do its best to obey

---

[4] If QP is forced to move (perhaps by the need to preserve Contiguity-prominence, as discussed in the previous section), then we might expect that, all other things being equal, its choice of landing sites could be constrained by the need to create adjacency between C and Q. In other words, if QP is to move in a tree like the one in (23), we might expect it to land beneath C, while if Q is head-final in QP it might have to land above C. In Richards (2016), I discuss another condition (Affix Support) that can constrain landing site in this way, but the reasoning discussed here leads us to expect that condition to interact with this one. I will have to leave the checking of this prediction for future research. It will be easiest to test the prediction in languages in which C and Q are both overt in clauses involving overt wh-movement, and such languages are not common, as far as I know.

the Match conditions on ω, and if these conditions cannot be obeyed (as they cannot, I have said, in cases of Agree relations connecting distant points in the tree), then they simply are not obeyed. In Richards (2016), by contrast, it is not clear that there are any cases in which Selectional Contiguity fails. The account developed here therefore makes it important to look more carefully for failures of Contiguity between heads in the selection relation. If there actually are no such failures, then we might want to consider introducing mechanisms by which such Contiguity may always be created. For instance, we could imagine that the need to create Selectional Contiguity is sufficient to trigger conversion of a higher head to an affix (making it possible for a lower head to move to the higher head, and thus become Contiguous). Indeed, we could entertain the possibility that this kind of conversion is the only source for affixes. I will leave the exploration of this kind of possibility for future work.

3. Conclusion

This paper has made a claim (also defended at length in Richards 2016) about the relation between syntax and phonology. The current consensus about this relationship in Minimalist circles, as I understand it, is that a phonological derivation begins once the syntactic derivation of a spellout domain is completed. The details of the phonological derivation are not often a focus of interest for syntacticians (though see, for example, Elbourne and Sauerland (2002) and Arregi and Nevins (2012), among other work, for discussion), but I think it is generally assumed that the derivation begins with a syntactic tree and performs a series of operations to convert that tree into a representation that can be used by the phonological interface, perhaps eventually a series of instructions for the articulators.

On this view, it is logically necessary that there are operations that create representations that are to be used by phonology, but which apply to a syntactic tree. After all, if there is a

purely syntactic derivation, resulting in a purely syntactic tree, which then begins to undergo a

phonological derivation, then at least the first operations in that phonological derivation must be

operations that can apply to a purely syntactic tree. In a sense, the proposal of Contiguity Theory

is a very modest one; this kind of phonological operation, which applies to a syntactic tree, can

apply, not after the syntactic derivation is completed, but while it is still under way. In fact, if

there are any operations that the phonological derivation can perform before the syntactic

derivation is complete, perhaps it makes sense for them to be performed as early as possible, if

the goal is for the derivation to produce linguistic objects as quickly and efficiently as it can.

Indeed, the idea of the derivations occurring in tandem might itself be part of an explanation for

the effects of Match Theory; because the grammar must maintain multiple representations at

once, there is a motivation not to allow the representations to be too different from each other.

In this paper, I have proposed that the idea that phonological derivations begin in tandem

with their syntactic correspondents is almost all we need in order to get the consequences of

Contiguity described in Richards (2016). In particular, I have claimed (contra Richards 2016)

that we do not need any principles of prosody that make specific reference to Agree or selection

relations. If I am right, we may only need a general algorithm for mapping syntactic structure

onto prosodic structure (in particular, an algorithm which is constrained to maximally preserve,

at each step of the derivation, previously existing dominance and Contiguity-prominence

relations), together with the independently proposed and defended idea that Agree relations

create multidominance structures. The resulting theory is more restrictive than that of Richards

(2016), in that whatever discoveries we make about the apparent prosodic effects of Agree are

now to be handled, not by stipulations dedicated to describing the prosody of Agree relations, but

by the general conditions on how syntactic structures are mapped onto prosody, and must

therefore match what we understand independently about the syntactic structure of Agree

relations. If this burden can be met, the more restrictive theory seems desirable.

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