Class 1: What are phases?

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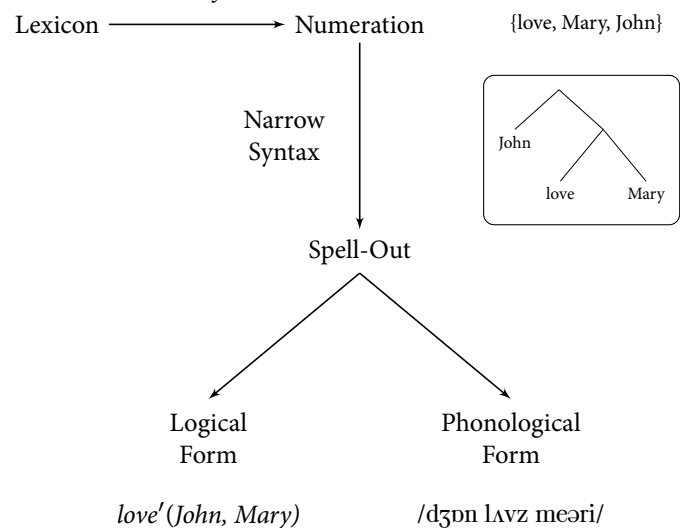Universität Leipzig
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1 What are phases?

- The basic architecture of the Minimalist Program (Chomsky 1995) is the Y-Model of grammar:

(1) *'Inverted' Y-Model of Grammar*:

- When does Spell-Out happen?
  - **Option 1**: We build the entire syntactic structure and then send it to the interfaces.
  - **Option 2**: We build only part of entire syntactic structure, send that part to the interfaces, and then continue to build the rest of the structure.

- The latter is the so-called *Multiple Spell-Out* model (Uriagereka 1999; also cf. Bresnan 1978).

(2) *Numeration*: {love, John, Mary}

a.	Create SO	[love Mary]
b.	Send SO to interfaces (Spell-Out)	**loves Mary**
c.	Continue to build	[John **loves Mary**]
d.	Send SO to interfaces	**John loves Mary**

2 Classical Phase Theory (Chomsky 2000, 2001)

2.1 Merge-over-Move

- The original motivation for phases in Chomsky (2000) comes from the following paradigm:

(3) a. $[_{TP_2}$ A man seems $[_{TP_1}$ ___ to $[_{vP}$ be ___ the garden]]]
     b. $[_{TP_2}$ There seems $[_{TP_1}$ ___ to $[_{vP}$ be a man in the garden]]]
     c. *$[_{TP_2}$ There seems $[_{TP_1}$ a man to $[_{vP}$ be ___ in the garden]]]

(4) *Generalization*:
     If expletive *there* is to be merged in Spec-TP_2, it must also be merged in Spec-TP_1.

- This can be captured by the following constraint (also see Frampton & Gutmann 1999):

(5) *Merge-over-Move* (informal version):
     At a given derivational step, if both Move of α and Merge of β are possible, then Merge of β is preferred.

(6) a. *Step Σ*:
         Numeration: {there, C, $T_{[EPP]}$, v, seem}
         $[_{TP_1}$ to$_{[EPP]}$ $[_{vP}$ be $[_{DP}$ a man] the garden]]]

     b. *Step Σ_{+1}* (Move):
         Numeration: {there, C, T, v, seem}
         $[_{TP_1}$ [$_{DP}$ a man] $[_{T'}$ to$_{[EPP]}$ $[_{vP}$ be ___ in the garden]]]

     c. *Step $\Sigma_{+1}{}'$* (Merge):
         Numeration: {C, $T_{[EPP]}$, v, seem}
         $[_{TP_1}$ there $[_{T'}$ to$_{[EPP]}$ $[_{vP}$ be $[_{DP}$ a man] the garden]]]

- The preference for *Merge-over-Move* expressed in (5) means that only (6c) is possible.

- When the matrix clause is merged, only movement of *there* is possible (due to Minimality):

(7) a. $[_{TP_2}$ T$_{[EPP]}$ $[_{vP}$ seems $[_{TP_1}$ there $[_{T'}$ to$_{[EPP]}$ $[_{vP}$ be $[_{DP}$ a man $]$ the garden $]]]]]$
     b. $[_{TP_2}$ There $[_{T'}$ T$_{[EPP]}$ $[_{vP}$ seems $[_{TP_1}$ ___ $[_{T'}$ to$_{[EPP]}$ $[_{vP}$ be $[_{DP}$ a man $]$ the garden $]]]]]]$

   b.′ *$[_{TP_2}$ A man $[_{T'}$ T$_{[EPP]}$ $[_{vP}$ seems $[_{TP_1}$ there $[_{T'}$ to$_{[EPP]}$ $[_{vP}$ be ___ the garden $]]]]]]$

- If we hadn't blocked the step in (6b), the undesirable continuation in (8) would be possible:

(8) a. *Numeration*: {there, C}
         $[_{TP_2}$ T$_{[EPP]}$ $[_{vP}$ seems $[_{TP_1}$ a man $[_{T'}$ to$_{[EPP]}$ $[_{vP}$ be ___ in the garden $]]]]]$
     b. *Numeration*: {C}
         *$[_{TP_2}$ There $[_{T'}$ T$_{[EPP]}$ $[_{vP}$ seems $[_{TP_1}$ a man $[_{T'}$ to$_{[EPP]}$ $[_{vP}$ be ___ in the garden $]]]]]]$

- The following example poses a problem for *Merge-over-Move*, however (see e.g. Obata 2006):

(9) a. There exists [evidence [that a man was in the garden]]
     b. [Evidence [that there was a man in the garden]] exists

