The syntax and semantics of headless relatives

Chaoyi Chen

Committee members

Mark Baker (co-advisor); Yimei Xiang (co-advisor);
Dorothy Ahn; Ivano Caponigro

Headless relative clauses

Headless relative clauses lack overt external heads.

(1) I ate [what John cooked ___ yesterday].

Headless relative clauses

Headless relative clauses lack overt external heads.

(1) I ate [what John cooked ___ yesterday].

Properties characterizing headless relatives (Caponigro 2021)

- They are embedded/dependent/subordinated clauses.

Headless relative clauses

Headless relative clauses lack overt external heads.

(1) I ate [what John cooked ___ yesterday].

Properties characterizing headless relatives (Caponigro 2021)

- They are embedded/dependent/subordinated clauses.
- They lack a constituent.

Headless relative clauses

Headless relative clauses lack overt external heads.

(1) I ate [what John cooked ___ yesterday].

Properties characterizing headless relatives (Caponigro 2021)

- They are embedded/dependent/subordinated clauses.
- They lack a constituent.
- They lack an "external head".

Headless relative clauses

Headless relative clauses lack overt external heads.

(1) I ate [what John cooked ___ yesterday].

Properties characterizing headless relatives (Caponigro 2021)

- They are embedded/dependent/subordinated clauses.
- They lack a constituent.
- They lack an "external head".
- They exhibit the same distribution and interpretation as nominal phrases, prepositional/postpositional phrases, adjectival phrases or adverbial phrases.

Headless relative clauses

Headless relative clauses lack overt external heads.

(1) I ate [what John cooked ___ yesterday].

Properties characterizing headless relatives (Caponigro 2021)

- They are embedded/dependent/subordinated clauses.
- They lack a constituent.
- They lack an "external head".
- They exhibit the same distribution and interpretation as nominal phrases, prepositional/postpositional phrases, adjectival phrases or adverbial phrases.

(2) He will be [however hardworking you expect him to be].

(3) I will play my music [however loudly you play yours].

More on headless relative clauses

- **Light-headed relatives: determiner + WH-WORD**

  Jan czyta [to, co Maria czyta]. [Polish]
  Jan reads this what Maria reads
  'Jan reads what Maria reads.'

More on headless relative clauses

- **Super-free relatives: non-wh-relativizer**

  Bhí [a raibh __ san Oileán] ag féachaint ar na naomhóga. [Irish]
  was REL was in.the Island look.PROG on the currachs
  'Everyone who was in the Island was watching the currachs.'

More on headless relative clauses

- **Super-free relatives: non-wh-relativizer**

  Bhí [a raibh __ san Oileán] ag féachaint ar na naomhóga. [Irish]
  was REL was in.the Island look.PROG on the currachs
  'Everyone who was in the Island was watching the currachs.'

- **Super-free relatives: no-marker**

  [máki-and'əh nĭh=yɨʔ=ʔĩh ni-ĕ-ew-ĭt]=yɨʔ-íʔ? [Hup]
  Mark-ASSOC.PL POSS=FOC=M be-PVF-FLR-OBL=FOC-INT
  'It was with [that one who used to be associated with Mark's group] (that you went)?'

The typology

Types	D	wh	REL/COMP
Free relative clauses	−	+	±
Light-headed relative clauses	+	±	±
Super-free relative clauses	−	−	±

This dissertation

Syn The categorical transformations of nominal headless relatives (CP $\rightarrow$ NP/DP; cross-linguistic)

This dissertation

Syn The categorical transformations of nominal headless relatives (CP $\rightarrow$ NP/DP; cross-linguistic)

Syn Whether all arguments can be equally relativized (Mandarin SFR)

This dissertation

Syn The categorical transformations of nominal headless relatives (CP $\rightarrow$ NP/DP; cross-linguistic)

Syn Whether all arguments can be equally relativized (Mandarin SFR)

Sem The semantic composition of headless relatives (English FR)

This dissertation

Syn The categorical transformations of nominal headless relatives (CP $\rightarrow$ NP/DP; cross-linguistic)

Syn Whether all arguments can be equally relativized (Mandarin SFR)

Sem The semantic composition of headless relatives (English FR)

Sem The semantics of headless relatives and modified bare nouns (English FR)

This dissertation

Syn The categorical transformations of nominal headless relatives (CP $\rightarrow$ NP/DP; cross-linguistic)

Syn Whether all arguments can be equally relativized (Mandarin SFR)

Sem The semantic composition of headless relatives (English FR)

Sem The semantics of headless relatives and modified bare nouns (English FR)

The categorical transformations of nominal headless relatives

The categorical transformations of headless relatives

English headed relatives are introduced by either wh-words or null operators.

The categorical transformations of headless relatives

English headed relatives are introduced by either wh-words or null operators.

(4) I ate the food [which$_i$ you cooked t_i yesterday].

