The order of operations and A/Ā interactions

Elise Newman

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1 The DOMA: a wh-movement/passivization interaction

- **Observation**: sometimes syntactic operations interact with each other
    - For example: let's look at A and Ā-movement separately and together in Norwegian
        * A-movement can separately target either object of a double object construction (1)
        * Ā-movement can also separately target either object of a double object construction (2)

(1) *Norwegian symmetrical A-movement* (Haddican & Holmberg, 2015, 145)

    a. Jon ble gitt _ boka.   b. Boka   ble gitt Jon _.
        Jon was given   the.book   the.book was given Jon
        'Jon was given the book.'   'The book was given to Jon.'

(2) *Norwegian symmetrical wh-movement* (Holmberg et al., 2019, p.678, ex.3)

    a. Hvem ga   du _ boka?   b. Hvilken bok ga   du Jon _?
        who   gave you   the.book   which   book gave you Jon
        'Who did you give the book to?'   'Which book did you give Jon?'

- But as discussed by Holmberg et al. (2019): when you try to wh-move one object and A-move another, an asymmetry arises

(3) **"Double object movement asymmetry"** (DOMA) (Holmberg et al., 2019): direct object wh-movement+indirect object A-movement is fine, but indirect object wh-movement+direct object A-movement is ungrammatical

    a. Hvilken bok   ble Jon gitt   _ _?
       which   book was Jon given
       'Which book was John given?'   *DO wh-movement from IO passive*
    b. *Hvem ble boka   gitt   _ _?
       who   was the.book given
       intended: 'To whom was the book given?' *IO wh-movement from DO passive*
       (Norwegian; Holmberg et al. (2019), p.680)

- If A-movement and Ā-movement are both separately permitted for each object in (1,2), but their combination is not permitted in (3b), we can imagine two approaches that would rule out (3b):

  1. Option 1 (an approach taken by Holmberg et al. 2019): Ā-movement of an indirect object is not permitted in a direct object passive

  2. Option 2 (an approach that I will adopt): A-movement of a direct object is not permitted in an indirect object wh-question

- Each of these approaches assumes different possible orders of operations

  - Option 1 assumes the direct object A-moves before the indirect object wh-moves, or else it would be incoherent to ban wh-movement of an indirect object from a direct object passive

  - Option 2 assumes the indirect object wh-moves before the direct object A-moves, for the same reason

  (4)   Blocking indirect object wh-movement + direct object A-movement
      a. * Hvem ble boka gitt hvem$_{io}$ boka$_{do}$?
      b. * Hvem ble boka gitt hvem$_{io}$ boka$_{do}$?

- Just looking at (4a,b), we might not be tempted to consider that Ā-movement could precede A-movement, because the resulting derivation looks like it violates the extension condition. In that case, only Option 1 is worth considering.

  - Assuming, however, that both A- and Ā-movement proceed through the edge of vP (Chomsky, 1986; Legate, 2003; Sauerland, 2003; Longenbaugh, 2019), both orders of operations could obey the extension condition, and should therefore be considered!

  (5)   If both A- and Ā-movement proceed through the edge of vP
      a. * [$_{vP}$ Hvem boka [gitt hvem$_{io}$ boka$_{do}$]]?
      b. * [$_{vP}$ Boka hvem [gitt hvem$_{io}$ boka$_{do}$]]?

- **A clue**: not every language is like Norwegian

  (6)   Greek doesn't restrict indirect object wh-movement in passives
      a. Tinos   dhothike   to vivlio?
          who.GEN gave.NACT.3SG the book.NOM
          'Who was the book given to?' (Anagnostopoulou, 2003, ex.308)

  - One way in which Norwegian and Greek differ is that Norwegian has indirect object passives but Greek does not

(7) *Greek asymmetric passives*
  a. To vivlio   tis   charistike   tis Marias.
     the book.NOM cl.GEN award.NACT the Maria.GEN

     'The book was awarded to Mary.' (Anagnostopoulou, 2003, ex. 33)
  b. *I Maria   stalthike   to grama.
     the Maria.NOM sent.nonact.3s the letter.ACC

     intended: 'Mary was sent the letter.' (Anagnostopoulou, 2003, ex. 10a)

- Plausible description of the contrast between Norwegian and Greek:
  Indirect object wh-movement+direct object passive is ruled out just in case the indirect object could in principle A-move.