- Both of these sentences have the same numeration:

(10) {C, T, there, v, evidence, T$_{[EPP]}$, exist, that, a, to$_{[EPP]}$ man, v, be, the, in, garden}

- The problem is that, when we build the relative clause for (9a), the *Merge-over-Move* preference will block movement

(11) *There exists evidence that a man was in the garden*
      $[_{TP}$ T$_{[EPP]}$ $[_{vP}$ be a man in the garden $]]$
      Numeration: {C, T, there, v, evidence, T$_{[EPP]}$, exist, that}
      a. $[$ there $[_{T'}$ T$_{[EPP]}$ $[_{vP}$ be a man in the garden $]]]$ (Merge)
      b. *$[_{TP}$ a man $[_{T'}$ T$_{[EPP]}$ $[_{vP}$ be ___ in the garden $]]]$ (Move)

- As the derivation proceeds, at TP$_2$ there is no expletive in the numeration that can be merged (12a). The only solution is to move the complex DP to check the EPP.

(12) a. $[_{TP_2}$ T$_{[EPP]}$ $[_{vP}$ exist $[_{DP}$ evidence $[_{CP}$ that $[_{TP_1}$ there $[_{vP}$ was a man in the garden $]]]]]]$
      b. $[_{TP_2}$ $[_{DP}$ evidence $[_{CP}$ that there was a man in the garden $]]$ $[_{T'}$ T$_{[EPP]}$ $[_{vP}$ exists ___ $]]]$

- The problem here is that we cannot derive the sentence in (9a) (an *undergeneration* problem).
- *Solution*: Chomsky (2000) proposes that numerations should be divided into *lexical subarrays*, i.e. smaller sub-numerations:

Suppose we select LA as before […] Suppose further that at each stage of the derivation a subset LA$_i$ is extracted, placed in active memory (the 'work space'), and submitted to the procedure L. When LA$_i$ is exhausted, the computation may proceed if possible. Or it may return to LA and extract LA$_j$, proceeding as before.

(Chomsky 2000:106)

(13) a. *Numeration*: {a, b, c, d, e, f}
      b. *Numeration with lexical subarrays*: {{a, b}, {d, e}, {e, f}}

- Only one lexical subarray is accessible at a time (i.e. lexical access is cyclic), so this reduces the computational burden (Ott 2009).
- This also helps us solve our undergeneration problem in (9):

(14) a. There exists [evidence [that a man was in the garden]]
          Numeration:
          LA$_1$: {C, exist, **there**, T$_{[EPP]}$, v}
          LA$_2$: {evidence, that, T$_{[EPP]}$, v, **a man**, be, in, the, garden}
      b. [Evidence [that there was a man in the garden]] exists
          Numeration:
          LA$_1$: {C, exist, T$_{[EPP]}$, v}
          LA$_2$: {evidence, that, **there**, T$_{[EPP]}$, v, **a man**, be, in, the, garden}

- In (14a), *there* and *a man* belong to **different** lexical arrays and therefore do not compete.

A phase of a derivation is a syntactic object derived … by choice of LA$_i$.

(Chomsky 2000:106)

Some problems for the MoM argument:

- If Move and (External) Merge are actually just different modes of application of the same basic operation MERGE (Internal vs. External), how can a constraint differentiate them?
- Deal (2009:302ff.) points out the *too-many-'there's*-problem. If we had two expletives in the numeration, then what prohibits (15a)?

(15) a. *$[_{TP_2}$ there seems $[_{TP_1}$ there to $[_{vP}$ be a man in the garden $]]]$
      b. $[_{TP_2}$ there seems $[_{TP_1}$ ___ to $[_{vP}$ be a man in the garden $]]]$

To rule this out, it seems we would need a Merge-over-Move preference at TP$_1$, but the opposite preference (*Move-over-Merge*) at TP$_2$.

- There is evidence that expletive *there* merges low in Spec-vP (see e.g. Deal 2009; Wu 2017).
- It has been argued that there is no need to move to the specifier of TP$_1$ (Castillo et al. 2009).
- There have been both empirical (Shima 2000; Murphy & Puškar to appear) and conceptual arguments (Chomsky 2013:41) for the opposite preference, *Move-over-Merge*. Do both exist? How is competition between them regulated? (see Broekhuis & Klooster 2007 for a suggestion).

2.2 Phase heads and the PIC

- If a phase is defined as a lexical subarray in the numeration, how are LAs defined?

- Chomsky (2000:106) talks about phases/LAs constituting a 'natural syntactic object that is relatively independent in terms of interface properties'

  – For LF, a phase should be a 'semantically complete/natural' object:

  > On the 'meaning side', perhaps the simplest and most principled choice is to take SO [syntactic object] to be the closest syntactic counterpart to a proposition: either a verb phrase in which all θ-roles are assigned or a full clause including tense and force. Call these objects *propositional*.
  >
  > (Chomsky 2000:106)

  – At PF, a phase should constitute a 'phonologically complete/natural' object:

  > The choice of phases has independent support: […] they have a degree of phonetic independence (as already noted for CP vs TP). […] The same is true of vP constructions generally.
  >
  > (Chomsky 2001:12)

- Chomsky (2000:106) suggests that we should assume that vP and CP constitute phases.

- However, Chomsky (2000) assumed that only transitive vP (with an external argument) were 'complete' enough to constitute a phase. To clarify this, we can refer to transitive v's as v*P.

- We now have some options when it comes to defining phases:

  (16) a. Phases are convergent objects.
        b. Phases are objects that determine points of Spell-Out (or Transfer).