The categorical transformations of headless relatives

English headed relatives are introduced by either wh-words or null operators.

(4) I ate the food [which$_i$ you cooked t_i yesterday].

The categorical transformations of headless relatives

English headed relatives are introduced by either wh-words or null operators.

(4) I ate the food [which$_i$ you cooked t_i yesterday].

(5) I ate the food [op$_i$ you cooked t_i yesterday].

The categorical transformations of headless relatives

English headed relatives are introduced by either wh-words or null operators.

(4) I ate the food [which$_i$ you cooked t_i yesterday].

(5) I ate the food [op$_i$ you cooked t_i yesterday].

Question

The categorical transformations of headless relatives

English headed relatives are introduced by either wh-words or null operators.

(4) I ate the food [which$_i$ you cooked t_i yesterday].

(5) I ate the food [op$_i$ you cooked t_i yesterday].

Question

a. Is the op-strategy/non-wh-strategy available for headless relatives?

The categorical transformations of headless relatives

English headed relatives are introduced by either wh-words or null operators.

(4) I ate the food [which$_i$ you cooked t_i yesterday].

(5) I ate the food [op$_i$ you cooked t_i yesterday].

Question

a. Is the op-strategy/non-wh-strategy available for headless relatives?

b. If so, what can they tell us about the categorical transformations?

This chapter

- **Such headless relatives exist:** Tsez and Mandarin headless relatives

This chapter

- **Such headless relatives exist:** Tsez and Mandarin headless relatives
- **A theoretical issue:** category transformations in headless relatives

This chapter

- **Such headless relatives exist:** Tsez and Mandarin headless relatives
- **A theoretical issue:** category transformations in headless relatives
- **(Re)labeling analysis:** different paths to one destination

Tsez headless relatives

Tsez headless relatives

Tsez (Northeast Caucasian) headless relatives: overt wh-word stays in-situ (Polinsky 2015).

Tsez headless relatives

Tsez (Northeast Caucasian) headless relatives: overt wh-word stays in-situ (Polinsky 2015).

(6) [ħuɬ babi-y-ä šebi žek'-ä(-si)]
yesterday father-OS-ERG who/what.ABS hit.PST.WIT.INTERR.ATTR
ø-ik'i-s.
I-go-PST.WIT
'Whoever father beat yesterday left.' (Polinsky 2015: 291)

Tsez headless relatives

Tsez (Northeast Caucasian) headless relatives: overt wh-word stays in-situ (Polinsky 2015).

(6) [ħuł babi-y-ä šebi žek'-ä(-si)]
yesterday father-OS-ERG who/what.ABS hit.PST.WIT.INTERR.ATTR
ø-ik'i-s.
I-go-PST.WIT
'Whoever father beat yesterday left.' (Polinsky 2015: 291)

Characterising Tsez headless relatives

a. the affix si/zo as nominalizers

b. relativized elements undergo A′-movements

A closer look at Tsez headless relatives: si/zo

Tsez's headless relatives have a suffix *si/zo* that appears on the verbs.

(7) [ħuł babi-y-ä šebi žek'-ä(-si)]
yesterday father-OS-ERG who/what.ABS hit.PST.WIT.INTERR.ATTR
ø-ik'i-s.
I-go-PST.WIT
'Whoever Father beat yesterday left.'

(8) [ħuł babi-y-ä šebi
yesterday father-OS-ERG who/what.ABS
žek'-ä-*(zo-)r] magalu teɬ!
hit.PST.WIT.INTERR-ATTR.OBL-LAT bread.ABS.III give.IMP
'Give the bread to whoever Father beat yesterday!'

si: the derived elements are in absolutive cases

zo: the derived elements are in any other cases.

A closer look at Tsez headless relatives: si/zo

Tsez's headless relatives have a suffix *si/zo* that appears on the verbs.

(7) [ħuł babi-y-ä šebi žek'-ä(-si)]
yesterday father-OS-ERG who/what.ABS hit.PST.WIT.INTERR.ATTR
ø-ik'i-s.
I-go-PST.WIT
'Whoever Father beat yesterday left.'

(8) [ħuł babi-y-ä šebi
yesterday father-OS-ERG who/what.ABS
žek'-ä-*(zo-)r] magalu teɬ!
hit.PST.WIT.INTERR-ATTR.OBL-LAT bread.ABS.III give.IMP
'Give the bread to whoever Father beat yesterday!'

si: the derived elements are in absolutive cases

zo: the derived elements are in any other cases.

Question

What is the nature of *si/zo*?

A closer look at Tsez headless relatives

The marker *si/zo* widely appears in two kinds of nominalizations: event and entity nominalizations.

A closer look at Tsez headless relatives

The marker *si/zo* widely appears in two kinds of nominalizations: event and entity nominalizations.

Event nominalizations: The participles ending in *zo* can be used as noun phrases denoting events.

