Against a feature driven view of *wh*-movement

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English multiple *wh*-questions involve overt movement of just **one** *wh*-phrase.

(1)   *Who* did Mary introduce _____ to | *whom* | ?

☞   **How are in-situ *wh*-phrases interpreted?**

Two traditional approaches to *wh*-in-situ

The covert movement approach:
Wh-phrases **must move to C** by LF for interpretability (Karttunen, 1977, among others).

(2)   LF: *Who whom* C did Mary introduce _____ to _____?

The in-situ approach:
Wh-phrases **are interpreted in their base-positions**, without movement (Hamblin, 1973; Rooth, 1985, 1992, among others).

(3)   LF: *Who* C did Mary introduce _____ to *whom*?

Movement, *Wh*-in-situ, and intervention effects

Certain quantifiers (**interveners**) cannot precede *wh*-in-situ.

(4) **Japanese: Intervention effects avoided through scrambling**

    a. ✓ John-ga | *nani-o* | yon-da-no?
         John-nom what-acc read-past-Q

       'What did John read?'

    b. ?* **Dare-mo** | *nani-o* | yom-ana-katta-no?
         no-one what-acc read-neg-past-Q

    c. ✓ | *Nani-o* | **dare-mo** _____ yom-ana-katta-no?
         what-acc no-one   read-neg-past-Q

       'What did no one read?'   *data from Tomioka (2007)*

Movement, *Wh*-in-situ, and intervention effects

(5) **German: intervention above *wh*-in-situ, rescued by scrambling**

    a.   ✓ *Wer* hat Luise $\boxed{wo}$ angetroffen?
          who has Luise where met
          'Who met Luise where'?

Movement, *Wh*-in-situ, and intervention effects

Puzzle: no intervention effects in corresponding English questions.

(7)　a.　✓ *Who* did**n't** _____ meet anyone *where*?

　　b.　✓ *Who* met **no one** _____ *where*?

This is **explained by the covert movement approach** to *wh*-in-situ
(Pesetsky, 2000; Beck, 2006; Cable, 2010):

(8)　LF: *Who where* C _____ met **no one** _____ ?

Proposal: English behaves covertly as German does overtly

(9)   LF: *Who* C _____ met *where* **no one** _____ ?

scrambling

☞ **Covert** movement happens for **interpretability** of the *wh*.
It is not feature-driven.

1. Experimentally detecting covert movement
2. **Experiment 1:** scrambling-like movement
3. **Experiment 2:** varying the size of movement
4. **Proposal:** covert *wh*-movement is covert scrambling
   ☞ Cannot be accounted for using syntactic features

Experimentally detecting covert movement

Experimentally detecting covert movement

- Hackl et al. (2012) paradigm

- Self-paced reading

- Tests for covert movement using the interaction between

  - Quantifiers in object position

  - Antecedent Contained Deletion (ACD)

Quantifiers in object position

- For formal semantic reasons, **cannot directly combine with the verb**.

- One prominent solution: **Covert Movement** (CM) of the object.

(10)

Verb-Phrase ellipsis
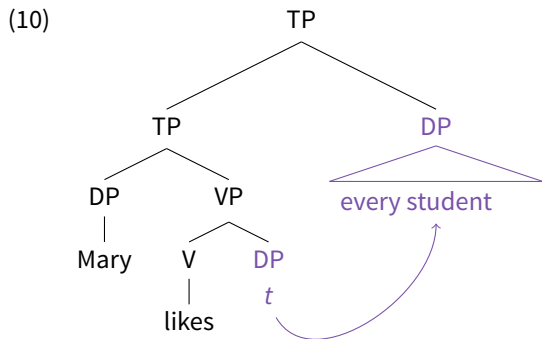
(11)   John $\boxed{\text{likes flying planes}}$. Bill doesn't $\boxed{}$.

- Missing VP requires **identical pronounced** antecedent VP.

(12) John [read every book Mary did [_____]].
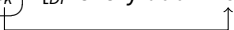
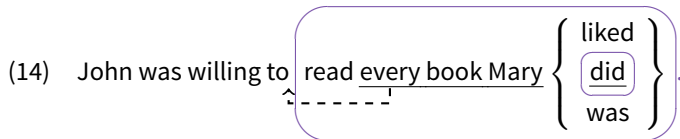- Missing VP requires **identical pronounced** antecedent VP.
- A VP can never be identical to its antecedent if one is properly contained inside the other!
- The solution: **Covertly move** the object containing the ACD site

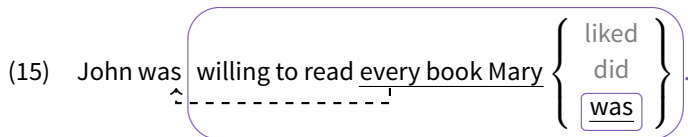(13) John [read t_k] [$_{DP}$ every book Mary did [_____]]$_k$.