  – **Proposal**: wh-movement of an indirect object can *Multitask* (in the sense of van Urk & Richards (2015)) – if the indirect object wh-moves before the direct object A-moves, it becomes the passive subject at the same time (i.e. it A-moves at the same time), which blocks the direct object from raising

  (8) * [$_{CP}$ Hvem ble [$_{vP}$ ~~hvem~~ boka gitt [$_{io}$ ~~hvem~~] [$_{do}$ ~~boka~~]?
                                                              X

  Surface subj.   can't have 2 surface subj.

  (3c) ***Hvem** ble *boka*   gitt?
        who   was the.book given

        intended: 'To whom was the book given?'

  – In Greek, indirect objects can only Ā-move, not A-move, so the indirect object can never block A-movement of the direct object[1]

    ∗ In sum, if something in the grammar enforces indirect objects to Ā-move early, indirect object wh-questions should block direct object A-movement in languages with indirect object passives but not in languages without
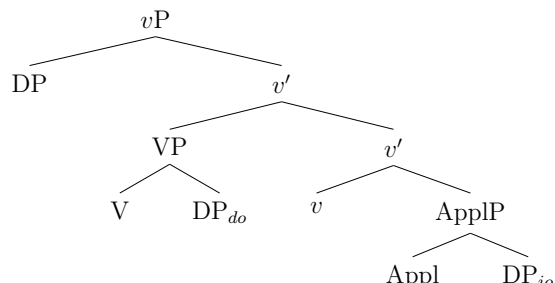   ∗ **Central puzzle**: what enforces early Ā-movement of the indirect object?

- **Plan for today**:

  – Explore a feature checking logic that enables different Merge operations to bleed each other
    ∗ Consequential assumption: the features driving external Merge, A-movement, Ā-movement are all the same kinds of features
  – Apply this feature checking logic to verb phrase syntax more generally to see what structures should be possible

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[1]Why Greek and Norwegian differ in this way is a topic I won't have time to focus on today. I suspect their difference relates to the overtness of inherent case in Greek but not Norwegian. When Norwegian indirect objects raise to nominative, they only ever strand covert case morphology, while in Greek, the stranded morphology would be overt (which could lead to a morphological problem).

* Predicts a novel structure for double object constructions: direct and indirect objects are each introduced by a head which is selected by $v \rightarrow$ one must be a complement of the v and the other a specifier

(9) If v selects for a VP and an ApplP, the logic of Merge features that I develop predicts the following structure for double object constructions

```
                    vP
           _____|_____
          DP              v′
                   _____|_____
                  VP              v′
               ___|___       ____|____
              V    DP_do    v       ApplP
                                 ____|____
                               Appl     DP_io
```

* The complement-specifier distinction makes indirect objects an earlier target for movement at Spec vP compared to direct objects, though neither argument c-commands the other

(10) *Multitasking* (revised from van Urk & Richards 2015):
At every step in a derivation, if two operations A and B are possible, and A checks more features than B, the grammar prefers A, *unless* doing B would check a subset of the features checked by A.