A closer look at Tsez headless relatives

The marker *si/zo* widely appears in two kinds of nominalizations: event and entity nominalizations.

Event nominalizations: The participles ending in *zo* can be used as noun phrases denoting events.

(9) cax-xo-zo aki-k'-si di.
write-PRS-ATTR.OS.ERG tired-TR-PST.WIT 1SG.ABS
'Writing tired me out.' (Polinsky 2015: 53)

A closer look at Tsez headless relatives

The derived *zo*-attached element is a noun rather than a verb because they can combine with adjectives but not adverbs.

(10) žuka/*žuk cax-xo-zo aki-k'-si di.
bad/badly write-PRS-ATTR.OS.ERG tired-TR-PST.WIT 1SG.ABS
'Bad writing tired me out.'
NOT: 'Writing badly tired me out.' (Polinsky 2015: 54)

A closer look at Tsez headless relatives

Entity nominalizations: the marker si/zo derives nouns of objects or persons. si/zo can combine with nouns or noun phrases to derive another semantically-related noun, and nominalize adverbs and verbs (Polinsky 2015).

(12) meši-za-xo-zo-r
calf-PL.OS-PRS-ATTR.OS-LAT
'to the calf shepherd' (lit.: to the (one) at calves) (Polinsky 2015: 54)

A closer look at Tsez headless relatives

Entity nominalizations: the marker si/zo derives nouns of objects or persons. si/zo can combine with nouns or noun phrases to derive another semantically-related noun, and nominalize adverbs and verbs (Polinsky 2015).

(12) meši-za-xo-zo-r
calf-PL.OS-PRS-ATTR.OS-LAT
'to the calf shepherd' (lit.: to the (one) at calves) (Polinsky 2015: 54)

(13) waɦɦo-si-ni-de
down-ATTR-DEF-APUD.ESS
'next to the one down below' (Polinsky 2015: 55)

A closer look at Tsez headless relatives

Entity nominalizations: the marker si/zo derives nouns of objects or persons. si/zo can combine with nouns or noun phrases to derive another semantically-related noun, and nominalize adverbs and verbs (Polinsky 2015).

(12) meši-za-xo-zo-r
calf-PL.OS-PRS-ATTR.OS-LAT
'to the calf shepherd' (lit.: to the (one) at calves) (Polinsky 2015: 54)

(13) waɦɦo-si-ni-de
down-ATTR-DEF-APUD.ESS
'next to the one down below' (Polinsky 2015: 55)

(14) ø-oɦɦo-xo-zo eƛi-n…
I-be.in.the.middle-PRS-ATTR.OS.ERG say-PST.NWIT
'the middle one said…' (Polinsky 2015: 55)

A closer look at Tsez headless relatives

Characterizing Tsez headless relatives

a. the affix -si/-zo as nominalizers

b. relativized elements undergo A′-movements

A closer look at Tsez headless relatives

Wh-in-situ in Tsez is derived from movements in parallel with overt English wh-movements (Polinsky & Potsdam 2001, Polinsky 2015; Demirok 2017).

A closer look at Tsez headless relatives

Wh-in-situ in Tsez is derived from movements in parallel with overt English wh-movements (Polinsky & Potsdam 2001, Polinsky 2015; Demirok 2017).

Evidence-1: Weak Crossover (WCO)

(15) * Who$_1$ did his$_1$ mother invite t$_1$?

(16) * nesiz-(tow) babiy-ā šebi žek'-ā?
his-own father-ERG who.ABS hit-PST.INTERR
Intended: Who$_1$ did his$_1$ father hit?

A closer look at Tsez headless relatives

Evidence-2: wh/quantifier scope interactions

(17) What did every guest bring?

1. Every guest brought chocolate. [what > ∀ guest]
2. John brought dip, Kyle brought salad .... [∀ guest > what]

(18) šibaw ɣ$^{\text{ʕw}}$way-ā šebi han-ā
every dog-ERG what bite-PST.INTERR
What did every dog bite?

A closer look at Tsez headless relatives

Evidence-3: in-situ island effects

(19) * [beɬi-χ’ šebi b-äk’-äsi yäɬ-zay]
chase-SUPER.ESS who.ABS.IPL IPL-GO-RES be.PRS-while
χirba-bi b-ay-ä?
guests-PL.ABS.IPL IPL-came-PST.WIT.INTERR
Intended: ‘The guests arrived when who were away hunting?’

(20) * už-ā [t’ek-no šeb(i-n)] r-is-ā
boy-ERG book.ABS-and what.ABS-and II-IV.PL-buy-PST.INTERR
Intended: ‘The boy bought a book and what?’

A closer look at Tsez headless relatives

Characterizing Tsez headless relatives:

A closer look at Tsez headless relatives

Characterizing Tsez headless relatives:

a. the affix si/zo as nominalizers

A closer look at Tsez headless relatives

Characterizing Tsez headless relatives:

a. the affix si/zo as nominalizers

b. relativized elements undergo A′-movements

A closer look at Tsez headless relatives

Characterizing Tsez headless relatives:

a. the affix si/zo as nominalizers

b. relativized elements undergo A′-movements

Question

Can we see similar patterns in other non-wh headless relatives?