The size of the antecedent VP determines the **minimal** size of movement.

(14)   John was willing to [read every book Mary $\left\{ \begin{array}{c} \text{liked} \\ \boxed{\text{did}} \\ \text{was} \end{array} \right\}$].

Ellipsis size and locality of movement

The size of the antecedent VP determines the **minimal** size of movement.

(15) John was willing to read every book Mary $\left\{ \begin{array}{c} \text{liked} \\ \text{did} \\ \boxed{\text{was}} \end{array} \right\}$.

The Hackl et al. (2012) paradigm

(16) John was willing to read $\left\{ \begin{array}{c} \text{the} \\ \text{every} \end{array} \right\}$ book Mary $\left\{ \begin{array}{c} \text{liked} \\ \text{did} \\ \text{was} \end{array} \right\}$.

- Assumptions about online processing:

- **L → R:** parser encounters *the/every* before *Verb/Aux*.

- ***The* does not require movement.**
  → Movement only if Aux is reached

- ***Every* is moved when encountered**
  → *Small* movement step: above *read*

☞ **Prediction** Upstream *every* facilitates resolution *small ellipsis* (*did*)

Mean Residual Reading Times
Two words after the embedded verb

— The
— Every

RRTs (ms)

Gap size: Verb   Did   Was

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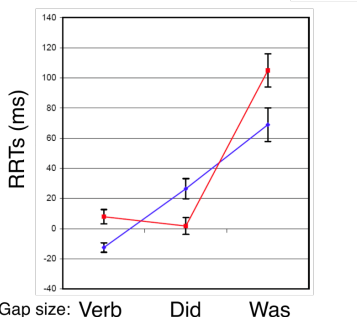
Online processing of multiple *wh*-questions

(17)   *Which* boy was willing to read *which* book Mary $\left\{ \begin{array}{c} \text{did} \\ \text{was} \end{array} \right\}$

The covert movement approach:
In-situ *wh*-phrases move to C by LF for interpretation.

(18)   *Which boy* *which book ...* C _____ was willing to read _____ ?

☞ Antecedent containment preemptively undone, small ellipsis (*did*)
and large ellipsis (*was*) <u>facilitated</u>.

(19) *Which* boy was willing to read *which* book Mary $\begin{Bmatrix} \text{did} \\ \text{was} \end{Bmatrix}$

The in-situ approach:
In-situ *wh*-phrases are interpreted in their base-positions

(20) *Which boy* C _____ was willing to read *which book* ... ?

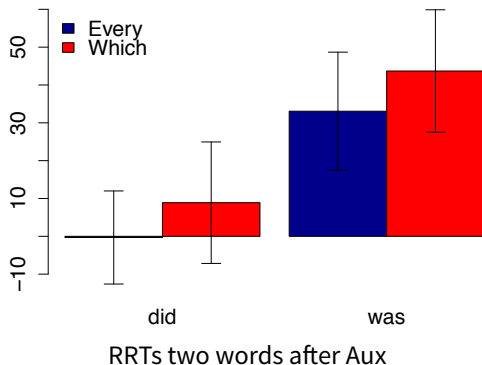☞ Antecedent containment not preemptively undone, small ellipsis (*did*) and large ellipsis (*was*) not facilitated.

(21) *Which* boy was willing to read $\left\{ \begin{array}{c} which \\ every \end{array} \right\}$ book Mary $\left\{ \begin{array}{c} did \\ was \end{array} \right\}$

- *Every* conditions as in Hackl et al. (2012), provides baseline:
    - small ellipsis facilitated.
    - large ellipsis not facilitated.
- *Which* conditions should pattern with each other:
    - small ellipsis and large ellipsis facilitated (covert movement approach), or
    - small ellipsis and large ellipsis not facilitated (in-situ approach)

Experiment 1: Residual reading times

(22) *Which* boy was willing to read $\left\{ \begin{array}{c} \textit{which} \\ \textit{every} \end{array} \right\}$ book Mary $\left\{ \begin{array}{c} \textit{did} \\ \textit{was} \end{array} \right\}$.