- **Takeaway**: by unifying the conditions on structure building with those on wh-movement, apparent restrictions on wh-movement can instead be understood through general conditions on the timing of different Merge operations
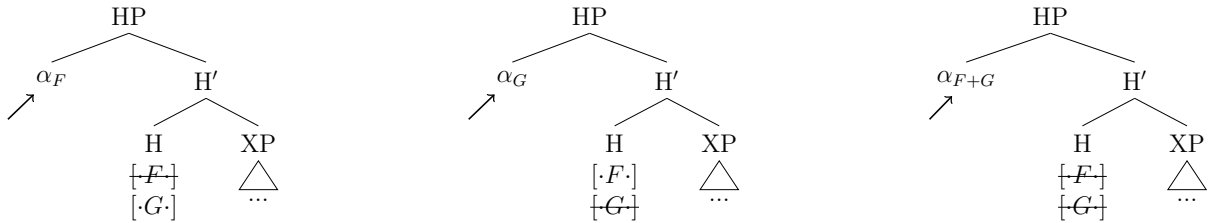
2 The logic of Merge-features

(11) Background assumptions:
a. All Merge is feature driven (Chomsky, 1995)
b. Merge features on a head are *unordered* (Longenbaugh 2019, contra e.g. Adger 2003; Müller 2010), and can *fail* (Preminger, 2014)
c. Feature Maximality/Multitasking/Free Rider condition: Given a head H with features $[F_1]...[F_n]$, if XP discharges $[F_i]$, XP must also discharge each $[F_j]$ that it is capable of (Chomsky, 1995; Pesetsky & Torrego, 2001; Rezac, 2013; van Urk & Richards, 2015; Longenbaugh, 2019)
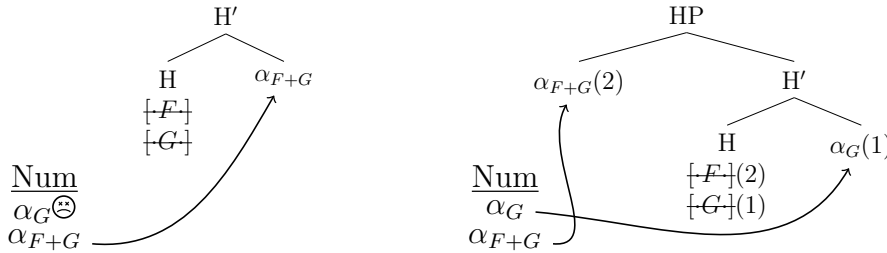
(12) **Proposal**: the Merge features involved in wh-movement, A-movement, and external Merge all have the same properties
a. $[\cdot X \cdot]$ = an instruction to Merge with an element bearing X

(13) Merging a bearer of F or G (but not both) checks one feature on H. Merging a bearer of *both* F and G checks both features on H.
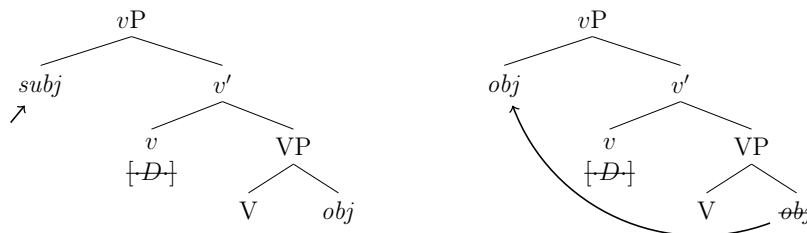
HP tree:
α_F — H'
H: [F] (struck), [·G·]   XP ...

HP tree:
α_G — H'
H: [·F·], [G] (struck)   XP ...

HP tree:
α_{F+G} — H'
H: [F] (struck), [G] (struck)   XP ...

(14) If both α_G and α_{F+G} appear in HP, α_G must have merged first

H' tree:
H: [F] (struck), [G] (struck) α_{F+G}

$\underline{\text{Num}}$
α_G ☹
α_{F+G}

HP tree:
$\alpha_{F+G}(2)$ — H'
H: [F](struck)(2), [G](struck)(1) $\alpha_G(1)$

$\underline{\text{Num}}$
α_G
α_{F+G}

3   Building verb phrases

- I assume that wh-movement is successive cyclic through the edge of *any* vP (not just agentive ones, for example) → whatever feature is responsible for wh-movement must be a property of the *category* v