A closer look at Tsez headless relatives

Characterizing Tsez headless relatives:

a. the affix si/zo as nominalizers

b. relativized elements undergo A′-movements

Question

Can we see similar patterns in other non-wh headless relatives?Yes!

Mandarin headless relatives

Mandarin headless relatives

Mandarin headless relatives obligatorily end with a sentence-final marker *de* and relativized elements are silent.

(21) [ta shuo *(de)] shi yingyu
he speak DE be English
'What he speaks is English.'

Mandarin headless relatives

Mandarin headless relatives are productive and usually found as the subjects of copular sentences (Li and Thompson 1981; Zhu 1982; among others).

(22) [ta kan de] shi xiaoshuo
he read DE be novel
'What he read are novels.'

(23) [ta he de] shi niunai
he drink DE be milk
'What he drank is milk.'

Mandarin headless relatives

They can be attested in more constructions and syntactic positions.

First, they can freely appear in negation sentences and *zhi* 'only'-sentences.

(24) wo ting bu-dong [ta shuo de]
I listen not-understand he say DE
'I cannot understand what he said.'

(25) zheli mei-you [wo xihuan de]
here not-have I like DE
'There is nothing I like here.'

(26) wo zhi kan [Zhangsan yan de]
I only watch Zhangsan act DE
'I only watch what Zhangsan acts on.'

(27) wo zhi zuo [laoshi yaoqiu de]
I only do professor require DE
'I only do what the professor requires.'

Mandarin headless relatives

Besides, they are also grammatical in any nominal positions.

(28) [Zhangsan (zuotian) zhu de] dou hen haochi
Zhangsan yesterday cook DE all very tasty
'What ZS cooked (yesterday) was all tasty.'

(29) [(zuotian) lai kaoshi de] dou guo le
yesterday come take-exam DE all pass FP
'Who came to take exams (yesterday) all passed.'

(30) wo kan le [Zhangsan (zuotian) hua de]
I look ASP Zhangsan yesterday draw DE
'I had a look at what Zhangsan drew (yesterday).

(31) wo jiedai le [(zuotian) lai caifang de]
I greet ASP yesterday come interview DE
'I greeted who came for interviews (yesterday).'

A closer look at Mandarin headless relatives

Characterizing Mandarin headless relatives:

a. *de* as nominalizers (similar to *si/zo* in Tsez)

b. relativized elements undergo A′-movements (similar to wh-in-situ in Tsez)

de as a nominalizer

The marker *de* can be independently (without a following noun) used to nominalize syntactic objects in different sizes.

de as a nominalizer

The marker *de* can be independently (without a following noun) used to nominalize syntactic objects in different sizes.

Evidence-1: the marker *de* can attach to bare verbs to denote entities.

(32) chi-de
eat-DE
'what could be eaten (=food)'

(33) chuan-de
wear-DE
'what could be worn (=clothing)'

de as a nominalizer

Evidence-2: The marker *de* can also attach to a bare VP to derive an occupational reading.

(34) Zhangsan shi [hua hua de]
Zhangsan be draw picture DE
'Zhangsan is a painter.'

(35) Zhangsan shi huajia
Zhangsan be painter
'Zhangsan is a painter.'

de as a nominalizer

The marker *de* is selective to the VP it combines with.

de as a nominalizer

The marker *de* is selective to the VP it combines with.

The occupational reading requires that the VP denotes an action that could qualify as an occupation.

de as a nominalizer

The marker *de* is selective to the VP it combines with.

The occupational reading requires that the VP denotes an action that could qualify as an occupation.

(36) * Zhangsan shi [zai zher da che de]
Zhangsan be at here call taxi DE
Intended: 'Zhangsan is a person who calls taxis here.'

De functions as a nominalizer, which can take bare verbs, VPs and TPs.

A closer look at Mandarin headless relatives

Characterizing Mandarin headless relatives:

a. *de* as a nominalizer

b. relativized elements undergo A′-movements

Relativizations by A′-movements

Although the relativized elements are phonologically null in Mandarin, two pieces of evidence show that the relativized element does move.

Relativizations by A′-movements

Although the relativized elements are phonologically null in Mandarin, two pieces of evidence show that the relativized element does move.

Evidence-1: The relativization is island-sensitive.

Adverbial clause island

(39) * wo kandao le [Zhangsan [yinwei meiyou dedao e] gandao nanguo de]
I see ASP Zhangsan because not get feel sad DE
'I saw what Zhangsan felt sad because he didn't get.'