- Option (16a) is undesirable because it requires Look-Ahead (i.e. we cannot know if an object is convergent until it is sent to the interfaces).

- Instead, we can try to determine phases as the point in which syntactic structure is sent to the interfaces in a MSO model.

- One way of achieving this is to combine the phases CP and v*P with the following condition:

  (17) *Phase Impenetrability Condition* (PIC$_1$) (Chomsky 2000:108):
        In a phase α with head H, the domain of H is not accessible to operations outside α, only H and its edge are accessible to such operations.

- The head of a phase (e.g. C, v*) is then a *phase head*.

- The *edge* of a phase includes the phase head and its specifier(s).

- The complement of the phase head is the *Spell-Out domain* that is sent to interfaces once the phase is complete.

- This gives rise to the following abstract structure:

(18)
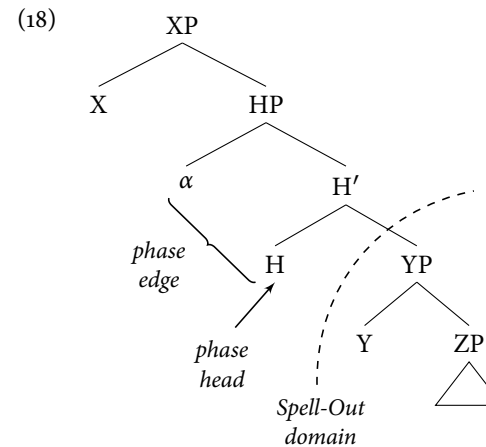
- For a head X, only elements at the phase edge (α and H) are accessible for X.

- YP (or phrases contained in YP) are no longer accessible to syntactic operations because they have already been transferred to the interfaces (LF and PF) after HP was complete.

- The only way for a phrase such as ZP to be accessible for X is for it to first move to the phase edge.

(19)
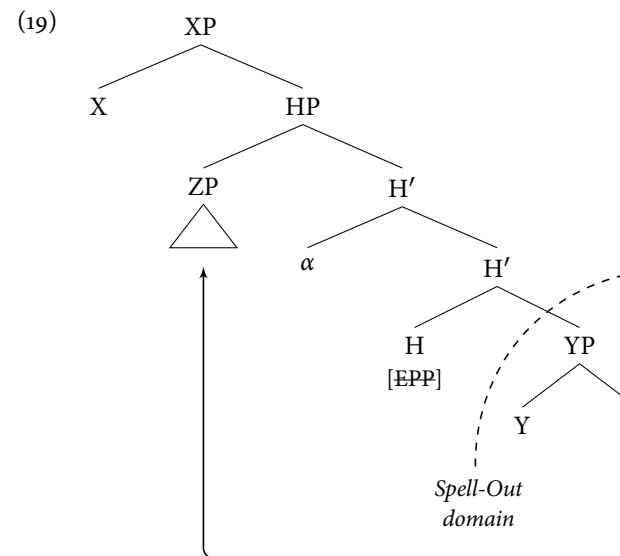
- Chomsky (2000) envisages the possibility of freely adding an EPP-feature to phase heads to facilitate this kind of movement.

(20)

```
            CP
          /  \ ‑ ‑ ‑ ‑
         C    TP
        /    /  \
       /    T    vP
   Spell-Out   /  \
   domain    DP    v′
                  /  \‑ ‑ ‑
                 v    VP
                     /  \
                    V    DP
              Spell-Out
              domain
```
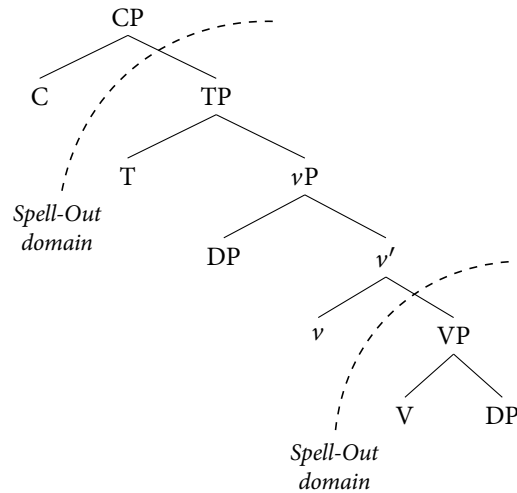
- Notice that the direct object of a transitive is inside the Spell-Out domain of the *v*P phase.

- In order for it to move out, e.g. in an object wh-question, it must first move to the edge of *v*P.

(21) *Who does Peter like?*
   a. [$_{v\text{P}}$ Peter [$_{v'}$ *v* [$_{V\text{P}}$ like who]]]   (*Create v*P)
   b. [$_{v\text{P}}$ Peter [$_{v'}$ *v*$_{[\text{EPP}]}$ [$_{V\text{P}}$ like who]]]   (*EPP-insertion*)
   c. [$_{v\text{P}}$ who [$_{v'}$ Peter [$_{v'}$ *v*$_{[\text{EPP}]}$ [$_{V\text{P}}$ like ⎯⎯]]]   (*Movement to v*P edge)
   d. [$_{v\text{P}}$ who [$_{v'}$ Peter [$_{v'}$ *v*$_{[\text{EPP}]}$ [$_{\textbf{VP}}$ **like** ⎯⎯]]]   (*Spell-Out*)
   e. [$_{C\text{P}}$ who C$_{[\text{wh}]}$ [$_{T\text{P}}$ Peter T [$_{v\text{P}}$ ⎯⎯ [$_{v'}$ ⎯⎯DP [$_{v'}$ *v*$_{[\text{EPP}]}$ [$_{\textbf{VP}}$ **like** ⎯⎯]]]]]]
                                                                                                  (*Movement to Spec-CP*)

