Modeling "Exceptional" Phrasal Stress*

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1 Introduction

- Since SPE, **syntax has been known to have a (near) deterministic effect on phrasal stress** (PS):
  - "Once the speaker has selected a sentence with a particular syntactic structure and certain lexical items (largely or completely unmarked for stress, as we shall see), the choice of stress contour is not a matter subject to further independent decision" (SPE:p.25)
  - To determine what bears PS, SPE employs its Nuclear Stress Rule, summarized below:

    (1) **Nuclear Stress Rule** (SPE, English):
    The rightmost primarily-stressed vowel in a domain receives the highest stress

  - In this way, since only syntax determines linear order, and linear order determines PS, syntax determines PS... with a caveat.
- The underlined portion of the quote suggests that lexical properties can cause exceptions
  - In this vein, there is a common, **long-standing assumption in the literature: lexical/interpretive properties can cause exceptions to PS assignment** (e.g. Bresnan 1971)
    - Even if SPE's NSR is not employed (e.g. Zubizarreta 1998, Kahnemuyipour 2009, a.o.)
- Four types of "exceptional" phrases will be investigated here:
  - Given material, reflexive anaphors, indefinites, and verb particles
  - Below are some examples of each of these types
    (In all examples, PS is marked with *underlined italics* and an accent on the stressed syllable)

    (2) a. given material
    (Chicken was cheap today, so...)
    Bill *áte* chicken.

    b. reflexive anaphors
    Sara glued *Ják* to herself.

    c. indefinites
    The president *chánged* something.

    d. verb particles
    Speaking of TV, I'll turn the *néws* on.

  - **The assumption that these are exceptions is a problem**:
    - First of all, theoretically:
      - ◇ It obscures the connection between the signal and syntactic structure.
      - ◇ It requires the learner to posit complex lists of exceptions.

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- More critically, empirically:
  - ◇ "Exceptional" phrases aren't always exceptional.

- Compare (2) with (3)

(3) a. given material
(Chicken was cheap today, so...)
Bill ate beans and *chícken*.

b. reflexive anaphors
Sara glued Jack to *himsélf*.

c. indefinites
The president changed *some láws*.

d. verb particles
Speaking of the news, I'll turn the news *ón*.

THE PROBLEM

What determines whether constituent can be "exceptional"?

- For approaches with "excpetions", **this kind of variable behavior is not straightforwardly unexpected**
  - ***Either*** more complex definitions are needed for stipulating the exact kind of constituent that can/cannot be exceptional
    - ◇ Weighing down the theory, making the learning task more difficult
  - ***Or*** we need a different approach to these "exceptions"
- To address this, let us take a step back and consider what it means to be exceptional

(4) **Definition**: *Exceptional*
A phrasal stress pattern P is exceptional just in case P is not predicted as the output of
i. the phrasal stress rule
ii. the input that the rule operate on

  - Both (i) and (ii) are possible places to change our approach
    - ◇ There is single simple phrasal stress assignment rule operation in the vein of Cinque 1993
    - ◇ The input is highly articulated syntactic structures sent to PF by Spell-Out
  - **In this model, putative exceptions from the work on phrasal stress are not exceptional at all**

CONCLUSIONS TO BE MADE

- This model with the appropriate PS rule and syntactic inputs
  - **Renders the previously "exceptional" prosodic patterns to be the predicted output**
  - **Provides evidence for richer clausal structure**
  - **Simplifies the interfaces and learning problem**
  - **Conforms to modern generative approaches to what information is accessible at the interfaces**

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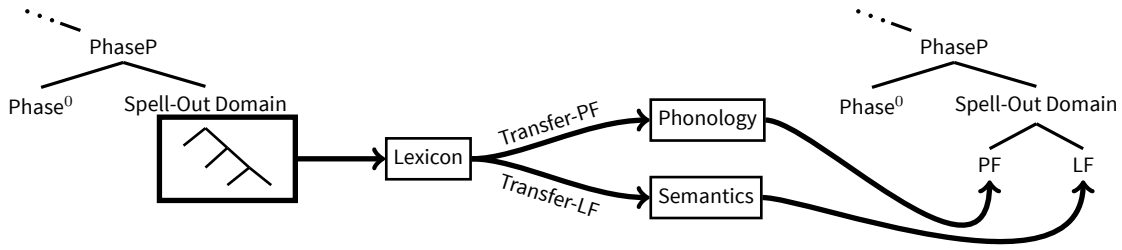
2 Modelling PS Assignment

2.1 Architecture of the Interfaces

- Minimalist architecture defines syntax, semantics (LF), and phonology (PF) as modular
  - The interfaces between them are only able to pass certain kinds of information in certain directions (e.g. Chomsky 1995)
  - The (narrow) syntax generates input to LF and PF, at cyclic domains (Spell-Out Domains) throughout the course of the derivation, that are the complement of phasal heads (e.g. Uriagereka 1999, Chomsky 2001, Chomsky 2008)

(5)



    - (See also Collins and Stabler *to appear* and Ahn and McPherson *in prep*)

  - As such, there is no PF-LF interface – except for the narrow syntax

    (6) **Condition on LF and PF Operations**
    No operations at PF depend on LF operations/properties.

  - Any phenomenon that has both PF and LF effects ***must be rooted in the syntax***

  - Additionally, not all portions of the syntactic representation get passed on to (both of) the interfaces
    - Lexical items get inserted after syntax, by Vocabulary Insertion
      - A postsyntactic operation that associates syntactic structures with phonological and semantic content from the lexicon (e.g. Halle and Marantz 1993)
    - Features without semantic/phonological interpretation must be deleted ("checked") before being sent to the respective interfaces
      - Deletion happens just before Transfer, because Vocabulary Insertion is sensitive to such features, but LF/PF cannot receive them (Full Interpretation)
    - Only syntactic hierarchy, lexical items and interpretable features are sent to LF/PF – nothing else.