- **Hypothesis**: Merge features are properties of *syntactic categories*, not individual lexical items

  - E.g. if v selects for a DP subject in transitive clauses, it must also select for a DP subject in intransitive clauses – selecting a subject is a property of the category v rather than the specific derivational morpheme v_{agent}

    * Easily captures Legate (2003); Sauerland (2003); Longenbaugh (2019)'s proposal that v always hosts the surface subject, whether externally or internally merged

    (15) v doesn't need distinct features for transitive vs. intransitive clauses: just an ever present $[\cdot D\cdot]$ feature

    vP tree:
    subj — v'
    v [D] (struck)   VP
    V   *obj*

    vP tree:
    obj — v'
    v [D] (struck)   VP
    V   ~~obj~~

- **Puzzle**: verbs vary considerably in the number and category of arguments they merge with. If the category V controls Merge instead of $\sqrt{enjoy}/\sqrt{turn}$/etc., where does the idiosyncrasy come from?

  (16) Verbs c-select for different numbers and categories of arguments

5

a. Jo enjoys <u>fruit</u>. (DP object)

b. Amy turned <u>blue</u>. (AP object)

c. Beth depends <u>on Lauri</u>. (PP object)

d. Meg wants <u>to go camping</u>. (TP object)

e. Jo thinks <u>that Marmie likes carrots</u>. (CP object)

f. Beth introduced <u>Marmie to Lauri</u>. (DP+PP objects)

g. Amy told <u>Meg that she hates carrots</u>. (DP+CP objects)

- **Proposal**: argument introducers bear an unspecified feature $[\cdot X\cdot]$ (in addition to $[\cdot D\cdot]$) that can be checked by any constituent

(17) Features for each verbal category

    a. V = $[\cdot D\cdot]$, $[\cdot X\cdot]$

    b. v = $[\cdot D\cdot]$, $[\cdot X\cdot]$, $[\cdot V\cdot]$ (and $[\cdot wh\cdot]$ for wh-movement, we'll get to that)

– The fact that X is non-specific induces ordering restrictions on the time of DP vs. non-DP Merge

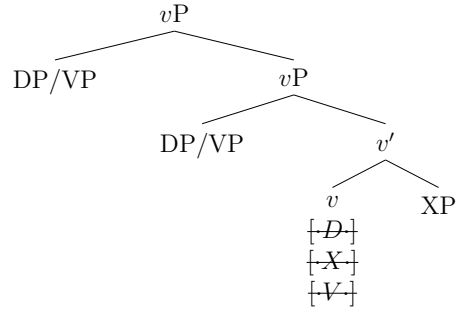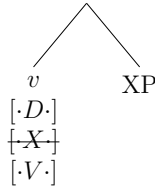(18) *The non-DP first theorem*: if V selects for a non-DP, the non-DP must be merged first.
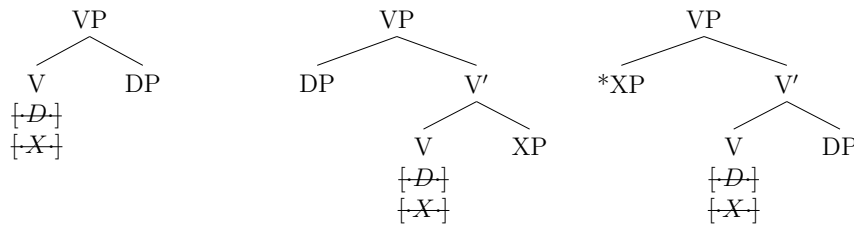
– The same ordering restrictions apply at vP: VP and DP both block non-DP/VPs, so non-DP/VPs must merge first → predicts a novel constituent structure for vP's that host a non-DP argument