- Another consequence is that long distance movement proceeds through the edge of each phase along the way (CP and *v*P):

(22) *Successive-cyclic movement*:
   [$_{C\text{P}}$ Who do you [$_{v\text{P}}$ ⎯⎯ think [$_{C\text{P}}$ ⎯⎯ that Mary [$_{v\text{P}}$ ⎯⎯ [$_{V\text{P}}$ likes ⎯⎯]]]]] ?
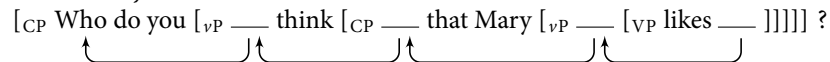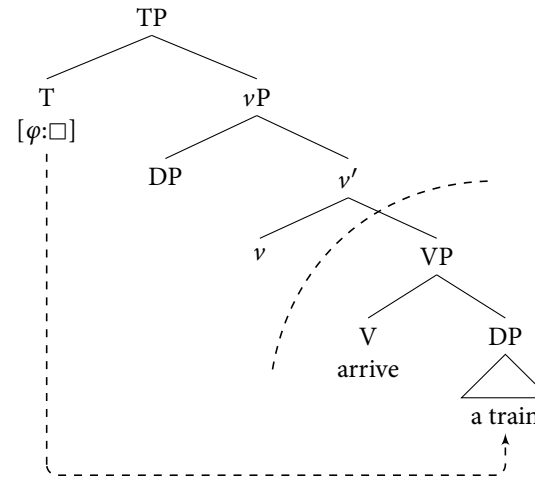
2.3 Strong vs. weak phases

- Given the PIC in (17), we can see why unaccusative/passive *v*P was not assumed to be a phase.

(23) There arrived a train (at the station).

- In (23), the DP *a train* is clearly in its base-positionas the direct object of *arrive*.

- If unaccusative *v*P were a phase, then the DP should not be accessible for agreement/case assignment from T, given the definition of the PIC in (17).

(24)

```
            TP
          /  \
         T    vP
     [φ:□]   /  \
           DP    v′
                /  \ ‑ ‑ ‑
               v    VP
                   /  \
                  V    DP
                arrive   △
                       a train
```

- Arguably, there may also have to be a relation between the expletive and its associate DP. Evidence for this comes from what is known as the 'definiteness restriction' on expletive associates (see Milsark 1974 for English and Bobaljik & Jonas 1996 for Icelandic).

(25) *Definiteness restriction*:
   a. There is a man in the room.
   b. There are three men in the room.
   c. *There is the man in the room.
   d. *There are those men in the room.

Problem:

- Treating a defective *v* head as not being a phase potentially undermines the diagnostic of phases being semantically and phonologically complete syntactic objects.

- For example, just because a *v*P lacks an (overt) external argument does not mean that they are incomplete in some way (all θ-roles assigned, propositional).

- Shouldn't the same logic apply to unergatives that lack an overt internal argument?

- Furthermore, there is no clear sense in which unaccusative *v*Ps are any less phonologically complete than transitive *v**Ps.

- To address this point, Chomsky (2001, 2004) assumes that all *v*Ps are phases based on the criteria of being a 'convergent SO', however introduced the notion of *strong* and *weak* phases.

*v*P with nontransitive *v* is relatively isolted and […] cannot be phase for Spell-Out. Call these *weak phases.* then the strong phases are those that have an EPP-position as an escape hatch for movement and are, there, the smallest constructions that qualify for Spell-Out.

(Chomsky 2004:124)

- Only strong phases trigger cyclic Spell-Out and provide an intermediate landing site for movement (in class 3, we will see empirical arguments that this is wrong; Legate 2003).

- But it is unclear whether this distinction is really helpful. To all intents and purposes, 'weak' phases lack any discernable properties of phasehood.

  > […]if an XP does not trigger cyclic transfer, it is pointless to call it a phase.
  > (Gallego 2010:168)

  > As far as we can tell, [the strong-weak] distinction plays no role in the theory, except that it restricts phase properties to strong phases. Weak phases act as if they weren't phases; in particular, they don't count as domains for the application of Spell-Out or PIC.
  > (Boeckx & Grohmann 2007:215)

- There is also another potentially serious problem with the strong/weak phase distinction, namely we can have unbounded A-dependencies involving raising TPs:

(26) [$_{TP}$ John [$_{vP}$ seemed [$_{TP}$ ___ to [$_{vP}$ appear [$_{TP}$ ___ to [$_{vP}$ have been offended ___]]]]]]

- While there may or may not be EPP driven movement to these intermediate positions (Bošković 2002; Castillo et al. 2009), if all of these non-transitive, defective *v*P were to constitute weak (i.e. non-)phases, then the search space available to matrix T would rather large (even potentially unbounded):

(27) [$_{TP}$ T$_{[EPP]}$ [$_{vP}$ seemed [$_{TP}$ to [$_{vP}$ appear [$_{TP}$ to [$_{vP}$ have been offended John]]]]]]

search space of T

- This seems to severely undermine the idea that phases and cyclic Spell-Out are motivated by reducing computational burden (more on this below).

2.4 PIC₁ vs. PIC₂

- The conception of phases in Chomsky (2000) faced a much more serious problem, however.

- Recall that the problem of agreement into a phase domain with unaccusatives/passives was solved by assume that these constitute weak/non-phases.

