pro-drop in Coordinated-WH Questions
Further Challenges for Multidominance and Ellipsis*

Zuzanna Fuchs, Harvard University
zuzannafuchs@fas.harvard.edu

LFRG, MIT
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1 Introduction

Coordinated-WH questions (CWH) have two (or more) WH-phrases coordinated at the left edge of the clause (1).

(1) When and where did Peter sing?

Languages vary in what WH-phrases they allow in CWH. English and languages like it are limited to ADJ & ADJ (1) (with a few exceptions), while Polish belongs to a group of languages that allow free coordination of WH-phrases in CWH (2).

(2) Scenario: We’re pooling our money together for a class gift for our teacher. I was very uninvolved, just gave my money to someone, and now I want to know what’s happening.
   a. kto i kiedy kupili prezent?
   b. kto i co kupili?
   Who and when buy.3SG.PST gift?
   Who and what buy.3SG.PST
   *Who and what bought?* or *Who bought something and what did they buy?*

These kinds of questions are a puzzle, as the coordinate structure is not a constituent (and it violates the Law of Coordination of Likes (Williams 1978)).

(3) a. [what_{adj} and when_{adj}] did John eat?
   b. John ate pizza and at noon.

(4) a. [Kto_{npl} i co_{npl}] kupili?
   b. *Janek i kwisty kupili.
   Who and what buy.3SG.PST
   *Who and what bought?
   Janek and flowers buy.3SG.PST
   intended: ‘Janek bought the flowers.’

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There is a long tradition of trying to determine the syntax of these constructions, with very little consensus.

Goal: Consider what properties correlate with availability of CWH constructions, and examine these properties more closely in the context of possible analyses of CWH.

Roadmap:
- Introduce analyses that have been put forth in the literature, focusing on ellipsis and multidominance
- Compare English, Polish, and Italian to look for properties that correlate with freedom in CWH
- Consider each of these properties and what challenges they may present for already existing analyses

2 Background

2.1 Interpretation

We’re familiar with the multiple pair readings of regular multiple-WH questions (MWH):

(5) a. Who ate what?
   b. Abby ate the apples, Bob ate the bananas, Charlie ate the chocolate, etc...

This is not so straightforward for CWH. In Polish, it’s well known that these questions most naturally take a single pair reading:

(6) a. Kto i co kupili?
   who and what buy.3SG.PST
   *‘Who and what bought?’*
   b. Janek kupił kwisty.
   Janek buy.3SG.PST flowers
   *‘Janek bought flowers.’*

But it’s also been claimed based on examples like (7) (Tomaszewicz 2010), that CWH take multiple pair readings as well.

(7) Kto i co po kolacji mówimy na zebraniu?
   who and what after order say.3SG.PST at meeting
   *‘Who said what, in order, at the meeting?’*

In English, Gribanova (2013) argues against the single-pair reading (what she refers to as the st-reading) in favor of an at-all-reading:

(8) a. What and when did Peter sing?
   b. #What and where did Peter sing at all?
   a. What did Peter sing and where did Peter sing at all?
   b. #What did Peter eat and where did Peter eat it?

A scenario for illustration (a version of David’s example from class):

(9) Rachel doesn’t know what songs Matt is going to sing when he goes on tour, so someone gives her a list of songs: ‘Dancing Queen’, ‘Take a Chance on Me’, ‘Gimme Gimme Gimme’, and ‘Money Money Money’. A few days later, Rachel realizes she doesn’t even know where Matt will be singing, so someone gives her Matt’s itinerary. Looks like Matt will be traveling to and singing in New York
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City, Portland, San Francisco, and Boston. Rachel knows he will only be singing one song in each city.

If the all-all-reading is available, then the following should felicitously describe the above scenario:

(10) Rachel found out what and where Matt will be singing, but she didn’t find out where he will sing what.

2.2 Monoclausal vs multiclausal

Monoclausal analyses of CWH in English (Zhang 2007, Zoerner 1995) and other languages have been proposed:

(11) a. \[\text{CP WH & WH | CP ...WH...WH...}\] (Gribanova 2009)
    b. \[\text{CP WH & WH | CP ...WH...WH...}\] (Merchant 2007)

These analyses tie CWH to MWH, which is problematic because often languages allow greater freedom in what WH-phrases can be in MWH than in CWH:

(12) a. Who ate what?
    b. "Who and what ate?"