      (7) **Condition on Features and PF Operations**
      No operations at PF depend on uninterpretable features.
    - Any PF effects that appear to be the result of formal syntactic features must not be
      - Case and syntactic labels are an example of such a features

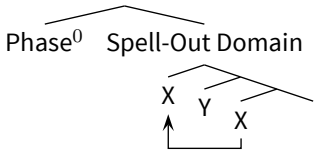
2.2 The Nuclear Stress Rule

- Contemporary theories of phrasal stress generally agree that **syntactic hierarchy (and not linearization) is the input to PS assignment**
  - Specifically, depth of embedding is what matters
    - (Cinque 1993, Zubizarreta 1998, Kratzer and Selkirk 2007, Kahnemuyipour 2009, a.o.)
  - We define depth of embedding as follows[1]

    (8) **Depth of Embedding**:
    A syntactic object, X, is more deeply embedded than some other syntactic object, Y, provided that no copy of X c-commands all copies of Y
    - This basically means that a constituent is most embedded if it doesn't c-command (all the copies of) some other constituent
- PS assignment, as with any PF operation, does not apply to entire sentence-structures at once
  - Instead, it operates on Spell-Out Domains (e.g. Legate 2003, Adger 2006)
- This gives the following definition for the PS assignment operation:

  (9) **Syntactic Depth Nuclear Stress Rule**:
  The most deeply embedded constituent in a Spell-Out Domain receives the phrasal stress.
  - This NSR often yields the same output as the often-descriptively-true NSR in (1)
    - In English, most-deeply-embedded often coincides with the rightmost, but not always
- Given this definition, **some movements feed/bleed NSR and some don't** (Legate 2003)
  - If movement applies to X within a Spell-Out Domain, the NSR will see both copies of X
    - This may potentially render the moved item less embedded than something else, as (10)
  - In the following case, both copies of X are sent to Spell-Out with Y

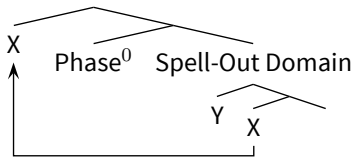
    (10)



    - **Y is deemed most embedded**
      - Even though there is a copy of X lower than a copy of Y; some copy of X c-commands all copies of Y — see (8)
  - However, if movement targets a position outside of a Spell-Out Domain, the moving item will stop in the phase edge
    - In this way, the Spell-Out Domain will not contain the head of this movement chain
      - And to the NSR, it will appear as though this movement has not occurred
  - In the following case, only one copy of X is sent to Spell-Out with Y

[1] See Appendix E for a slightly (but importantly) refined version of this definition.

(11)



- **X is deemed most embedded**
  - Spell-Out doesn't see that there is a copy of X that c-commands (every copy of) Y — see (8)[2]
- As such, if the moved item was most-embedded before this movement, the NSR will still treat it as such

- Movements that take place **within a Spell-Out Domain may feed/bleed NSR**, but movements that take place **out of a Spell-Out Domain preserve previously assigned NSR**
  - Largely the same conclusions are reached in Bresnan 1971, in different formal terms
  - (i.e. transformations applied after the cycle will preserve any PS assigned within that cycle; transformations applied withing the cycle can influence it)

- In this way, prosody can help the problem of acquisition

PROSODY CAN SIGNAL TO THE LEARNER:
• The fact that a movement has taken place, and
• When in the structure that movement takes place

- In section 3, we will go through the structures of (2) and (3)
  - As in previous literature
  - Now supported by distribution of PS and the NSR in (9)

3 Deriving Classes of "Exceptions"

3.1 Given Material

- We will begin by deriving the givenness "exceptions"
  - Recall the minimal pair below:

    (2a) (Chicken was cheap today, so…) Bill *áte* chicken.

    (3a) (Chicken was cheap today, so…) Bill ate beans and *chícken*.

- Generalization: features like givenness may affect PS placement
  - Even without movement

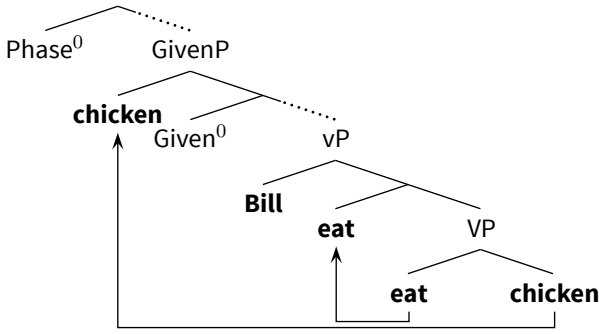
[2]X may surface in the position of the higher copy. If the higher copy surfaces, the lower copy will be deleted at a higher occurrence of Spell-Out – this is how a copy theory of movement defines movement through the phase edge (see e.g. Nunes 2004). Additionally, the fact that the copy of X that gets declared most embedded may be later deleted at PF is irrelevant: if one member of the chain receives a PF specification like [+F], all members of the chain do (such a position is defended in Selkirk 1996, Ahn 2012b and McPherson In Progress).

- Common analysis: information structure features may affect PS, without any change in the syntactic representation
  - e.g. as an interpretable feature sent to both PF and LF
- Prediction: all given things will bear this feature, and since this feature determines PS assignment, all given things should behave uniformly with regard to PS assignment
  - We have seen this analysis is not supported, given data like (3a)

- Instead, pursuing the correct syntax for structures with given material as Wagner (2006), given material actually moves, as much as is grammatically possible[3]
  - This is motivated in part for semantic reasons

- Thus *chicken* in (2a) moves, but it does not move in (3a) because movement is impossible
  - This givenness movement is "covert" in that it does not affect linear word order
    - Wagner does not go into what kind of movement it must be, but it **must not** be LF movement
      - If movement is what affects PS assignment (done at PF), givenness movement cannot take place at LF — see (6)
      - (Two candidates for this movement are: spell-out of a lower copy (Fox and Nissenbaum 1999), and plain-old string-vacuous movement (Kayne 1998).)
  - Let's call the target of movement for given material "GivenP"
    - GivenP **must be located within** the lowest Spell-Out Domain
    - Since **given material (covertly) moves within the Spell-Out Domain**, and PS is calculated upon Spell-Out Domains, **given material will not be considered the most deeply embedded constituent for the NSR** — see (10)
    - The derivation of (2a) thus proceeds as below:[4]

(12)



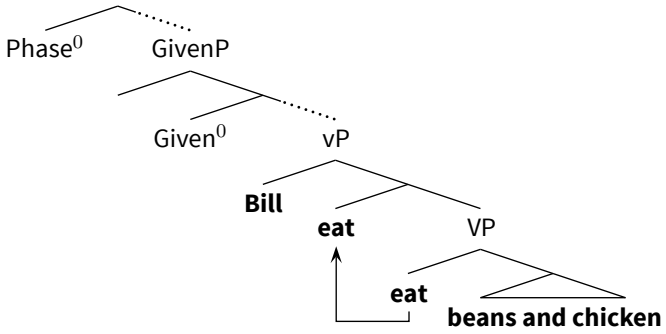
      - Following (9), *chicken* does not receive PS because it is not most embedded in (12)
      - (all copies of *eat* are more embedded than the higher copy of *chicken*)
  - However, since movement of *chicken* is impossible in (13), due to (island effects), it stays the most embedded

[3]This "as much as is grammatically possible" restriction is intriguing. When movement is impossible, the givenness seems to 'come for free'. This is reminiscent of Preminger 2011. For further discussion, see discussion in Ahn In Progress.