- However, there are languages in which there is agreement into the domain of a *transitive v*P:

(28) a. Henni   höfðu leiðst   þeir
          her.DAT had.3PL bored.at they.NOM
          'She had found them boring.'   (Sigurðsson 2002:692)

      b. Marii   podobała się   ta książka
          Maria.DAT please   REFL this book.NOM
          'Maria liked this book.'   (Citko 2014:35)

- There is evidence that this nominative is genuinely a syntactic object (see e.g. Zaenen et al. 1985; Taraldsen 1995 for Icelandic).

- Thus, we have the following structure:

(29) a. [$_{TP}$ DP$_{DAT}$ [$_{T'}$ T$_{[\varphi:\square]}$ [$_{vP}$ ___DAT [$_{v'}$ *v* [$_{VP}$ V DP$_{NOM}$]]]]]

- Given the PIC in (17), the complement of the *v* phase head would become inaccessible after the *v*P is complete.

- Consequently, the object DP is no longer accessible for agreement.

(30) a. [$_{vP}$ DP$_{DAT}$ [$_{v'}$ *v* [$_{VP}$ **V DP**]]]]   (*Spell-Out*)
      b. [$_{TP}$ T$_{[\varphi:\square]}$ [$_{vP}$ DP$_{DAT}$ [$_{v'}$ *v* [$_{VP}$ **V DP**]]]]   (*Merge TP*)

- *Problem*: Appealing to weak phases here would severely undermine the motivation for phases (if we were to start allowing construction-specific exceptions).

- To address this issue, Chomsky (2001) proposes a slightly weaker definition of the PIC, which delays Spell-Out of a phase complement until the next highest phase head is merged.

(31) *Phase Impenetrability Condition* (PIC₂) (Chomsky 2001:14):
      Given the structure [$_{ZP}$ Z … [$_{HP}$ α [$_{H'}$ H YP]]], where H and Z are phase heads, the domain of H is not accessible to operations at ZP; only H and its edge are accessible to such operations.

- This is sometimes referred to as the 'Weak PIC' (Gallego 2010:58) or as PIC₂ (Müller 2004:291).

- Under this definition, the complement of *v*P is not sent to Spell-Out until the next highest phase head (C) is merged.

(32) a. [$_{vP}$ *v* DP]
      b. [$_{vP}$ DP$_{DAT}$ [$_{v'}$ V DP]]   (*No Spell-Out under PIC₂!*)
      c. [$_{TP}$ T$_{[\varphi:PL]}$ [$_{vP}$ DP$_{DAT}$ [$_{v'}$ V DP]]]   (*Agree possible with DO*)

      d. [$_{CP}$ C [$_{TP}$ DP$_{DAT}$ [$_{T'}$ T$_{[\varphi:PL]}$ [$_{vP}$ ___ [$_{v'}$ V DP]]]]]   (*Merge CP*)
      e. [$_{CP}$ C [$_{TP}$ DP$_{DAT}$ [$_{T'}$ T$_{[\varphi:PL]}$ [$_{vP}$ ___ [$_{v'}$ **V DP**]]]]]   (*Spell-Out of vP*)

- If we have this view of the PIC, then we do not really need a strong/weak phase distinction. The problem of T agreeing with the direct object in unaccusatives/passives disappears (at least in these simple cases).

- However, the PIC_2 weakens the locality of syntactic operations significantly (Müller 2004; Richards 2011) and this undermines one of the main conceptual motivations for phases (computational efficiency).

- In the case of T agreeing with a direct object DP, the search space available to T is increased into the domain of the phase head under the PIC_2 (33b).

(33) a. $[_{CP}$ $\underline{C}$ $[_{TP}$ T $[_{vP}$ DP $[_{v'}$ $\underline{v}$ $[_{VP}$ V DP $]]]]]$

    search space of T (PIC_1)

  b. $[_{CP}$ $\underline{C}$ $[_{TP}$ T $[_{vP}$ DP $[_{v'}$ $\underline{v}$ $[_{VP}$ V DP $]]]]]$

    search space of T (PIC_2)

- While in this example it may seem like a minimal extension, depending on the syntactic structure involved, the domain accessible could be larger:

(34) I told John who I'd like to meet.

  a. $[_{CP}$ $\underline{C}$ $[_{TP}$ T $[_{vP}$ DP $[_{v'}$ $\underline{v}$ $[_{VP}$ DP $[_{V'}$ V $[_{CP}$ DP $[_{C'}$ $\underline{C}$ **TP** $]]]]]]]]]$

    search space of T (PIC_1)

  b. $[_{CP}$ $\underline{C}$ $[_{TP}$ T $[_{vP}$ DP $[_{v'}$ $\underline{v}$ $[_{VP}$ DP $[_{V'}$ V $[_{CP}$ DP $[_{C'}$ $\underline{C}$ TP $]]]]]]]]]$

    search space of T (PIC_2)

- **PIC_1**: Reduced search space, problem with DAT-NOM constructions

- **PIC_2**: Increased search space, no problem with DAT-NOM constructions

  The indeterminacy in PIC formulations is thus identical with and equivalent to an indeterminacy in T's search space—nothing else changes or is at stake. The question of why two divergent definitions of the PIC are possible (as opposed to just a single PIC, or indeed three, four, or 34 PICs) thus reduces to the question of why T's (i.e., the nonphase head's) search space is undetermined by phase theory in this way. If we can find a principled answer to this latter question, then we can remove the stipulation of T's search space (i.e., (8a)) from the definition of the PIC itself and thus reduce the two PICs to a single, fundamental formulation – a unified PIC.

    (Richards 2011:80f.)