(19) Unless XP merges first, only DP and VP can adjoin to v.
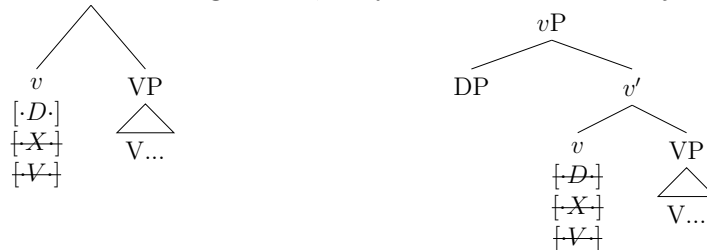
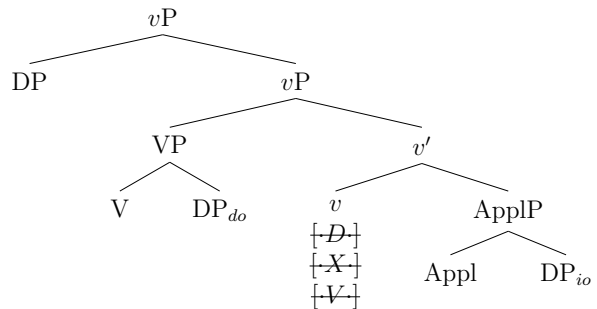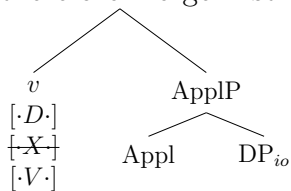(20) If XP merges first, VP is adjoined as a specifier (as is DP).

$$
\begin{array}{c}
v \\
[\cdot D \cdot] \\
[\cdot X \cdot] \\
[\cdot V \cdot]
\end{array}
\qquad
XP
$$

vP
 DP/VP   vP
          DP/VP   v′
                    v   XP
                   [·D·]
                   [·X·]
                   [·V·]

(21)   Results:

    a. 4 kinds of arguments: DP objects (DP arguments of V), DP subjects (DP arguments of v), "low XPs" (non-DP arguments of V), "high XPs" (non-DP arguments of v)

    b. Clauses with a low XP or no XPs → VP is v's complement

    c. Clauses with a high XP → VP is v's specifier
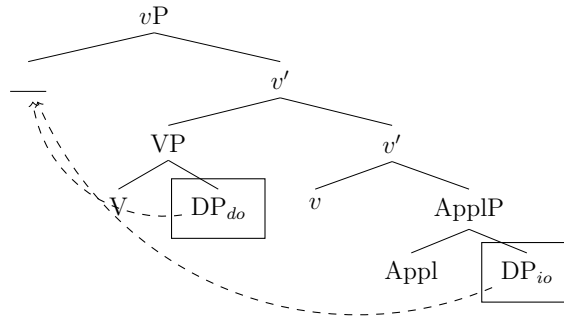
3.1 Passives of double object constructions

- Double object vPs have three arguments

1. A subject introduced by v

2. A direct object introduced by V

3. An indirect object introduced by Appl → ApplP is selected by v and is neither a DP nor a VP, *and so must be licensed by* $[\cdot X \cdot]$

    (22)   Double object structures: ApplP can check neither $[\cdot D \cdot]$ nor $[\cdot V \cdot]$ and must therefore merge first

$$
\begin{array}{c}
v \\
[\cdot D \cdot] \\
[\cdot X \cdot] \\
[\cdot V \cdot]
\end{array}
\qquad
\begin{array}{c}
\text{ApplP} \\
\text{Appl} \quad \text{DP}_{io}
\end{array}
$$

vP
 DP   vP
        VP   v′
     V   DP$_{do}$ v   ApplP
                    [·D·]
                    [·X·]   Appl   DP$_{io}$
                    [·V·]

- Passives: when no external argument checks v's $[\cdot D \cdot]$ feature, so some other argument must raise to check it instead

    – In the proposed double object structure, neither object c-commands the other, so either could in principle raise to subject position without violating relativized minimality