RRTs two words after Aux

- **Main effect of ellipsis size** (small: *did* < large: *was*)
- *Every*: replicating Hackl et al. (2012)

Experiment 1: Results

- *Small ellipsis* (did) is faster than *large ellipsis* (was).

☞ **No difference between *every* and *which*.**

- Not predicted by either traditional approach to *wh*-in-situ.

- Paradigm sensitive enough to detect differences between determiners: *Every* and *which* both facilitate more ACD than the non-quantificational determiner *the*.

**Covert *wh*-movement behaves like scrambling,
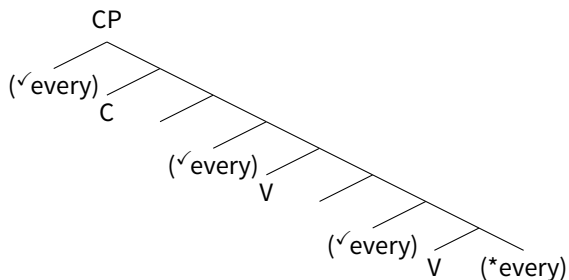not like unbounded movement.**

Previous approaches: two places where *wh*-phrases can be interpreted.
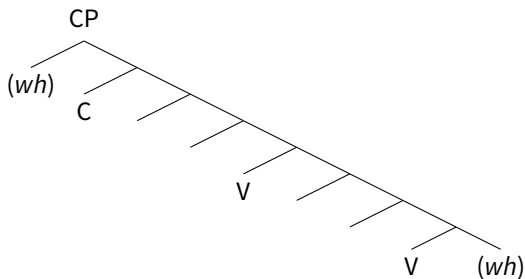
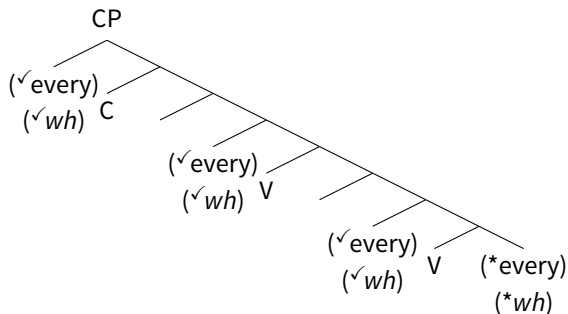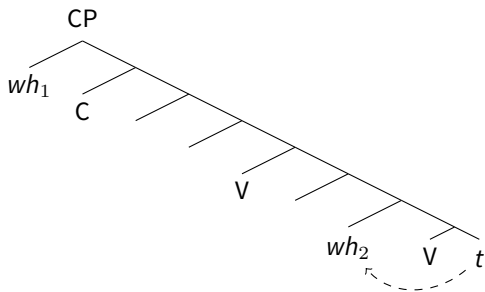In contrast, quantifiers can be interpreted in a variety of positions:

Proposal

☞ A *wh*-phrase can be interpreted at any position with propositional type at LF (same as quantifiers, e.g. *every*).

Proposal

In-situ *wh*s move locally immediately upon being integrated into the structure, like conventional quantifiers e.g. *every*.
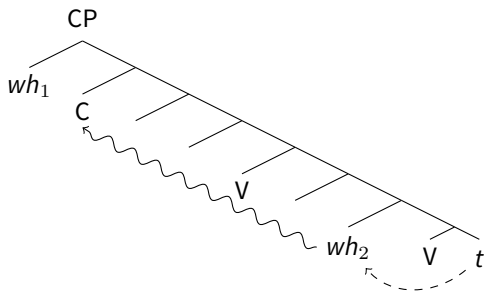
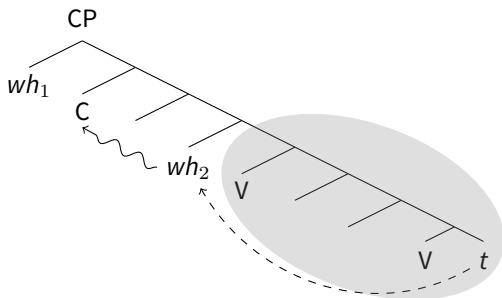Small movement step is sufficient.