[4]The structure is more complex than given here, and the labels used is not crucial for this theory. Thus, to clarify: the labels vP and VP are used for their common usage as the stretch of structure in which arguments of the predicate are introduced.

- And it receives PS, **despite being given**[5]

(13)



- To recap:
  - If there were an interpretable 'givenness' feature in the narrow syntax, the difference between (2a) and (3a) is not predicted
  - What does is givenness movement along with our theory of PS, (9)

3.2 Reflexive Anaphors

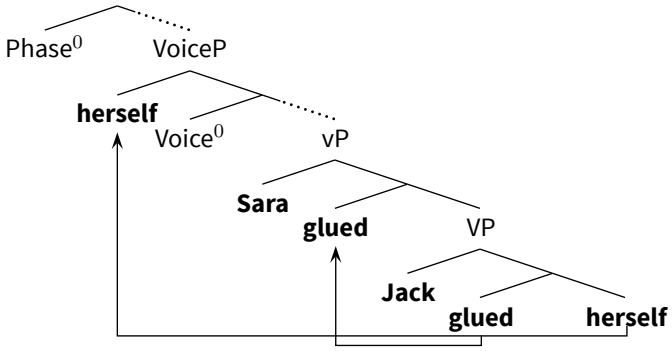
- Let us turn now to reflexive anaphors
  - Recall the minimal pair below:

    (2b) Sara glued *Jáck* to herself.

    (3b) Sara glued Jack to *himsélf*.

- In a very similar way, reflexive anaphors are shown to undergo movement to a position outside of vP and within the Spell Out Domain (Ahn 2012a, 2013, In Progress)
  - This anaphor-movement will thus bleed NSR
    - This anaphor-movement has syntactic and semantic motivations, as well
  - However, this anaphor-movement only takes place when the anaphor is bound by the subject:

(14)

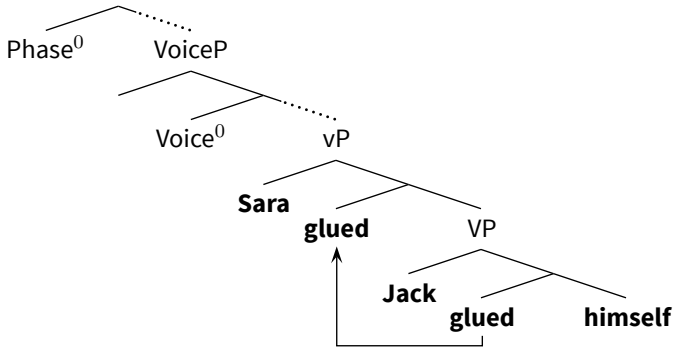


[5]It has been suggested that, in (3a), *beans and chicken* are being interpreted as a non-given entity, and therefore *beans and chicken* ought to behave as such. This may be true; however, *chicken* is still notionally 'given' in all the same ways. A system in which an interpretable feature of givenness can be assigned without movement to GivenP (and this givenness feature is what derives PS "avoidance") would still predict *chicken* to avoid phrasal stress within the otherwise non-given *beans and chicken*.

- *herself* is bound by the subject and thus moves, leaving *Jack* as the most embedded[6]
- *Jack*, and not *herself*, is correctly predicted to bear PS

▸ When bound by a non-subject, the movement doesn't take place:

(15)



- *himself* is bound by the object *Jack* and doesn't move, staying as most-embedded
- *himself* does bear PS, in contrast to (14), as predicted

▸ Similarly, if put in an island that blocks anaphor-movement, even subject-bound anaphors must remain most embedded, and will bear PS

- See Ahn In Progress for more details

◆ To recap:

▸ If the lexical property of being an anaphor made anaphors invisible to the PS operation, the difference between (2b) and (3b) is not predicted

▸ What does is reflexive movement along with our theory of PS, (9)

3.3 Indefinites and N→D

◆ Continuing our investigation, we will now consider indefinites

▸ Recall the minimal pair below:

(2c) The president *chánged* something.

(3c) The president changed some *láws*.

◆ English N→D movement moves a subset of nouns[7] (*one*, *thing*, *body*, *time*...) from their base position, targeting a position higher than all nominal adjuncts

▸ The fact that there is N→D movement in this domain is motivated by syntax

(16) a. [$_{DP}$ some thing [$_{NP}$ red ~~thing~~]] [N→D]

b. [$_{DP}$ some [$_{NP}$ red object]] [no N→D]

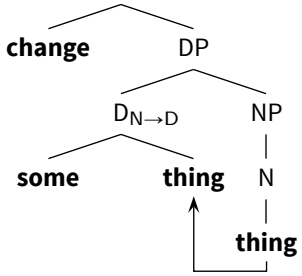
[6] Questions may arise about the preposition *to* and why it is absent from the derivations above. Essentially, it enters the derivation higher in the structure. It is not the case that Ps 'avoid' stress, but rather they are typically not candidates from stress because they are not the most deeply embedded. Thus Ps are like Ds (in that their surface-complement is not a deep-complement) and like particles (in their merge position) – see those sections, and appendix B.1.

[7] Without any complements, adjuncts or number features.