(23)   Passives of double object constructions should be symmetric

```
                    vP
            ┌────────┴────────┐
          ___              v'
           ↑      ┌─────────┴─────────┐
           ┊    VP                 v'
           ┊  ┌──┴──┐         ┌─────┴─────┐
           ┊  V    DP_do      v        ApplP
           ┊  └┈┈┈┈┘                ┌────┴────┐
           ┊                      Appl     DP_io
           └┈┈┈┈┈┈┈┈┈┈┈┈┈┈┈┈┈┈┈┈┈┈┈┈┈┈┘
```

(1)   *Norwegian symmetric passives* (Haddican & Holmberg, 2015, ex. 145)

    a. Boka   ble gitt Jon ___.   b. Jon ble gitt   ___ boka.
       the.book was given Jon   Jon was given   the.book
       'The book was given to Jon.'   'Jon was given the book.'

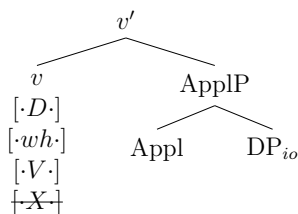# 4   Building verb phrases with wh-elements

- Recall the DOMA:

    (3)   **"Double object movement asymmetry"** (DOMA) (Holmberg et al., 2019): direct object wh-movement+indirect object A-movement is fine, but indirect object wh-movement+direct object A-movement is ungrammatical

      a. Hvilken bok ble Jon gitt   _ _?
         which   book was Jon given
         'Which book was John given?'   *DO wh-movement from IO passive*

      b. *Hvem ble boka   gitt   _ _?
         who   was the.book given
         intended: 'To whom was the book given?' *IO wh-movement from DO passive*
         (Norwegian; Holmberg et al. (2019), p.680)

- Suppose that wh-movement has the same representation as other kinds of Merge: $[\cdot wh \cdot]$

    - Assuming that v hosts successive cyclic wh-movement (Chomsky, 1986), it must therefore have a $[\cdot wh \cdot]$ feature

    - Starting with wh-moving a direct object in a passive double object construction, let's build the vP step by step

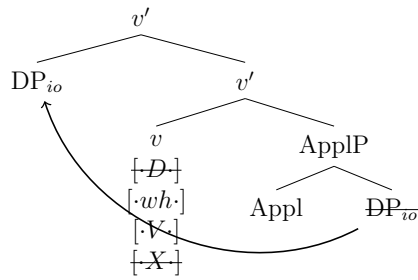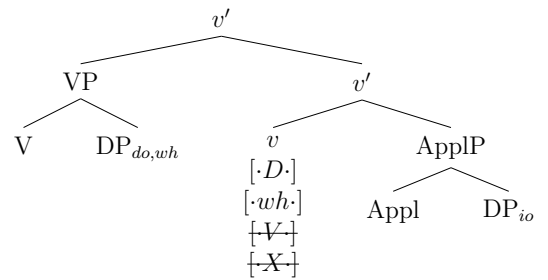   (24)   Step 1: Merge(v,ApplP)

```
                    v'
            ┌───────┴───────┐
           v             ApplP
        [·D·]         ┌────┴────┐
        [·wh·]      Appl     DP_io
        [·V·]
        [·X·]
```

8

(25) Step 2: two options! Check [·D·] with DP$_{io}$ or check [·V·] with VP

a. Move DP$_{io}$ first

```
                  v'
         _____/_____
       DP_io              v'
                    _____/_____
                   v            ApplP
                 [D]          __/\__
                 [·wh·]     Appl    DP̶_io̶
                 [V]
                 [X]
```

b. Merge VP first

```
                        v'
              _____/_____
            VP                   v'
          _/\_             _____/\_____
         V  DP_do,wh      v         ApplP
                        [·D·]     __/\__
                        [·wh·]  Appl   DP_io
                        [V]
                        [X]
```