Relative clause island

(40) * wo chi le [Zhangsan yaoqing le [hui zuo e de ren] de]
I eat ASP Zhangsan invite ASP can cook DE person DE
'I ate what Zhangsan invited the person who can cook.'

Relativizations by A′ movements

Evidence-2: Preposition-stranding is not allowed in the relativization of Mandarin headless relatives as in overt topicalizations.

(41) * Zhangsan, wo gen t bu shou.
Zhangsan, I with not familiar
'Zhangsan, I am not familiar with.'

Similar to overt topicalization movements, the relativization resulting in prepositional stranding is not grammatical for headless relatives.

(42) * wo hui fang san ben shu zai [ni zuotian fang shu zai e de]
I will put three CL book at you yesterday put books at DE
Intended: 'I will put three books where you put books yesterday.'

Relativizations by A′ movements

Evidence-3: The relativization of indirect objects and applicative objects in Mandarin headless relatives is deviant.

(43) * wo kandao le [wo jiao (ta) jufa de]
I see ASP I teach him syntax DE
Intended: 'I saw who I taught Syntax.'

(44) * wo he le [ni he le e san ping jiu de] jiu
I drink ASP you drink ASP three CL wine DE wine
Intended: 'I drank wine on who you drank three bottles of wine on.'

Relativizations by A′ movements

Evidence-3: The relativization of indirect objects and applicative objects in Mandarin headless relatives is deviant.

(43) * wo kandao le [wo jiao (ta) jufa de]
I see ASP I teach him syntax DE
Intended: 'I saw who I taught Syntax.'

(44) * wo he le [ni he le e san ping jiu de] jiu
I drink ASP you drink ASP three CL wine DE wine
Intended: 'I drank wine on who you drank three bottles of wine on.'

This deviance is also observed in their overt counterpart English wh-movements.

(45) ?/* Which woman do you think I should give/buy perfume?

(46) * Who did you bake a cake?

Summary

Characterizing Tsez and Mandarin headless relatives:

a. External nominalizers are required (*si/zo* in Tsez and *de* in Mandarin)

b. Relativized elements undergo A′-movements

Summary

Characterizing Tsez and Mandarin headless relatives:

a. External nominalizers are required (*si/zo* in Tsez and *de* in Mandarin)

b. Relativized elements undergo A′-movements

A theoretical question

What is the difference between English-type [+wh] headless relatives and Mandarin/Tsez-type [-wh] headless relatives in terms of category transformation?

The categorical transformation

The syntactic analyses of headless relatives

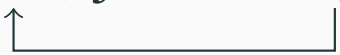
One-element analysis for [+wh] headless relatives

- [what$_i$ John likes t_i]

This "one-element" analysis

Under the "one-element" analysis, the matrix verb selects no external base-generated nominal, and the category transformation from CP to NP is implemented by the wh-nominal within headless relatives.

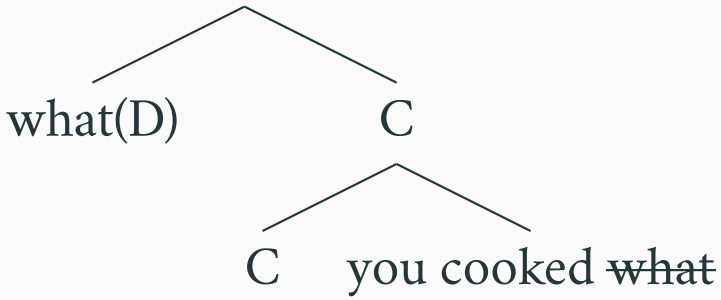
(47) [what$_i$ John likes t_i]



Theoretical background

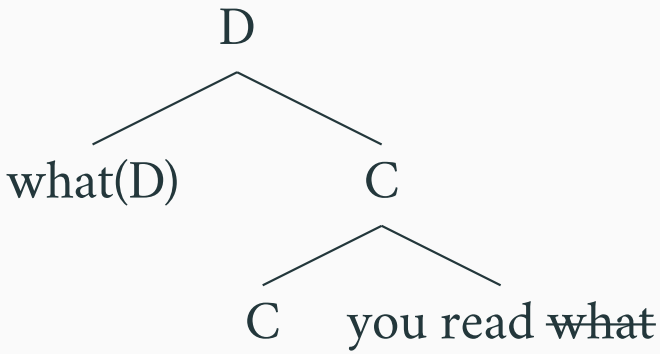
- According to labeling theory, the labels of the derived elements should come from the sets of their daughters.
- Following Citko (2008), I assume that Project Goal and Project Probe are both possible in grammar.

- **Empirical motivation:** *what you cooked* is ambiguous.