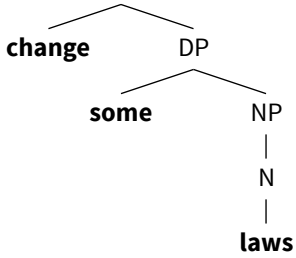
- Note that when N→D movement takes place, the N does not bear PS[8]
  (17) What did Liz do?
  a. She *cóoked* something.
  b. She cooked some *food*
  c. # She cooked *sómething*.
  - This is not the case that *something* is unstressed because they are not 'newsworthy' (as in Bolinger 1972)
    - Wagner 2006 shows that newsworthy-ness is not an adequate analysis: it is not clear that *some food* is more newsworthy than *something*, since you can only cook food

- So let us consider the syntax, as that is what we have seen to affect PS
  - It is standard to assume that *change something* (involving N→D movement) and *change some laws* have the following structures:

(18)



(19)



  - But this does not explain why *change* bears PS in the former, but *laws* bears PS in the latter[9]
  - Sportiche 2005 proposes an alternate structure of DPs, in which the deep structure of *change some law* is as (20)

(20) [DP some [VP change [NP law]]]

  - One Sportiche's basic arguments in favor of (20):
    - Locality of Selection only allows a head X to select something within its XP
    - Vs may place selectional restrictions on Ns but *never* place restrictions on Ds[10]
    - A standard structure like (19) where V and DP are sisters makes the wrong predictions
  - Instead, NPs (and not DPs) are merged as arguments of the predicate
    - Then later in the derivation the NP forms a derived constituent with the D, via movement of nominal material up to near D
  - However, the two *some*s in *change something* and *change some laws* are not the same D – they have different selectional restrictions
    - The N→D *some* can only attract (certain) bare Ns in the singular

[8] In fact, there is the segmentally homophonous: *She greets every (single) one*, in which *one* does bear PS. The N *one* does not undergo N→D in such a case.

[9] In fact, it is not clear what our NSR would predict when there is symmetrical c-command, as in (18). One possibility is that it looks for other copies for which there is no symmetrical c-command – however, this would falsely predict that *thing* should bear PS in (18). Alternatively, it could be that such structures should never reach the interfaces – see Moro 2000 and Chomsky 2013, among others.

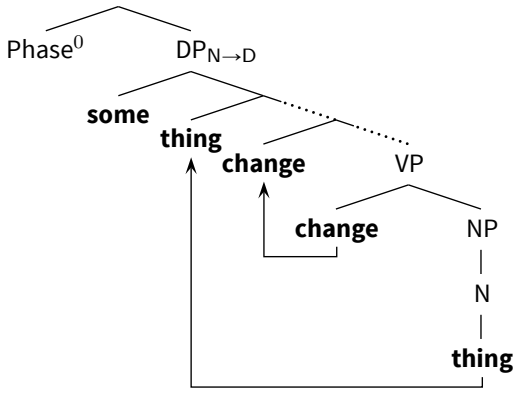
[10] Nor on Num^0 – any apparent number effects are about semantic selection for semantically plural entities, that are not necessarily syntactically plural. Cf. *I gathered my collection*.

- The *some* that doesn't trigger N→D movement can form a constituent with either plural or singular Ns

- It is thus possible that the two Ds occur in different positions
  - (For a discussion of different types of Ds being associated with different loci on the clausal spine, see Hallman 2004)

- Given the PS differences between the two, the N→D Ds must be within the Spell-Out Domain, and the non-N→D D must be outside of it:

(21)



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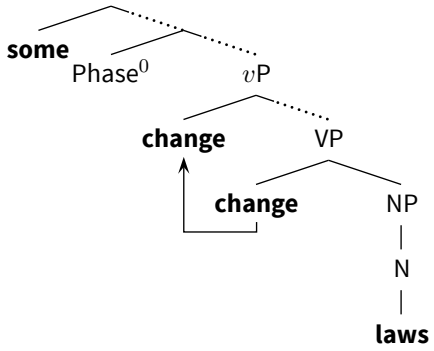


  - Less theory-specific, just in case the phenomenon of "N→D movement" takes place...
    - ...**(a copy of) the N (e.g. *thing* in *something*) will be higher than (all copies of) the V**
    - (Perhaps it is movement to Num^0, which is also outside the verbal domain in this approach. See Appendix D.)

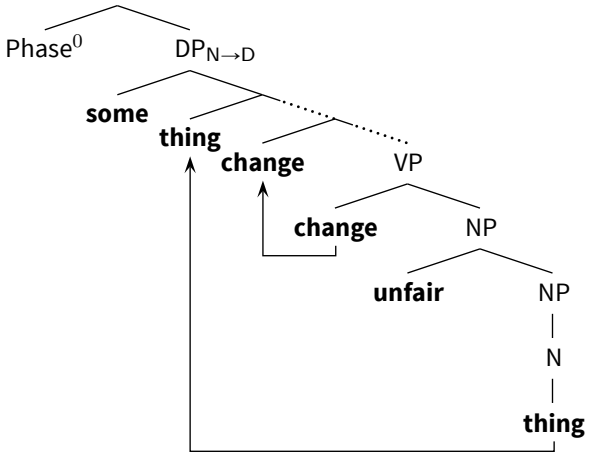
- By having Ds outside of the VP, with different Ds in different positions (as independently argued), we now understand which indefinites bear PS and which do not[11]

- Under this approach, N→D movement causes the moved N to avoid stress

[11] Also, by this logic, it might be appropriate for other 'weak' Ns such as *stuff* or *shit* (as in, *She did stuff/shit* to also undergo N→D movement, albeit to a silent mass D – one that occurs with bare mass Ns. This is supported by the fact that *stuff* and *shit* in these types of cases are near synonyms for *something*. (Beware: there is a *shit* that doesn't undergo N→D movement, which is a near synonym of *nothing* – *About physics, I know shít* means "I know nothing" but *About physics, I knów shit* means "I know stuff". Note that *nothing* bears PS in places where *every/some/anything* do not, indicating that nothing has a different syntax – one with may involve movement out of the Spell-Out Domain to near Neg^0; see Kayne 1998.) However, these mass N→D Ns differ syntactically, in that, if there is an adjective modifier, it will be prenominal. At the same time, these Ns only avoid PS when there is no adjective – note the similarities in these patterns: *saw someone táll* and *did stupid shít*. At this point, the similarities/differences are not fully understood. [12]

- N→D strands any nominal adjuncts, resulting in them becoming post-nominal, following the movement

  (23) The president changed something *unfáir*.



  - After this movement, the (lowest) stranded adjunct will be most embedded (compare *unfair* and *change* in (23))
  - This structure correctly predicts that it will bear PS, as in (23)
  - (This means N→D movement is movement of a smaller constituent than movement to D in cases like *change some unfair laws*.)