If analysis of CWH is dependent on MWH then we significantly overgenerate the set of possible CWH in a language like English.

Gribanova (2013) also presents a set of English-specific arguments that show biclausal analyses account for the facts of English because they require two well-formed conjuncts. See Gribanova (2013) for evidence from

- preposition stranding
- subject vs object deictics
- impossibility of coordinating subject WH-expression and adjunct WH-expression

2.3 Ellipsis

One prominent multiclausal analysis of CWH in ellipsis, or backwards slicing (Giannakidou and Merchant 1998), which proposes that CWH is a result of the slicing of the TP in the first conjunct:

(13) When and where is the party?

\[\text{CP when [CP is-the-party -t] and CP where [CP is-the-party -t]}\]

English does allow backwards slicing in general (Coppock 2001):

(14) I don’t know what, but I am sure John will win something.
    I don’t know [what; [John will win what]]], but I am sure John will win something.

There are some arguments against this analysis though, including an argument about swiping, which can occur in regular slicing (15), as well as backwards slicing (16):

(15) a. I know Mary danced with someone but I don’t know with who.
    b. I know Mary danced with someone but I don’t know who with.

(16) Although we don’t yet know who from, we know she received a package last Monday with instructions on bomb assembly. (Merchant 2002)

If CWH is backwards slicing/ellipsis, then swiping should be allowed. However, this doesn’t seem to be the case:

(17) a. Mary doesn’t know who and when Billy danced.
    b. *Mary doesn’t know who with and when Billy danced.

2.4 Multidominance

Also biclausal, analyzes CWH as two coordinated CPs, in which everything below the CP domain is individually shared (Gricanin-Yuksekt 2007):

(18)

\[\text{CP1} \rightarrow \text{TP1} \rightarrow \text{VP1} \rightarrow \text{C1} \rightarrow \downarrow \text{what} \rightarrow \text{E} \rightarrow \text{CP2} \rightarrow \text{TP2} \rightarrow \text{VP2} \rightarrow \text{C2} \rightarrow \downarrow \text{where} \rightarrow \text{E} \rightarrow \text{Peter} \rightarrow \text{TP1} \rightarrow \text{VP1} \rightarrow \text{sing} \rightarrow \text{t1} \rightarrow \text{there} \rightarrow \text{VP2} \rightarrow \text{C2} \rightarrow \downarrow \text{where} \rightarrow \text{E} \rightarrow \text{Peter} \rightarrow \text{TP1} \rightarrow \text{VP1} \rightarrow \text{sing} \rightarrow \text{t1} \rightarrow \text{there} \rightarrow \text{VP2} \]

For a multidominant structure to be well-formed, it must

- obey the Constraint on Sharing
- be composed of two well-formed conjuncts

Gribanova (2013) proposes the Constraint on Sharing (COSH) filter to exclude ungrammatical CWH.

(19) **Constraint on Sharing: COSH**

a. **informal version:**
   Multiple mothers of every shared node must completely dominate identical sets of terminal nodes

b. **formal version:**
   For any $\alpha$, $M$ and $N$, where $M \neq N$, and
   1. $M$ and $N$ are both mothers of $\alpha$, and
   2. $\alpha$ does not have a unique highest mother (a mother that dominates all other mothers of $\alpha$),
   For any terminal node $\beta$, $M$ completely dominates $\beta$, iff $N$ completely dominates $\beta$.

This rules out ungrammatical structures like (20) because VP1 completely dominates the depictive raw while VP2 does not, which violates COSH.

(20) a. *What and when did John eat raw?
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3 A Correlation with pro-drop and Optional Transitivity

3.1 pro-drop

Goal 1: Compare availability of CWH across languages to check for relationship with pro-drop

ADJ & ADJ: available in English & Polish

(24) When and where is the party?
   . [ when, [ is the party t ] & [ where, [ is the party t ] ] ]

Polish: Gdzie i kiedy będzie impreza?

(25) [ gdzie, [ będzie impreza t ] ] i [ kiedy, [ będzie impreza t ] ]
    [ where, [ be.3SG.3RD party t ] ] and [ when, [ be.3SG.3RD party t ] ]

"When and where will the party be?"

ARG & ADJ:
- SUBJ & ADJ: available in Polish (has subject pro-drop) but not English (no pro-drop)

(26) *Who and when bought the chocolate?
   . [ who, [ t bought the chocolate ] ] and [ when, [ bought the chocolate t ] ]

Polish: Kto i kiedy kupił czekoladę?

