Against a feature driven view of \textit{wh}-movement

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Interpreting \textit{wh}-in-situ

English multiple \textit{wh}-questions involve overt movement of just one \textit{wh}-phrase.

(1) \textit{Who} did Mary introduce \underline{____} to \underline{whom}?

How are in-situ \textit{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).

\[(2) \quad \text{LF: } \textit{Who whom C did Mary introduce }\underline{\text{_____}} \text{ to } \underline{\text{_____}} \text{?}\]

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

\[(3) \quad \text{LF: } \textit{Who C did Mary introduce }\underline{\text{_____}} \text{ to whom }?\]
Certain quantifiers (interveners) cannot precede *wh*-in-situ.

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

   John-nom what-acc read-past-Q
   ‘What did John read?’

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

c. ✓ [boxed: 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 [*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 didn’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 ____?

\[ \hat{\text{scrambling}} \]

Covert movement happens for interpretability of the \textit{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.
Verb-Phrase ellipsis

(11) John \([\text{likes flying planes}]\). Bill doesn’t \([-\text{_____}]\).

- Missing VP requires **identical pronounced** antecedent VP.
Antecedent Contained Deletion (ACD)

(12) John \(\text{read every book Mary did } \underline{\text{____}}\).

• 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 \(\text{read } t_k \ [\text{DP every book Mary did } \underline{\text{____}} ]_k\).
The size of the antecedent VP determines the \textbf{minimal} size of movement.

(14) John was willing to read every book \textcolor{red}{Mary} \{ \textcolor{red}{\text{liked}} \} \{ \textcolor{red}{\text{did}} \} \{ \textcolor{red}{\text{was}} \}.
The size of the antecedent VP determines the \textit{minimal} size of movement.

\begin{equation}
\text{(15) John was willing to read every book Mary\{ liked did was \}}.
\end{equation}
The Hackl et al. (2012) paradigm

(16) John was willing to read \{the every\} book Mary \{liked did was\}.

- 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](chart.png)
Online processing of multiple *wh*-questions
Predictions for real-time processing

(17) Which boy was willing to read which book Mary \{ \text{did} \} \{ \text{was} \}

The covert movement approach:
In-situ \textit{wh}-phrases move to C by LF for interpretation.

(18) Which boy \textit{which book} \ldots C \underline{____} \underline{____} was willing to read \underline{____} \underline{____}?

\begin{itemize}
  \item Antecedent containment preemptively undone, small ellipsis (\textit{did}) and large ellipsis (\textit{was}) \underline{facilitated}.
\end{itemize}
Predictions for real-time processing

(19) *Which* boy was willing to read *which* book Mary \{ *did* \}

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 \{ *which* every \} book Mary \{ did was \}

• *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 \{ which \}
    every \} book Mary \{ did \}
    was \}.

- Main effect of ellipsis size (small: did < large: was)
- Every: replicating Hackl et al. (2012)
• *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:
A *wh*-phrase can be interpreted at any position with propositional type at LF (same as quantifiers, e.g. *every*).
In-situ *whs* move locally immediately upon being integrated into the structure, like conventional quantifiers e.g. *every*.

Small movement step is sufficient.
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. $^* [_{CP} C ... \textit{intervener} ... wh ]$
  b. $^{\checkmark} [_{CP} C ... wh \textit{intervener} ... t ]$

• 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 \( \overrightarrow{\text{which}} \) book Mary \( \overrightarrow{\text{did was}} \) every

(25) Which boy was also willing to read \( \overrightarrow{\text{which}} \) book Mary \( \overrightarrow{\text{did was}} \) every

Expect:

- *Wh*-movement above also \( \rightarrow \) 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 *which* book Mary {did was}

(25) *Which* boy was **also** willing to read *which* book Mary {did was}

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*.
Experiment 2: Residual reading times

\[ \begin{array}{c}
\text{Every: high} & \text{Every: low} \\
\text{Which: high} & \text{Which: low}
\end{array} \]

\[ \begin{array}{c}
did & was \\
did & was
\end{array} \]

\text{every: RRTs three words after Aux} \quad \text{which: RRTs three words after Aux}

- \text{Every: Main effect of ellipsis size (small: did < large: was)}
  \text{No effect of also}

- \text{Which: Main effect of ellipsis size (small: did < large: was)}
  \text{Main effect of also (high also < low also)}
Experiment 2: Summary

• 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 \textit{wh}-in-situ in the literature:
   - Covert movement approach: movement to C.
   - In-situ approach: no movement at all.

2 \textbf{Both} approaches are \textit{partially correct}.
   \begin{itemize}
     \item Covert \textit{wh}-movement in English is \textit{covert scrambling}.
     \item Covert \textit{wh}-movement is not feature driven.
   \end{itemize}
Thank you! Questions?

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