- Additionally, this approach predicts that the PS behavior of indefinites like *something* is not the result of being indefinite / not newsworthy
  - This PS avoidance also happens in other places where N→D happens[13]

    (24) What's Sara's job?
    a. She *gréets* everyone.
    b. She greets every *guést*.
    c. # She greets *éveryone*.

- To recap:
  - If an indefinite pronoun's interpretive property of being "not newsworthy" makes it invisible to the PS operation, the difference between (2c) and (3c) is not predicted
    - Nor is the behavior of *everyone* in (24)

[13] However, it might be that not all N→D movement seems to be the same. Consider the following data:

i. What will happen if the contract is broken?
   a. [I'd *gét* something]F
   b. # [I'd get *sómething*]F
   c. # [I'd *gét* nothing]F
   d. [I'd get *nóthing*]F
   e. ? [I'd *gét* everything]F
   f. [I'd get *éverything*]F

This could be because of differences between types of 'determiners', with different types of 'determiners' merged in different locations (see Hallman 2004, as well as Kayne 1998 and Alrenga and Kennedy 2014, suggesting that *no* is in a position that is likely higher than *some* in (21)). More investigation is needed, especially with regard to interpretation. Alternatively, maybe the differences in PS above has to do with what is naturally focused by the context (i.e. the F-marking in the examples above are not what is being judged).

- What does is N→D movement targeting a position outside of VP, along with our theory of PS, (9)

3.4 Verb Particles

- Let us wrap up our investigation with an investigation of verb particles
  - Recall the minimal pair below:

    (2d) Bill turned the *rádio* on.

    (3d) After Sarah bought a radio, Bill turned the radio *ón*.

- The syntax of particle verbs is heavily debated
  - Guéron 1987, Hoekstra 1988, Johnson 1991, Neeleman 1994, den Dikken 1995, Kayne 2000, Ramchand and Svenonius 2002, among many, many, many others
  - Looking at the distribution of PS, some of these analyses can be ruled out
- By definition, verb particles in English can occur between the V and an object, or after the object
  - Let us compare the distribution PS in these two orders
- First we will consider scenarios in which nothing is given
  - In the both possible word orders, the object bears PS

(25) [V Obj Prt]

Q: What's that noise?

A1: John turned the *rádio* on.

A2: # John turned the radio *ón*.

(26) [V Prt Obj]

Q: What's that noise?

A1: John turned on the *rádio*.

A2: # John turned *ón* the radio.

    - This means **the object is more embedded than the particle at Spell-Out**, in both word orders

- Now we will turn our attention to scenarios in which the object is given
  - Again, in both word orders, the PS falls on the same constituent: the particle – and not the verb or object – bears PS

(27) [V Obj Prt]

Q: What happened to the radio?

A1: John turned the radio *ón*.

A2: # John turned the *rádio* on.

A3: # John *túrned* the radio on.

(28) [V Prt Obj]

Q: What happened to the radio?

A1: John turned *ón* the radio.

A2: # John turned on the *rádio*.

A3: # John *túrned* on the radio.

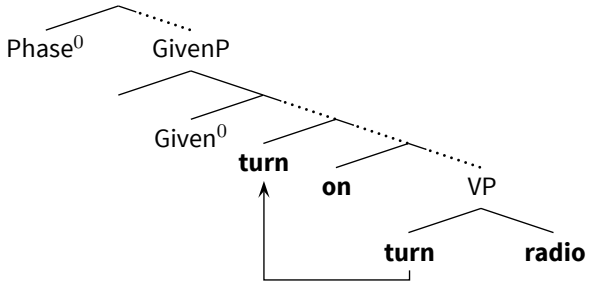
    - This means **the particle is more embedded than the verb and given material at Spell-Out**, in both word orders

- What is perhaps striking is that the PS facts are constant across both word orders
  - Indicating that, at spell out, the hierarchical relations are the same
    - **Phase > Given > Verb > Particle > Object**
    - And the word order differences between the two could arise through movements later in the derivation

- ◇ (i.e. the [Prt Obj] order given at this point of the derivation could be broken at some later point in the derivation)

- Thus we have the following derivations for both word orders of (2d):

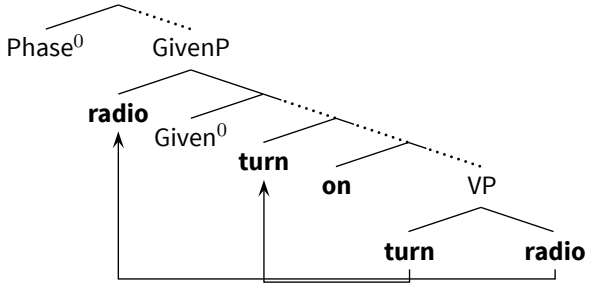
(29)



  - At Spell-Out, *radio* is seen as most embedded

- If *radio* undergoes movement to GivenP, as in (3d):

(30)



  - The particle is most embedded at Spell-Out, as the result of givenness movement

- The findings from PS only sketch out constraints on what kinds of structures for particle verbs are possible[14]
  - Since objects are more embedded than particles, small clause analyses like Hoekstra 1988, Kayne 2000, Ramchand and Svenonius 2002, etc. are ruled out[15]

- To recap:
  - If the (non-phonological) lexical property of being a particle (or other functional head) derived (2d), the PS in (3d) would not be predicted
  - What does is the height of particles in the structure, givenness movement, and our theory of PS in (9)

[14]Indeed, see appendix C for an alternative derivation.

[15]A small clause analysis *might* be possible, if there are enough movements to replicate the hierarchical relations sketched above.