(27) [ kto, [ t kupił czekoladę ] ] i [ kiedy, [ pro kupił czekoladę t ] ]
    [ who, [ t buy.3SG.3RD chocolate.ACC ] ] and [ when, [ pro buy.3SG.3RD chocolate.ACC t ] ]

"Who and when bought the chocolate?"

- OBJ & ADJ: available in Polish (has object pro-drop) but not English (no pro-drop)

(28) *What and when did you buy?
   . [ what, [ did you buy t ] ] and [ when, [ did you buy t ] ]

Polish: Co i kiedy kupiłeś?

(29) [ co, [ pro kupiłeś t ] ] i [ kiedy, [ pro kupiłeś pro t ] ]
    [ what, [ pro buy.3SG.3RD t ] ] and [ when, [ pro buy.3SG.3RD t ] ]

"What and when did you buy?"

ARG & ARG: available in Polish (has subject and object pro-drop), but not in English, which has neither

(30) *Who and what bought?
   . [ who, [ t bought ] ] and [ what, [ bought t ] ]

Polish: Kto i co kupił?
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(31) [kto1 [t1 kupić pro] i [co2 [pro kupić t2]]
    "Who and what bought?"

Looking at English and Polish we see a possible correlation: If an argument can be pro-dropped, then it can be an argument WH-expression in a CWH.

(32)

<table>
<thead>
<tr>
<th>pro-drop</th>
<th>ADJ &amp; ADJ</th>
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<th>ARG &amp; ARG</th>
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<td>??</td>
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<tr>
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<tr>
<td>SUBJ &amp; OBJ pro-drop</td>
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</tbody>
</table>

Prediction: Language that has SUBJ but not OBJ pro-drop should allow SUBJ & ADJ CWH but not OBJ & ADJ CWH or SUBJ & OBJ CWH.

Italian: a SUBJ pro-drop language but not OBJ pro-drop

(33) pro hai mangiato la pizza?
    pro have eaten the pizza
    'Have you eaten the pizza?'

Can it have a CWH with a SUBJ WH-expression?

Yes.

(34) chi e quando hai mangiato l’ultima fetta di pizza?
    who and when have eaten the last piece of pizza
    'Who and when ate the last piece of pizza?'

But OBJ & ADJ is bad...:

(35) *Che cosa e quando hai comprato?
    what thing and when have bought
    'What and when did you buy?'

...as is ARG & ARG:

(36) *Chi e che cosa ha comprato?
    who and what thing have bought
    'Who and what bought?'

So we have our missing piece to show there’s a correlation:

(37)

<table>
<thead>
<tr>
<th>pro-drop</th>
<th>ADJ &amp; ADJ</th>
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3.2 Optional Transitivity

Is the correlation we saw above just about pro-drop? Or is it more generally about ‘missing’ arguments?

Goal 1: Compare availability of CWH within languages to check for relationship with optional transitivity.

If it’s about missing arguments, comparing the availability of CWH with respect to implicit arguments should also show some correlation with CWH. If the verbs can take an implicit argument, that argument should be able to appear as a WH expression in a CWH.

No surprises in Polish, which allows ARG & ADJ CWH anyway:

(38) Co i kiedy zjadłeś?
    what and when eat 2SG.PST
    'What and when did you eat?'

Test cases in English and Italian: eat is optionally transitive and should allow OBJ & ADJ CWH, while obligatorily transitive verbs will not.

English (Whitman 2002):

(39) *What and when did you fix?
    . [what1 [did you fix t1] and [when2 [did you fix t2]]]
(40) What and when did you eat?
    . [what1 [did you eat t1] and [when2 [did you eat t2]]]

Italian:

(41) *Che cosa e quando hai comprato?
    what thing and when have bought
    'What and when did you buy?'
(42) Che cosa e quando hai mangiato?
    what thing and when have eaten
    'What and when did you eat?'

Another table to look at the correlations:

(43)

<table>
<thead>
<tr>
<th>pro-drop</th>
<th>ADJ &amp; ADJ</th>
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Interim conclusion:

- If availability of CWH were in some way tied to availability of MWH, the picture would be different.
- Some correlation between ‘missing’ arguments: If an argument can be pro-dropped or be an implicit argument, it can appear in a CWH construction as a WH expression.
• pro-drop and implicit arguments have in common ‘silence.’ So does the syntax just care about this phonological nullness, or is there some deeper syntactic similarity between these two kinds of ‘missing’ arguments?
• Next steps: Look closer at independent analyses of pro and of WH-extraction in Italian and Polish.
• How will this shed light on multidominance and ellipsis as potential analyses for CWH?