- Richards (2011) suggests that the two PICs can be unified if phases are defined over lexical arrays, rather than categories (PIC_{LA}):

(35) *Phase Impenetrability Condition* (PIC_{LA}) (Richards 2011:81):
    Given $[_{ZP}$ Z $[_{XP}$ X $[_{HP}$ α $[_{H'}$ H YP $]]]]$, with H and Z belonging to separate LAs, the domain of H is not accessible to operations 'outside' [the maximal phrase projected from] LA_H; only H and its edge α are accessible to such operations
    where LA_H = the lexical subarray defined by head H,
    with either $\quad$ X $\in LA_H$ $\qquad$ (= PIC_2)
    $\quad$ or $\qquad$ X $\notin LA_H$ $\qquad$ (= PIC_1)

- Here, the PIC is defined depending on which LA non-phase head such as T are assigned to.

- Depending on how we construct our LAs, we get either PIC_1 or PIC_2:

(36) a. $PIC_1 = \{C, T\}, \{v, V\}, \ldots$ $\qquad\qquad$ $[_{CP}$ C $[_{TP}$ T $[_{vP}$ DP $[_{v'}$ v $[_{VP}$ V DP $]]]]]$

    Max. phrase projected from LA

  b. $PIC_2 = \{C\}, \{T, v\}, \{V\}, \ldots$ $\qquad\qquad$ $[_{CP}$ C $[_{TP}$ T $[_{vP}$ DP $[_{v'}$ v $[_{VP}$ V DP $]]]]]$

    Max. phrase projected from LA

- *Consequence*: We remove the concept of phase heads/phase edges (see Richards 2011 for what to replace it with).

2.5 Feature inheritance and further developments

- There were further developments in Phase Theory after Chomsky (2001).

- For example, it has been argued that phase heads can be defined as the locus of uninterpretable features (see e.g. Chomsky 2004, 2008; Gallego 2010:60; Miyagawa 2011:1273; Legate 2012).

- The concept of *Feature Inheritance* was introduced by Chomsky (2007, 2008), where uninterpretable features on C and v are passed down to the next non-phase head, i.e. T and V.
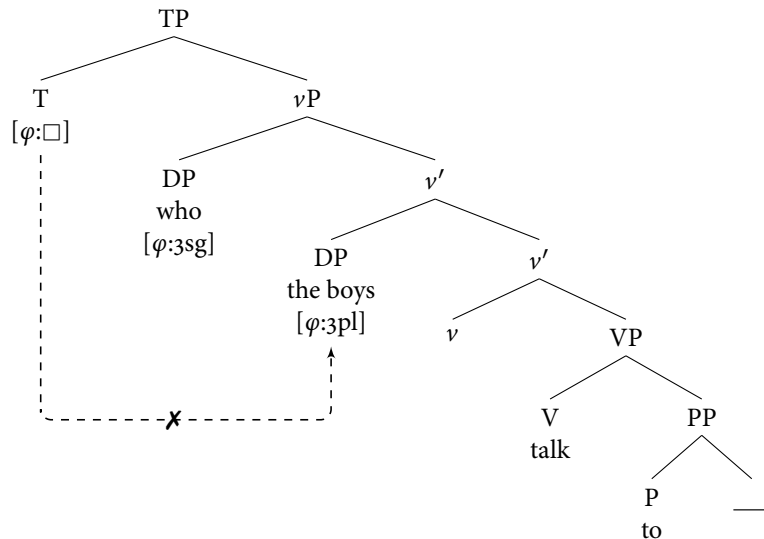
(37) *Feature Inheritance* (Chomsky 2007, 2008):
    a. $[_{CP}$ $C_{[uF]}$ $[_{TP}$ T $[_{vP}$ DP $[_{v'}$ $v_{[uF]}$ $[_{VP}$ V DP $]]]]]$
    b. $[_{CP}$ C $[_{TP}$ $T_{[uF]}$ $[_{vP}$ DP $[_{v'}$ v $[_{VP}$ $V_{[uF]}$ DP $]]]]]$

- *Question*: What kind of operation is FI? It doesn't look like Agree. It must be conceived of as a kind of 'feature sharing' (Richards 2007) or perhaps copying (Gallego 2014).

- Furthermore, feature inheritance requires that operations at the phase level take place 'simultaneously' (Richards 2007).

- Among other reasons, the EPP and φ-feature probes on T actually originate on C.

- One such simple case discussed by Chomsky (2004) involves an apparent problem with intervention by moving operators (Citko 2014:48f.). Consider (38).

(38) Who have the boys talked to?

(39)

```
                        TP
          ┌─────────────┴──────────────┐
          T                            vP
        [φ:□]               ┌──────────┴──────────┐
          ┊                 DP                    v′
          ┊                 who          ┌────────┴────────┐
          ┊               [φ:3sg]        DP               v′
          ┊                           the boys     ┌───────┴───────┐
          ┊                            [φ:3pl]      v              VP
          ┊                              ↑                  ┌───────┴───────┐
          └─────────✗─────────────────┘                   V              PP
                                                          talk      ┌──────┴──────┐
                                                                    P            ___
                                                                    to
```

- The argument goes that T should not be able to agree with the subject because the intermediate subject intervenes.
- If arguments apply 'simultaneously', i.e. movement to Spec-CP and Agree between T and *the boys*, then this problem does not arise (apparently).
  Objection:
- Whether or not there is intervention at the phase edge ultimately depends on the timing of intermediate movement and merge of the subject (see e.g. Heck & Himmelreich 2017).
- Chomsky (2008) provides other arguments based on CED effects (cf. Gallego 2011) and opaque intervention in Icelandic (cf. Bošković 2012), however these all have plausible alternative explanations. Ultimately, it seems that there are no really convincing arguments for simultaneous application of operations at the phase level.
- There are also conceptual objects regarding the seeming abandonment of cyclicity and derivationalism (cf. Epstein & Seely 2002).