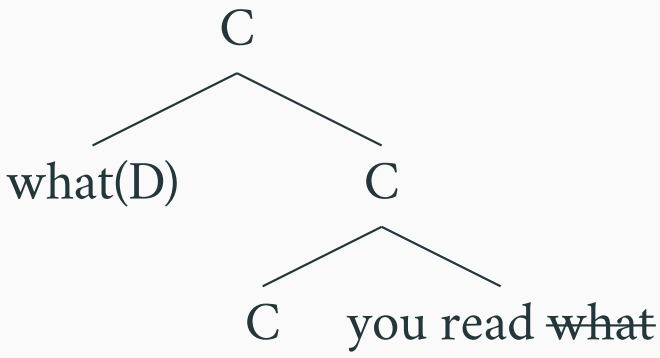


Theoretical background

- **Outcome-1:** I read what you read.

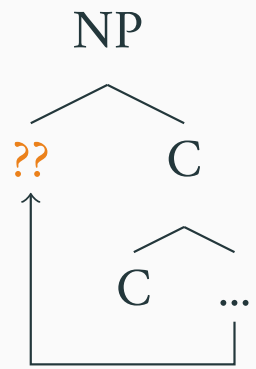


- **Outcome-2:** I wonder what you read.



Theoretical background

- How can we get to NP/DP? What are the realizations of ?? in non-wh headless relatives?



The requirement for ??

It needs to encode a [D] or [N] feature to relabel the structure into a DP or NP.

A typological picture

What we have learned from Tsez, Mandarin and English:

	type	determiner	fronted wh	nominalizer	comp	in-situ wh
[-wh]	Mandarin	-	-	✓	-	-
	Tsez	-	-	✓	-	✓
[+wh]	English	-	✓	-	-	-

(Re)labeling in cross-linguistic headless relatives: different paths to one destination

The destination: nominal FRs require a categorial feature [N]

Nominal headless relatives pattern with regular nouns in the matrix clause.

The destination: nominal FRs require a categorial feature [N]

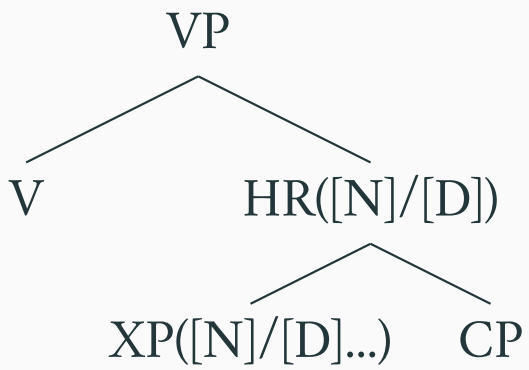
Nominal headless relatives pattern with regular nouns in the matrix clause.

Nominal headless relatives also need to bear a categorial feature [N][N]/[D] to satisfy the subcategory requirement.

The destination: nominal FRs require a categorial feature [N]

Nominal headless relatives pattern with regular nouns in the matrix clause.

Nominal headless relatives also need to bear a categorial feature [N][N]/[D] to satisfy the subcategory requirement.



The destination: a categorial feature [N]/[D]

	type	determiner	fronted wh	nominalizer	comp	in-situ wh
[-wh]	Mandarin	-	-	✓	-	-
	Tsez	-	-	✓	-	✓
[+wh]	English	-	✓	-	-	-

Question

What is the distinction between [-wh] and [+wh] headless relatives?

The destination: a categorial feature [N]/[D]

Chomsky (1993): movement is triggered by the need to check features.
Ideally, when movements are triggered, only the relevant features move.

The destination: a categorial feature [N]/[D]

Chomsky (1993): movement is triggered by the need to check features. Ideally, when movements are triggered, only the relevant features move.

However, in standard English wh-questions, it is the whole wh-phrase, not just the op-feature (or wh-feature) that moves.

The destination: a categorial feature [N]/[D]

Chomsky (1993): movement is triggered by the need to check features. Ideally, when movements are triggered, only the relevant features move.

However, in standard English wh-questions, it is the whole wh-phrase, not just the op-feature (or wh-feature) that moves.

(81) 'I wonder who John likes.'
Structure: I wonder $[_{CP}$ who$_i$ $[_{C'}$ Comp $[_{IP}$ John likes t_j]]

The destination: a categorial feature [N]/[D]

Chomsky (1993): movement is triggered by the need to check features. Ideally, when movements are triggered, only the relevant features move.

However, in standard English wh-questions, it is the whole wh-phrase, not just the op-feature (or wh-feature) that moves.

(81) 'I wonder who John likes.'
Structure: I wonder $[_{CP}$ who$_i$ $[_{C'}$ Comp $[_{IP}$ John likes t_j $]]$

This movement carries along with the op-feature features irrelevant to the checking, such as intrinsic features like [+human].

The destination: a categorial feature [N]/[D]

Takahashi (1997): a null operator can undergo a pure feature movement (op-feature) in overt syntax because it is free from PF considerations.

(82) $[_{CP}$ op -Comp $[_{IP}$ ... OP ...]] (order irrelevant)

[[N]/[D], ... ,$t_{op'}$, ... ,F_n]

(Takahashi 1997: 187)

The destination: a categorial feature [N]/[D]

Takahashi (1997): a null operator can undergo a pure feature movement (op-feature) in overt syntax because it is free from PF considerations.