4 Conclusions

4.1 Syntax / Prosody Interface

- Each of (2a-d) has a different analysis, which explains why the exact conditions on when one is extrametrical varies across each word class.
- **Syntactic structure is more complicated (as has already argued) but the principles and interfaces are simpler**
  - The locus of phrasal stress is in fact a signal about the structure
- **Prosodically motivated movement (p-movement) is unnecessary** as a grammatical operation
  - Two examples of p-movement:
    - Focused phrases in Spanish/Italian move to a position "[in order] to receive Nuclear Stress" (Zubizarreta 1998)
    - So-called heavy NP shift (a.k.a. HNPS) (Zec and Inkelas 1990)
  - This is good: p-movement is actually incompatible with Minimalist grammatical architecture
    - The syntax cannot look ahead to PF to know the prosodic weight when performing movement operations[16]
      - Indeed, if Vocabulary Insertion happens post-syntactically, syntax could never know about prosodic weight
    - PF cannot effect syntactic movement, because doing so would require PF to counter-cyclically reach back in derivational time to change established structure that has been sent to the interfaces
  - PF can retain the power to move phonological material post-syntactically (see Appendix F)
  - **Even if p-movement were grammatically possible, prosodically-motivated movement is unnecessary**
    - What has been proposed as p-movement can be movement driven by syntax-internal reasons
      - "P-movement is a run-of-the-mill syntactic movement; whether it is legitimate or not can only be assessed by looking at the resulting syntactic *and* prosodic structure" (Büring 2013:883)
        - See Büring 2013 for more discussion and references
      - So perhaps there is a phonological/prosodic constraint that is sensitive having something of the wrong phonological size in the wrong place, and this could filter out ungrammatical HNPS movements.
    - By Occam's razor, a system without p-movement (that is, phonologically conditioned syntactic movement) is thus desirable
      - Such a system is simpler, and derives parallel effects in multiple domains
        - Empirically, many of the phenomena that are typically analyzed as p-movement do not occur without being sensitive to syntactic constraints / providing interpretive contributions[17]

[16] Though movement may be sensitive to the syntactic complexity of what is potentially moving (and syntactic complexity may sometimes be correlated with prosodic weight). See Tokizaki 1999.

[17] Those that do occur in this way are candidates for the PF "movement" defined in Appendix F.

- Thus the reason we find syntactic/semantic effects and prosodic effects going together would be that movement must happen at syntax

- Though the syntactic structures are more complex, **this simplifies the learning problem**
  - The interfaces are more transparent, providing detectable cues in the prosody can inform the learner (or hearer, or theoretician) about the syntactic structure
  - We can thus (tentatively) say that these complex structures are in fact more easily learnable

INTERFACE CONCLUSIONS

- P-movement and Exceptions-based interfaces are not only inadequate, they are theoretically undesirable
- Phrasal stress is a transparent marker of depth of embedding, providing cues about the structure to the learner

4.2 The Predicate Spell-Out Domain

- Many works (Chomsky 2008 *inter alia*) consider the lowest phase head to be v^0, with little functional structure within its c-command domain
  - **We now have the evidence that this structure is too simple**
    - v^0 is not the lowest Phase head[18]
    - More functional structure is needed lower in the clause

STRUCTURAL CONCLUSIONS

The distribution of PS provides evidence for the following rank ordering at the first Spell-Out:

(31) $$\text{Phase} > \left\{ \begin{array}{c} \text{given material} \\ \text{subject-bound reflexives} \\ \text{N}\rightarrow\text{D Ds} \end{array} \right\} > \text{Verb} > \text{Particles} > \text{Complements}$$

- **Parts of the structure in (31) have been argued for before**
  - The distribution of PS adds weight to these proposals, and provides a more fine-grained view on how they come together
    - We know that complements typically phase bear PS, but...
      - The verb can bear PS if a complement re-merges above the verb and within the phase.
        - givenness, subject-binding, and N→D movements
      - Moreover, particles always behave as more embedded than the verb, and sometimes as more embedded than a complement (when it moves)

[18] It might be that v^0 is a phase head *provided that* there are different types of phase heads. What can be conclusively determined is that v^0 is not the type of phase head that triggers PS assignment (assuming there are multiple types of phase heads, each with possibly different jobs).

- Finally, we know the verb starts much lower (where its complements are introduced), but within the Spell-Out Domain, it must raise past (or at least, up to) Particles[19]

- Additionally, this approach to PS maintains earlier generalizations that **movements that take place after the first Spell Out will preserve earlier PS assignment**
  - As originally noted by Bresnan 1971
  - For example WH-movement (Bresnan 1971), object shift (Cinque 1993), and NP fronting around adjectives (Adger 2006) must all happen across phase boundaries because they preserve an earlier-assigned PS

- **PS is thus a diagnostic for syntactic hierarchy and timing of movements**
  - We can probe whether one thing is more embedded than another, within a given domain
  - We can also probe whether a given movement involves intermediary movements within a Spell-Out Domain

[19] In fact, it would seem to be that the verb raises even higher, outside of the Spell-Out Domain. Otherwise the verb would not be able to precede the material that gets introduced higher, such as the 'normal' (non-N→D) Ds.

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Appendix

A Prosodic Evidence for Structure of the Lower Spell-Out Domain

- The data we saw throughout the paper, when taken together, yielded the hierarchy sketched in (31).

(31) Phase > { given material / subject-bound reflexives / N→D Ds } > Verb > Particles > Complements

- Below, more data are given that more completely argue for this hierarchy
- In all examples, the subject is given information, but all else is new information, allowing NSR to apply to the predicate.

(32) Phase > Given > Verb
  a. Sara raises *fárm animals*. What does Bill do?
  b. He *sláughters* farm animals.
  c. # He slaughters *fárm animals*.

(33) Phase > Reflexive > Verb
  a. What did Sara do when she thought she was dreaming?
  b. She *slápped* herself.
  c. # She slapped *hersélf*.

(34) Phase > N→D > Verb
  a. What did Bill do at the party?
  b. He *kícked* someone.
  c. # He kicked *sómeone*.

(35) Reflexive > Verb > Particle
  a. What did John do after prison?
  b. He cleaned himself *úp*.
  c. # He *cléaned* himself up.

(36) Given > Verb > Particle
  a. What did Bill do after Sara bought him a radio?
  b. Bill turned the radio *ón*.
  c. # Bill turned the *rádio* on.

(37) N→D > Verb > Particle
  a. What's that noise?
  b. Bill turned something *ón*.
  c. # Bill turned *sómething* on.

(38) Verb > Particle > Complements
  a. What's that noise?
  b. Bill turned the *rádio* on.
  c. # Bill turned the radio *ón*.

B More Hierarchy

B.1 Prepositions

- Prepositions are merged higher than the position that the verb reaches in the Spell-Out Domain
  - This is why PS is not assigned to the Ps, even when they appear to the right of the V at the surface

  (39) Preposition > Verb
  a. What did Bill do at the party?
  b. He *tálked* about himself.
  c. # He talked *ábout* himself.

  - Likely it is outside of the phase, above the non-N→D Ds
- See Kayne 2002 for arguments that Ps are merged outside the VP

B.2 Pronouns

- Pronouns (re-)merge higher than the V and within the Spell-Out Domain
  - For this reason, a given pronoun will avoid phrasal stress

  (40) Phase > Pronoun > Verb
  a. What did Bill do at the party?
  b. He *húgged* me.
  c. # He hugged *mé*.