  Note:
- There have been some further developments related to labelling that I will not discuss, i.e. the POP+ framework (Chomsky 2013, 2015). As far as I can see, their assumptions diverge too much from Classical Phase Theory to be considered a continuation of the same theory.

2.6 Some criticism of Classical Phase Theory

2.6.1 Phase ≠ Spell-Out domain

- Often interface properties of the phase-defining category (C, *v*) are taken to be relevant, for example if it is a 'complete' phonological or semantic object.
- However, this logic is undermined by the fact that interfaces only see the *phase complement*, which undergoes Transfer (cf. some diagnostics in Legate 1998 and Matushansky 2005).
- For this reason, a transitive VP should count as 'propositionally complete', which it is not (at least intuitively).

  > Chomsky argues that TP is not a phase. Interestingly, the criterion for phasehood he adopts –propositionality– would classify the embedded TP […] as a phase.
  >
  > (Bošković 2002:182)

- So a raising TP such as (40a), for example, would constitute a phase given this criterion. If this were the case, then the ban on 'improper movement' would be mysterious (40b) (*Ā → A).

  (40) a. John₁ seems [TP __₁ to be happy]
       b. *John₁ seems [CP __₁ that [TP __₁ is happy]]

- The same holds for CP, where force and discourse-related features are hosted.
- The same confusion holds for phonological diagnostics, too. Chomsky (2001) points to the phonetic independence of CP vs. TP, for the phasehood of the former rather than the latter. However, it precisely TP that is sent to the interfaces as a single unit (and not CP+TP, for example).
- Interface diagnostics should perhaps be taken with a pinch of salt if something like non-simultaneous Spell-Out is possible (e.g. Marušič 2009).

2.6.2 The status of the 'spelled out' phase complement

- Another motivation for cyclic Spell-Out in phases comes from efficient computation, as we have seen.
- Syntactic material that has been sent to the interfaces is no longer accessible for later operations and can be 'forgotten' (Chomsky 2001:12f.).
- One criticism of this is that, while the internal structure of the phase complement may be inaccessible, the phase complement itself (VP, TP) must still be accessible for syntactic operations (i.e. movement).
- This has been proposed to be a desirable result. For example, Abels (2003, 2012) proposed that phase heads cannot be stranded

  (41) *Stranding Generalization* (Abels 2003:09; Abels 2012:89):
       The complement of a phase head may not be moved.

- This actually follows from the PIC coupled with a more general constraint on 'anti-local' movement, i.e. movement that is too short.

(42) *Anti-Locality* (Abels 2003; Grohmann 2003):

```
            YP
          /    \
         /      Y′
        /      /  \
       /      Y    ZP
       |_____|
              ✗
```
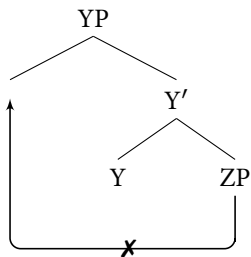
- If Y is a phase head, then in order for ZP to be moved, it must be present at the edge of YP in order (given the PIC).
- However, movement from the complement position to the specifier position violates Anti-Locality (42).
- Thus, stranding of phase heads is predicted to be ungrammatical.
- Is this empirically borne out?
- In English, CPs can be moved (43a), but TPs cannot (43b).

(43) a. [$_{CP}$ that Mary is smart] was believed ___$_{CP}$ by all.
      b. *[$_{TP}$ Mary is smart] was believed [$_{CP}$ that ___$_{CP}$] by all.

- However, it has been argued that sentence-final particles are derived by movement of TP to Spec-CP.
- This could follow from our background assumptions on linearization, i.e. Kayne's (1994) *Linear Correspondence Axiom*, where head-final structures have to be derived by 'roll-up' movement.
- Possibly the most convincing case for movement of a phase complement is discussed by Simpson & Wu (2002).
- They discuss the complementizer *kong* in Taiwanese that can occur either before or after the TP complement.

(44) *Final and initial-kong in Taiwanese* (Simpson & Wu 2002:79,81):
     a. A•hui liau•chun• [$_{CP}$ kong• [$_{TP}$ A•sin si• tai•pak• lang   ]]
        A-hui thought   KONG   Asin is Tapei   person
        'A-hui thought that A-sin is from Tapei.'
     b. [$_{CP}$ [$_{TP}$ A•sin si• tai•pak• lang   ] kong•]
              Asin is Tapei   person KONG
        'A-sin is from Tapei.'

(45) *Base-generation*:
     a. [$_{CP}$ kong [$_{TP}$ …]]
     b. [$_{CP}$ [$_{TP}$ …] kong]

(46) *Movement*:
     a. [$_{CP}$ kong [$_{TP}$ …]]
     b. [$_{CP}$ [$_{TP}$ …] kong ___$_{TP}$]

- Evidence for movement in this construction comes from *tone sandhi* (marked by •). Tone sandhi is a rule-governed tonal change on a syllable when preceded by another tone-bearing syllable. The exact change is unimportant here, if tone sandhi has occurred, the syllable is followed by •.
- The fact that tone sandhi requires a preceding tone-bearing syllable is shown by the fact it does not occur sentence-finally:

(47) *No tone sandhi clause-finally* (Simpson & Wu 2002:73):
     A•sin chin• ho.   A•hui ma• chin• ho.
     A-sin very good A-hui also very fine
     'A-sin is very well. A-hui is also very well.'