4 Further Challenges

4.1 Ellipsis: Parallelism

Italian: work by Brandi & Coordin (1989) and Cardinaletti (1994) suggests an asymmetry between the syntax of subject pro and subject WH-extraction.

pro always appears pre-verbally in Italian:

\[(44)\]
\[
\text{a. pro ho mangiato la pizza} \quad \text{pro have.1SG eaten la pizza}
\]

\[
\text{b. I ate the pizza.}
\]

\[(45)\]
\[
\text{a. Chi ha mangiato la pizza? who have eaten the pizza}
\]

\[
\text{b. Who ate the pizza?}
\]

Why is this potentially a problem? Consider what the structure of the two clauses would look like before ellipsis for Chi e quando ha mangiato la pizza?

\[(46)\]
\[
\text{a. Chi e quando ha mangiato la pizza who and when have eaten the pizza}
\]

\[
\text{b. \quad Who and when ate the pizza?}
\]

Polish: parallel to Russian (Gribovova 2013), there is an asymmetry between subject pro-drop and object pro-drop. Object pro-drop is not allowed in islands, but subject pro-drop is unrestricted. Two possibilities:

• Option 1: object pro-drop is actually some kind of null topic drop (Huang 1984), with pro in object position licensed by a null topic operator

\[(47)\]
\[
\text{a. kto1 Op2 i kupil proy7? who op i buy.3SG.PST pro}
\]

\[
\text{‘Who bought (that)?’}
\]

\[(48)\]
\[
\text{a. pro kupil present}
\]

\[
\text{pro buy.3SG.PST gift}
\]

\[
\text{‘(He) bought the gift.’}
\]

Subject pro-drop does not require a licensor:

\[(49)\]
\[
\text{a. pro kupil present}
\]

\[
\text{pro buy.3SG.PST gift}
\]

\[
\text{‘Who bought’}
\]

What this looks like in ellipsis structure:

\[(50)\]
\[
\text{a. kto1 Op2 i kupil? who and what buy.3SG.PST}
\]

\[
\text{‘Who and what bought?’}
\]

• Option 2: What looks like pro-drop is actually Verb-Stranding Verb Phrase Ellipsis (Russian, Gribovova 2013)
verb moves to Asp, then VP is elided:

(50)  

\[
\begin{array}{c}
TP \\
\text{Asp} \\
\text{Asp + } V_1 + v \\
\text{VP} \\
\end{array}
\]

So in a multidominant CWH, this would look like in (51)

(51)  

\[
\begin{array}{c}
\text{CP}_1 \\
k_1 \\
\text{Asp} \\
\text{Asp + kupi\l} \\
\text{VP} \\
\end{array}
\]

How much of a problem is lack of perfect syntactic parallelism in ellipsis? Possibly not much of a problem at all:

(52)  

Baking a cake is easy if you know how.  
Baking a cake is easy if you know [how, [to bake a cake, how]].

Specifically for the Italian case, we might use the following test case:

(53)  

Qualcuno ha mangiato la pizza, ma pro non so chi. 
someone have eaten the pizza, but pro NEG know 1ST.PRO who 
'Someone ate the pizza, but I don't know who.'

This is clearly ellipsis with a lack of parallelism (chi was extracted from the postverbal position, whereas qualcuno is in the preverbal position). If this is ok, then the lack of parallelism above is also not a problem.

4.2 Ellipsis: Coindexation

Coindexation in a case like subject pro-drop in Italian seems fine, we coindex pro with an overt DP from earlier in the discourse.

(54)  

Maria, e andato al negozio. pro_1 ha comprato le scarpe.  
Maria went to the store. pro have bought the shoes  
'Maria went to the store. (She) bought shoes.'

But in CWH this is less simple. If we take the ellipsis analysis, we are going to have to ensure a lot of things are coindexed.

In Italian, coindexing subject pro with trace of WH-movement:

(55)  

\[
\begin{array}{c}
\text{chi} \\
\text{ha mangiato t_1 la pizza} \\
\text{t_2} & & \text{and when pro have eaten t the pizza t} _1 \\
\end{array}
\]

'Who and when ate the pizza?'