(83) $[_{CP}$ op -Comp $[_{IP}$ ... OP ...]] (order irrelevant)

[[N]/[D], ... ,$t_{op'}$, ... ,F_n]

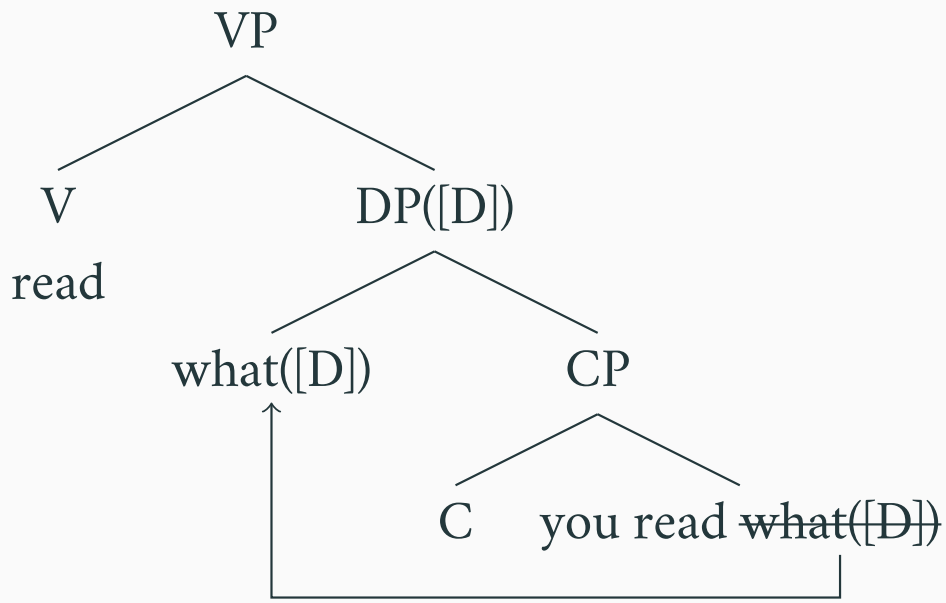
(Takahashi 1997: 187)

Take-away lesson

Overt wh-movements take [N]/[D] features while op-movements don't.