(26) Step 3: check remaining features

a. Merge VP then move DP$_{do,wh}$

```
                     vP
            _____/_____
          DP_io               v'
                    _____/_____
                 DP_do,wh              v'
                              _____/_____
                            VP                  v'
                          _/\_            _____/\_____
                         V  DP̶_do,wh̶     v        ApplP
                                       [D]       __/\__
                                       [wh]     Appl  DP̶_io̶
                                       [V]
                                       [X]
```

b. Move DP$_{do,wh}$

```
                     vP
            _____/_____
         DP_do,wh              v'
                    _____/_____
                  VP                   v'
                _/\_             _____/\_____
               V  DP̶_do,wh̶      v         ApplP
                             [D]        __/\__
                             [wh]      Appl   DP_io
                             [V]
                             [X]
```
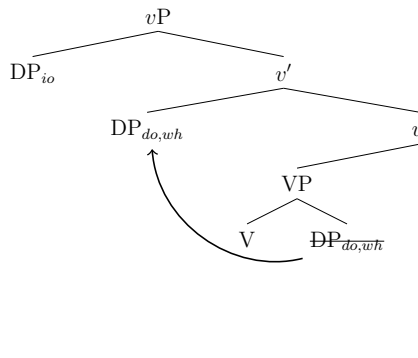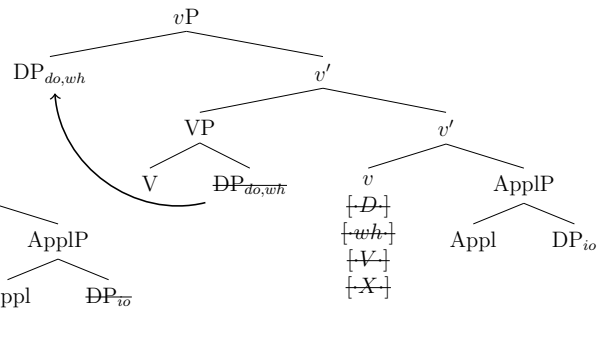
- Summary:

(27) Checking [·D·] before [·V·] → indirect object passive
   a. Hvilken bok   ble   Jon gitt?
      which   book was Jon given
      'Which book was John given?'   *DO wh-movement from IO passive*

(28) Checking [·V·] before [·D·] → direct object passive
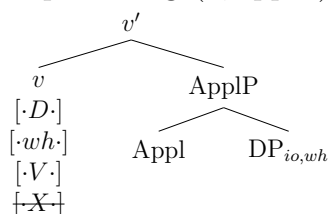   a. Hvilken bok   ble   gitt   Jon?
      which   book was given Jon
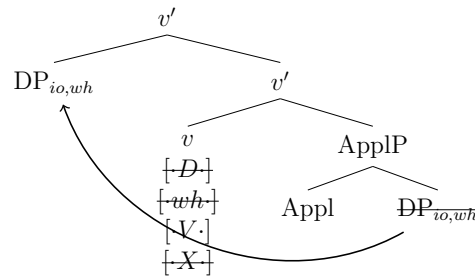   'Which book was given to John?'   *DO wh-movement from DO passive*

   – Let's repeat the exercise with a wh-moving indirect object: notice that the choice in Step 2 is now different!
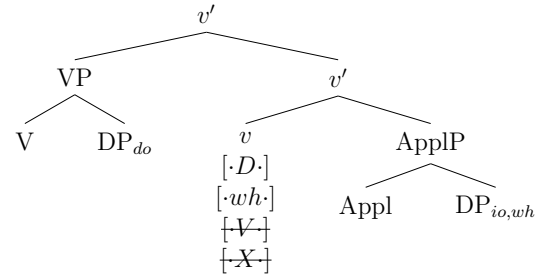
   (29) Step 1: Merge(v,ApplP)

```
              v'
        _____/\_____
       v          ApplP
     [·D·]       __/\__
     [·wh·]    Appl   DP_io,wh
     [·V·]
     [X]
```

(30) Step 2: check **both** $[\cdot D\cdot]$ and $[\cdot wh\cdot]$ with $DP_{io,wh}$ vs. check **only** $[\cdot V\cdot]$ by merging a VP

    a. Move $DP_{io,wh}$ first

    b. Merge VP first

* **Proposal:** an economy condition prefers to check more features in one operation if it can, so long as doing so doesn't bleed another available operation

    (10) *Multitasking* (revised from van Urk & Richards 2015):
At every step in a derivation, if two operations A and B are possible, and A checks more features than B, the grammar prefers A, *unless* doing B would check a subset of the features checked by A.