It becomes more questionable in Polish if we assume the null topic operator analysis of pro-drop:

(56)  

\[
\begin{array}{c}
k_1 \text{Op_1 [ t_1 kupi [pro] t_2 ] } \\
\text{who Op [t buy.3SG.PST pro]} \\
\text{and what pro buy.BUY.3SG t _1 } \\
\end{array}
\]

'Who and what bought?'

Can we coindex the trace of WH-movement with pro/the trace of null topic movement?

It might be easier if we assume the VVPE analysis of object pro-drop:

(57)  

a.  
\[
\begin{array}{c}
k_1 \text{[ t_1 kupi ] } \text{t_2 co_3 } \\
\text{who [t buy.3SG.PST something]} \\
\text{and what pro buy.3SG.PST t _1 } \\
\end{array}
\]

'Who and what bought?'

b.  
\[
\begin{array}{c}
k_1 \text{[ t_1 kupi, co_3 co_3 ] } \\
\text{who pro kupi t _2 } \\
\end{array}
\]

c.  
\[
\begin{array}{c}
k_1 \text{[ t_1 kupi, co_3 co_3 ] } \\
\text{who pro kupi t _2 } \\
\end{array}
\]

4.3 Multidominance: COSH

Regardless of whether we choose the topic operator analysis of object pro-drop in Polish or the VVPE analysis, object pro is a problem for COSH.

(58)  

a.  
\[
\begin{array}{c}
k_1 \text{co kupi} \\
\text{who and what buy.3SG.PST} \\
\text{Who and what bought?} \\
\end{array}
\]

b.  
\[
\begin{array}{c}
k_1 \\
\text{Op_2 [ kupi -pro ] t_2 } \\
\text{who pro kupi t _1 } \\
\end{array}
\]

A possible fix would be to say coindexed pro and t are actually just shared t:

(59)  

\[
\begin{array}{c}
k_1 \\
\text{Op_2 [ kupi ] t_1 } \\
\text{who pro kupi t _2 } \\
\end{array}
\]

But this is problematic. If t is shared, what prevents the movement from occurring in the other conjunct, as in (60)?
4.4 Multidominance: Optional transitivity

Consider the multidominant structure from earlier:

What would the semantics of the optionally transitive sing have to be to make this work? Presumably we are dealing with a single lexical item sing so shouldn’t it have only one semantics?

There are analyses of optionally transitive verbs as obligatorily transitive (Belletti & Leving 1985, Zwicky 1987, Culicover and Jackendoff 2005), according to which seemingly intransitive verbs like eat and sing actually have phonologically null items that are syntactically present (although it’s unclear what these null elements are...).

General concerns for this analysis: Fodor & Fodor (1980) show that implicit arguments must take narrow scope w.r.t. other scope-bearing elements in a sentence, as illustrated by comparing (62) to (63).

(62) Everyone ate.
   a. Everyone is such that there is something they ate.
   b. #There is something such that everyone ate it.

(63) Everyone ate something.
   a. Everyone is such that there is something they are.
   b. There is something such that everyone ate it.

Concern for multidominant CWH specifically: a null but phonologically present internal argument will violate COSH in the same way that object pro died in the previous section.

5 Conclusion

By comparing the availability of CWH within and across languages, we notice some correlations:

<table>
<thead>
<tr>
<th></th>
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<th>Italian</th>
<th>Polish</th>
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</thead>
<tbody>
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<td>ADJ &amp; ADJ</td>
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</tr>
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<td>ARG &amp; ADJ</td>
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<tr>
<td>OBJ &amp; ADJ</td>
<td>eat</td>
<td>yes</td>
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</tr>
</tbody>
</table>

- pro-drop seems to be correlated with availability of CWH: If an argument can be pro-dropped from the main clause, it can appear as an argument WH-phrase in a CWH

- optional transitivity seems to be correlated with availability of CWH: If an argument can be the implicit internal argument of an optionally transitive verb, it can appear as an argument WH-phrase in a CWH

What do pro-drop and implicit arguments have in common? Does the syntax just care about ‘silence’, or is there some deeper syntactic similarity between these types of missing arguments?

A closer look at the syntax of these is as far inconclusive: it poses potential challenges both for ellipsis (issues of codification and the question of parallel structure) and multidominance (violations of COSH and the semantics of optionally transitive verbs).

6 References