- If we go back and look at the examples in (44), we see that tone sandhi is triggered on the complementizer *kong* in (44a) since it precedes the TP.
- Crucially, tone sandhi is found on *kong* in final position in (44b), although this is not generally possible (47). This only makes sense if the TP-complement is moved, as in (46b).[1]
- This independent tone sandhi diagnostic provides a strong argument for the movement analysis and shows that phase complements must, in some cases, be moveable.

2.6.3 Locality of Move vs. Agree

- Bošković (2003, 2007) argues that Agree can reach into a finite clause in violation of the PIC, especially in Algonquian (also see Lee 2003; Legate 2005):

(48) a. *Chuckchee* (Bošković 2007:613):
         ənan qəlɣiḻu ləŋərkə-**nin-et** [$_{CP}$ iŋqun Ø-rənəmŋəv-nen-at **qora-t**   ]
         he   regret-**3-PL**   that 3SG-lost-3-PL   reindeer-PL
         'He regrets that he lost the reindeers.'
      b. *Blackfoot* (Legate 2005:150):
         kits-íksstakk-a   [$_{CP}$ omá n-oxkó-wa máxk-itáp-aapiksistaxsi **kiistóyi** omí
         2OBJ-want-3SUBJ   my 1-son-3   3-might-toward.throw   you   DET
         pokón-i]
         ball-4
         'My son wants to throw the ball to/at you.'

---

[1] There are some issues here regarding the exact nature of Spell-Out. It seems we may have to assume some interleaving of syntax and postsyntax (see Martinović to appear).

- This is even problematic for the PIC$_2$ (but cf. Polinsky & Potsdam 2001 on Tsez).

- I suggested that PIC$_2$ might obviate the need for the strong/weak phase distinction:

  (49) [$_{CP}$ C [$_{TP}$ T [$_{vP}$ DP [$_{v'}$ v [$_{VP}$ V DP]]]]]

  search space of T (PIC$_2$)

- This is only true for monoclausal cases, however. (50) is problematic if all vPs are phases.

  (50) a. [$_{TP}$ Ten trains [$_{vP}$ seem(*-s) [$_{TP}$ to have [$_{vP}$ arrived ___ into the station today]]]]
        b. [$_{TP}$ There [$_{vP}$ seem(*-s) [$_{TP}$ to have [$_{vP}$ arrived ten trains into the station today]]]]
                                                                    (Legate 2005:148)

- The problem is that T needs to agree with the direct object, however the complement of the phase head v_1 (if a strong phase), becomes inaccessible after v_2 is merged.

  (51) [$_{TP}$ There T [$_{vP_2}$ v_2 seem [$_{TP}$ to have [$_{vP_1}$ v_1 [$_{VP}$ arrived ten trains] into the station today]]]]

  search space of T

3 An alternative to the PIC (Fox & Pesetsky 2005)

- Fox & Pesetsky (2005) propose an alternative way to derive successive-cyclic movement without the PIC.

- They argue that phases (vP and CP) are spelled-out upon completion, and a set of linearization statements is generated.

  (52) *Order Preservation* (Fox & Pesetsky 2005:6):
        Information about linearization, once established at the end of a given Spell-out domain, is never deleted in the course of a derivation.

  (53) [$_{CP}$ Who does [$_{TP}$ Mary [$_{vP}$ t$_{Mary}$ [$_{v'}$ v [$_{VP}$ like ⟨who⟩]]]]]

        who ‹ **Mary** ‹ like   **Mary** ‹ like ‹ **who**

  (54) [$_{CP}$ Who does [$_{TP}$ Mary [$_{vP}$ ⟨who⟩ [$_{v'}$ t$_{Mary}$ [$_{v'}$ v [$_{VP}$ like ⟨who⟩]]]]]]

        who ‹ **Mary**   **who** ‹ **Mary** ‹ like

- This avoids the stipulative nature of the PIC (viz. edge).

- However, it requires that 'spelled out' material is freely accessible, so arguably does not reduce computational burden in any obvious way.

4 Diagnostics for phasehood

In order for Phase Theory to be a viable research programme, we need to have a set of diagnostics that can be used to identify phases. What could these be?

4.1 Successive-cyclicity

- The primary syntactic diagnostic for phases pertains to successive-cyclic movement.

- Recall that the PIC means that moving elements must pass through the edge of each phase, if not generated there.

  (55) *Successive-cyclic movement*:
        [$_{CP}$ Who do you [$_{vP}$ ___ think [$_{CP}$ ___ that Mary [$_{vP}$ ___ [$_{VP}$ likes ___]]]]] ?

- We can therefore posit the following diagnostics for successive-cyclicity.

  (56) a. *Intermediate pronunciation*:
            Can (part of) a moving phrase be pronunced at an intermediate landing site?
        b. *Intermediate interpretation*:
            Can a moving phrase be interpreted at an intermediate landing site?
        c. *Intermediate licensing*:
            Do certain licensing properties of a moved item hold at an intermediate landing site?

4.2 PF diagnostics

- If the phase complement and phase edge are transferred separately, we expect the following:

  (57) *Null Hypothesis*:
        Items in the phase edge should not interact phonologically with items in the phase complement (assuming domains of phonological computation match Spell-Out domains).

- This seems to be wrong in many cases, e.g. tone sandhi in Taiwanese (Bošković 2017).

4.3 LF diagnostics

- Less obvious: Should phases be of a particular type (e.g. ⟨t⟩, ⟨e⟩)?

- It has been proposed that Quantifier Raising targets phases…but why?

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