- Wagner argues that pronouns behave as exceptional because they are given (when they avoid stress)[20]
  - This seems right: when the referent of a pronoun is *not given* (as in the case of deictic pronouns), the pronoun *does bear* phrasal stress:

  (41) Q: What did John do today?
  A1: John went *thére*. *(pointing at a picture of the Eiffel Tower)*
  A2: # John *wént* there. *(pointing at a picture of the Eiffel Tower)*

- Alternatively, it could be that pronouns external merge in a position higher than the position that the verb reaches in the Spell Out Domain
  - Thus they would avoid stress by never being in an object position (like some analyses of clitics)
  - For this analysis, deictic pronouns as in (41) must merge in a different location, lower than the verb
- Either way, at Spell Out, a non-deictic pronoun is in a position higher than the verb

[20] It is also possible that pronouns are exceptional is because they are Ds, which are merged in a position (but cf. Cardinaletti and Starke 1999, arguing that English style pronouns are not Ds).

B.3 Summary

(42) Prepositions(?) > Phase > { given material / subject-bound reflexives / N→D Ds / non-deictic pronouns } > Verb > Particles > Complements

C Particle V Syntax

C.1 Ruling Out the Small Clause Analysis of Particle Vs

- Any theory whereby the base structure is:

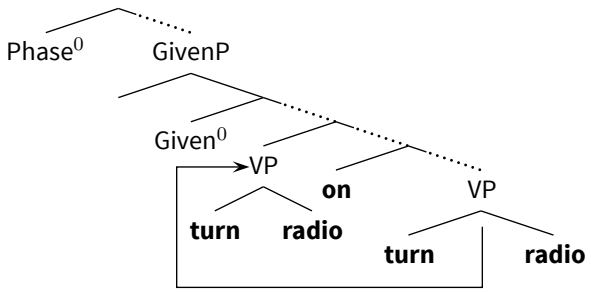
  (43) [V [object [particle]]] (Ramchand and Svenonius 2002, Kayne 2000:Ch.11)

  - (43) makes the wrong prediction about PS in [V object particle] order, namely:
    - ...that particle should bear PS
    - ...that the object should not bear PS because it is never most embedded, in the [V object particle] order
  - (43) makes these bad predictions, unless the particle also obligatorily moves to a position within the Spell Out Domain that:
    - is lower than V
    - is higher than complements, but lower than adjuncts
    - is lower than given / refls / ...

C.2 A Possible Alternate analysis of V Obj Prt

- In an alternate analysis for [V Obj Prt], the VP containing the verb and the object moves to precede the particle
  - And this movement may happen within the lowest Spell Out Domain:

  (44)



- If this analysis is correct, then we need to say something about the fact that the relation of ‘more embedded than’ provides conflicting results for *radio* and *on*
  - Recall our definition of syntactic embeddedness:

    (8) **Depth of Embedding**:
    A syntactic object, X, is more deeply embedded than some other syntactic object, Y, provided that no copy of X c-commands all copies of Y

- Under that definition, *radio* is more embedded than *on*, but *on* is also more embedded than *radio*[21]

- In such a scenario, there are at least two theoretical possibilities that we might entertain
  - The NSR does not see the moved *radio* in (44) as part of a movement chain

    (45) **Depth of Embedding** (possible revision A):
    a. A syntactic object, X, is more deeply embedded than some other syntactic object, Y, provided that no copy of X c-commands all copies of Y.
    b. If one copy of X does not c-command another copy of X, the copies of X are independent of one another and both copies may potentially be most deeply embedded.

  - Or, it could be that the NSR still views the moved *radio* in (44) as most embedded because of the pronounced copy doesn't c-command the particle

    (46) **Depth of Embedding** (possible revision B):
    A syntactic object, X, is more deeply embedded than some other syntactic object, Y, provided that:
    a. no copy of X c-commands all copies of Y
    b. and some copy of Y c-commands some copy of X

  - In either of these revisions, *radio* can be considered most embedded in (44)

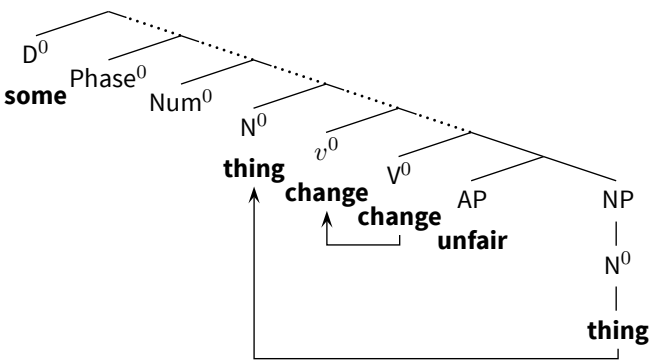
- However, **these solutions create bigger problems**, e.g. with regard to certain kinds of movement or complex specifiers
  - See Appendix E
  - (The conclusions made there renders (44) implausible)

D N→D Movement as Movement to NumP

- We have seen that if the N→D determiners are within the phase and that other determiners are outside of it, then prosodic facts of these N→D complexes is predicted
  - However, all that must be true is that the N of the N→D complex is higher than the V at Spell-Out
  - So it is possible that Ns move to some other position before moving up to D (which may or may not be within the same Spell-Out Domain)

- One candidate for this is movement of N to Num:

(47)



[21] In fact, in the current representation, the same problem arises between *turn* and *radio* – that is because certain nodes of the structure have been omitted. When fleshed out, *radio* is unambiguously more embedded than *turn*.

- Num is outside of the reach of the verb’s selection (see fn.10)
- The N→D determiner is outside of the Phase and it attracts a N head (or something that would exclude adjectives) that has stopped in Num
- Num is inside the Spell-Out Domain – movement to it feeds the NSR

- On the other hand, when there is no N→D movement, stress should fall on the N
  - The non-N→D determiner is also outside of the Phase, and it attracts the NP (or something that doesn’t exclude adjectives) that doesn’t stop in NumP
    - N gets Num morphology still
      - Through Agree or Affix Hopping (whatever theoretical machinery that corresponds to)
      - Without moving to Num^0

- This analysis and the one in the body are very similar
  - That is the point: all the derivation must do to get these PS facts is to put the N that does N→D movement in a higher position within the Spell-Out Domain than the N that doesn’t do N→D movement
  - But there is some reason to believe that N and Num are connected in this way

- Further evidence that these Ns move to Num
  - All Ns that behave this way are fixed in their grammatical number

    (48) a. I *knów* something/someone/somebody/somewhere.
    b. I know something/someone/somebody/somewhere *níce*.