Proposal

Following this movement step, the *wh can* but *need not* move any further:

It can be interpreted in its landing site using in situ computation (e.g. the projection of focus alternatives to C), without movement.

If in-situ composition cannot be used in a certain region,
expect *wh*-movement above the region of uninterpretability.

Intervention effects
in online sentence processing

Intervention effects: a *very* quick guide

- Recall: two strategies for the interpretation of *wh*-in-situ:
    - Covert movement
    - In-situ interpretation

- Beck (2006): In-situ strategy is sensitive to intervention effects.

(23) **The intervention configuration:**

    a.   * [$_{CP}$ C ... **intervener** ... *wh*]

    b.   ✓ [$_{CP}$ C ... *wh* **intervener** ... t]

- Interveners: elements such as *only*, *also*, negation, ...

Also is an intervener. We can place it at different heights in Exp1 items:

(24) *Which* boy was willing to **also** read $\begin{Bmatrix} \textit{which} \\ \text{every} \end{Bmatrix}$ book Mary $\begin{Bmatrix} \text{did} \\ \text{was} \end{Bmatrix}$

(25) *Which* boy was **also** willing to read $\begin{Bmatrix} \textit{which} \\ \text{every} \end{Bmatrix}$ book Mary $\begin{Bmatrix} \text{did} \\ \text{was} \end{Bmatrix}$

Expect:

- *Wh*-**movement above** *also* → more movement with high intervener.
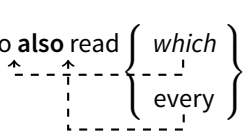- *Every* (and other quantifiers) **not affected**.

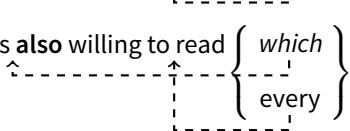☞ Facilitation of ACD resolution in the entire domain of movement.

Experiment 2: Predictions

Also is an intervener. We can place it at different heights in Exp1 items:

(24)   *Which* boy was willing to **also** read $\left\{\begin{array}{c} which \\ every \end{array}\right\}$ book Mary $\left\{\begin{array}{c} did \\ was \end{array}\right\}$

(25)   *Which* boy was **also** willing to read $\left\{\begin{array}{c} which \\ every \end{array}\right\}$ book Mary $\left\{\begin{array}{c} did \\ was \end{array}\right\}$
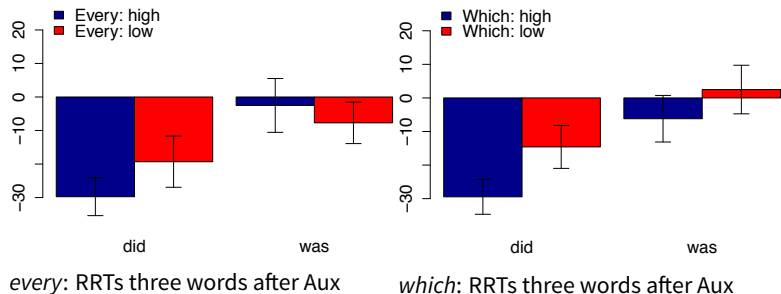
Low also (24) requires **small** *wh*-movement.

- *Which* and *every*: same effects as in Experiment 1 (no effect of *also*).

High also (25) forces **large** *wh*-movement.

- *Which*: Effect of *also*
- *Every*: No effect of *also*.

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Experiment 2: Residual reading times

every: RRTs three words after Aux   *which*: RRTs three words after Aux

- *Every*: Main effect of ellipsis size (small: *did* < large: *was*)
    - **No effect of *also***
- *Which*: Main effect of ellipsis size (small: *did* < large: *was*)
    - **Main effect of *also*** (high *also* < low *also*)

- **The position of *also* affects *which* but not *every*.**
  - High *also* forces long-distance *wh*-movement, resulting an increased domain of ACD resolution facilitation effects.
  - *Every* is not affected by the manipulation.

- **Unpredicted** by the covert movement approach and by the in-situ approach to *wh*-in-situ.

☞ **Explained if *wh*-movement behaves as scrambling.**

Conclusion

Take-home message

1. Two traditional approaches to *wh*-in-situ in the literature:
   - Covert movement approach: movement to C.
   - In-situ approach: no movement at all.

2. **Both** approaches are **partially correct.**
   ☞ Covert *wh*-movement in English is **covert scrambling**.

   | **Covert *wh*-movement is not feature driven.** |

Thank you! Questions?

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