* **Result**: the indirect object MUST wh-move (and become the passive subject) before the VP containing the direct object is merged $\rightarrow$ obligatory $\bar{\text{A}}$+A movement

- Summary:

(31) Checking $[\cdot D\cdot]$ and $[\cdot wh\cdot]$ before $[\cdot V\cdot]$ $\rightarrow$ indirect object passive
    a. Hvem ble gitt boka?
       who was given the.book
       'Who was given the book?'   *IO wh-movement from IO passive*

(32) Checking $[\cdot V\cdot]$ before $[\cdot D\cdot]$ not an option $\rightarrow$ no direct object passive
    a. *Hvem ble boka gitt?
       who was the.book given
       intended: 'To whom was the book given?' *IO wh-movement from DO passive*
       (Norwegian; Holmberg et al. (2019), p.680)

- Cross-linguistic prediction: joint A/$\bar{\text{A}}$-movement of the indirect object can only be enforced if indirect objects can A-move to subject position in the first place

  $\rightarrow$ languages without indirect object passives should not exhibit the DOMA

    (33) Greek doesn't have indirect object passives or the DOMA restriction
        a. *I Maria stalthike to grama.
           the Maria.NOM sent.nonact.3s the letter.ACC
           intended: 'Mary was sent the letter.' (Anagnostopoulou, 2003, ex. 10a)

b. Tinos dhothike   to vivlio?
who.GEN gave.NACT.3SG the book.NOM

'Who was the book given to?' (Anagnostopoulou, 2003, ex.308)

- Summary of cross-linguistic predictions:
  * Languages with symmetric passives should show the Norwegian-like restriction:
    Borne out in Norwegian, North-West British English, Zulu, Lubukusu (Holmberg et al., 2019), Haya (Duranti & Byarushengo, 1977), Sotho (Morolong & Hyman, 1977)
  * Languages without indirect object passives should not show the Norwegian-like restriction:
    Borne out in Greek, Tamil (Sundaresan, 2020), German, Turkish, Spanish, Italian

5 Conclusion and looking ahead

- **One of the goals of the project**:
  to find a uniform characterization of constraints on syntactic dependencies

- **A challenge for this goal**:
  Languages are different!

  - A constraint on movement that explains some paradigm in some language might make the wrong predictions for another
    * E.g. banning indirect object wh-movement in direct object passives makes the right predictions for Norwegian but not Greek
  - How do we avoid having to posit different constraints on movement in different languages?
    * Option 1: keep tinkering with the formulations of these constraints until they cover everything
    * Option 2: start finding explanations for exceptional cases that don't rely on constraints on movement
  - This talk explored a theory that unites conditions on wh-movement with those on structure building
    * Assuming both A- and Ā-movement are instances of Merge that take place at the edge of vP, and the order of operations is not stipulated by the lexicon...
      · General conditions on feature checking should determine whether A-movement should precede Ā-movement or vice versa in a given context
      · Those general conditions on feature checking also determine what kinds of structures can be built, which affects which elements are accessible to which operations in the course of a derivation
      · The structure of double object constructions makes indirect objects an earlier target for movement than direct objects, which only matters when the indirect object is a wh-phrase (because of *Multitasking*)

* Result: explains the distribution of the DOMA cross-linguistically, and without positing special constraints on wh-movement
* Consequence: reduces the space of phenomena that we need to explain via constraints on movement

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