    (49) a. I know some *thíngs*/#some *ónes*/#some *bódies*/*some *whéres*.
    b. *I know some things/some ones/some bodies/some wheres *níce*.

    - Only *some things* is a grammatical sequence (with the intended meaning)
    - But even then it behaves differently prosodically and with regard to adjectives

- Analogy with V and T
  - Vs of a certain “lightness” (auxiliaries, *be*) move to T
  - Ns of a certain “lightness” (e.g. *thing*, *one*, *body*) move to Num (on their way to N→D Ds)

E Depth of Embedding and Problems with Movement and Specifiers

- There is a problem with both of the possible revisions in (45) and (46)
  - They both make the wrong prediction in many scenarios
  - For example, where the syntactic object that moves within the Spell Out Domain contains more than one terminal. Consider (50):

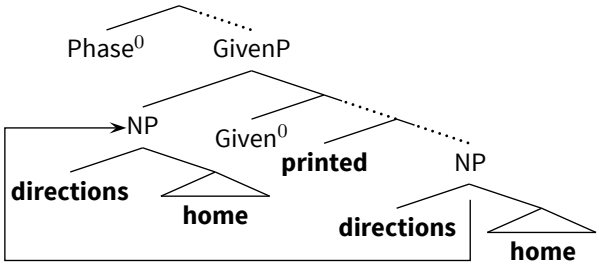
    (50) John printed the directions *hóme*.

    - In (50), *home* is the complement of directions – bearing PS, as expected
  - Now, let us consider a context in which *directions home* is given

(51) (John went online to find directions home. Than…) John *prínted* the directions home.

- The derivation for (51) should be as:

(52)

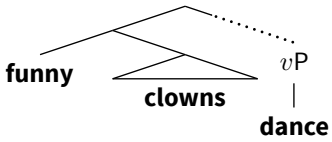


  - Our original definition of depth, (8), correctly predicts *directions home* doesn't bear PS, given (52)
  - **Under either of the new definitions in (45) and (46), *home* would be considered most embedded, even in the case of givenness movement, incorrectly predicting *home* to bear PS**

- At the same time, **our original definition is not sufficiently complex to determine the PS in similar scenarios**
  - Our original definition of depth does not make a clear prediction about the PS when a specifier is more structurally complex than its sister
  - Let us consider an example of this, (53), and its structure at Spell-Out, (54):

(53) I saw funny clowns *dánce*

(54)



  - In the tree above, our original depth of embedding definition would allow both *clowns* and *dance* to be considered most embedded, since there is no c-command between the two
  - Intuitively, there is a sense in which *dance* is more embedded
  - Our intuitions come from the idea that there is a spine to the tree, and when considering candidates for depth of embedding we compare elements that merge on the spine
    - The mechanism for determining depth of embedding searches down the path of complementation (the spine)
      - It considers the nodes that are directly merged on the spine
    - **It does not look into specifiers' structure**
  - **NSR considers non-complements to be atomic units, without any structural depth**
    - Things that (re-)merge in non-complement positions behave structurally as atoms
      - See Cinque 1993 and Uriagereka 1999 (a similar but different idea is explored in Hornstein 2010)
      - Cinque 1993 (paraphrased): when a non-complement merges with the path of complementation, that non-complement is only visible as a structural atom.

> "This implies that no matter how complex the specifier of CP, AgrP, and DP, it will never win over a complement, or, in the absence of [a complement], over the head." (*ibid.*)

- Specifiers behave as though they have been previously sent to Spell-Out
  - Specifiers have their own PS assigned internally, before merging on the spine
    - Consider an example non-complement, "XP": the PS for XP gets assigned within XP, according to what is most deeply embedded in XP
    - (XP may also end up being assigned the PS for a larger Spell-Out Domain containing it, as well)
  - Uriagereka 1999 follows the same logic in the domain of linearization – $ is an example of a non-complement's root node:
    - "...elements dominated by $ precede whatever $ precedes. [...] this is a direct consequence of the fact that [the non-complement $] ***has been spelled-out separately [...] in a different derivational cascade***." (emphasis mine)

- This leads us to a finalized conceptualization of Depth of Embedding[22]

(55) **Depth of Embedding** (final revision):

a. A syntactic object, X, is more deeply embedded than some other syntactic object, Y, provided that no copy of X c-commands all copies of Y.

b. The internal structure of non-complements is not accessible when calculating depth for a given domain.

[22] More radically, the internal structure of non-complements is *never* accessible; non-structural operations might have access to internal elements of non-complements – see Hornstein 2010's conceptualization of Copy.

F PF Movement

- PF has the ability to effect post-syntactic positional changes of certain phonological units
  - **Let's call this PF-movement** (to avoid confusion with p-movement)
  - "PF-movement" can be defined as the operations/constraints that determine placement of phonological material
  - A valid PF-movement will reference only the information available at PF
    - See (6) and (7)
  - In other words, to the extent that movements occur at PF...
    - They need to be defined on phonological primitives (prosodic word, phonological phrase, primary stress, ...)
    - They need to be insensitive to non-phonological formal syntactic features (e.g. syntactic labels, Hayes 1990, Tokizaki 1999)
    - They do not respect syntactic constraints (e.g. island constraints)
- As such, since focus movement and HNPS need to reference labels and are sensitive to island constraints, **they are not examples of well-formed PF-movements**
  - Even if p-movement were grammatically possible, prosodically-motivated movement is unnecessary
    - What has been proposed as p-movement can be movement driven by syntax-internal reasons[23]
- Some examples of good PF-movements:
  - The vowels in root/template morphology are morphemes external to the root, but which that get placed as infixes in the phonology, for reasons of syllabification (e.g. Kremers 2012)
  - Clitic-placement in Bulgarian/Macedonian is based on phonologically-defined primitives (see Harizanov 2014)

[23] Perhaps there is a phonological/prosodic constraint that is sensitive having something of the wrong phonological size in the wrong place, and this could filter out ungrammatical HNPS movements.