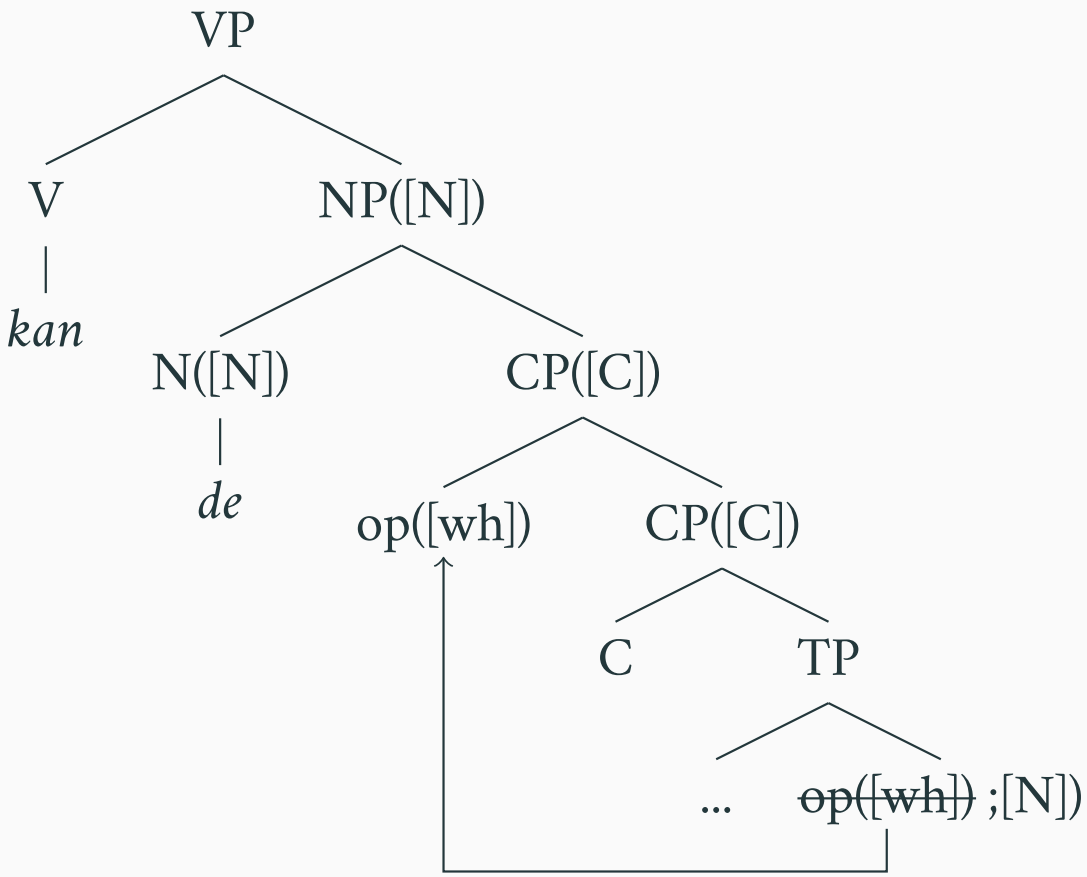
[+wh] English headless relatives

wh-word	types	determiner	fronted wh	nominalizer	rel/ comp	in-situ wh
[+wh]	English	-	✓	-	-	-



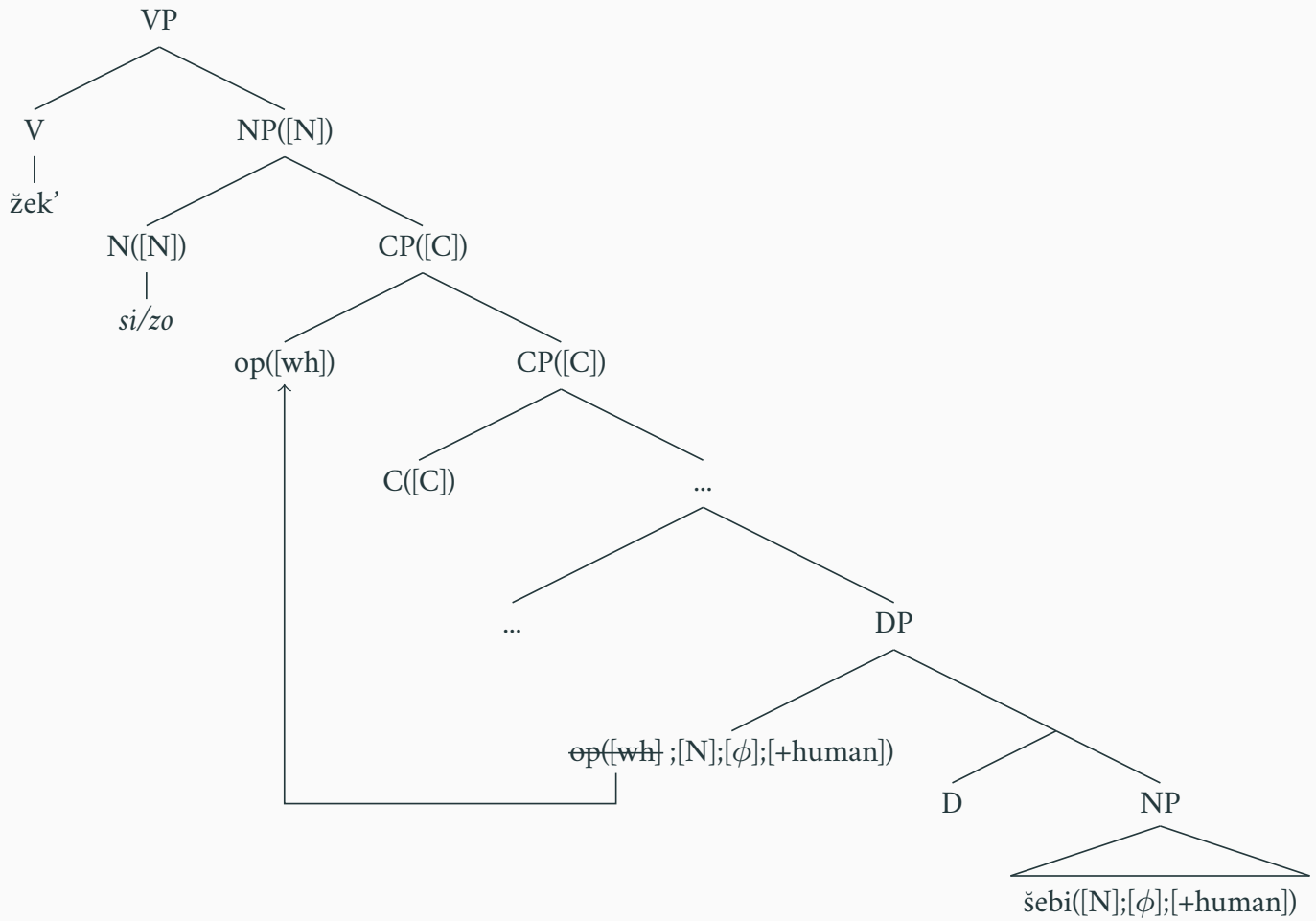
[-wh] Mandarin headless relatives

wh-word	types	determiner	fronted wh	nominalizer	rel/ comp	in-situ wh
[-wh]	Mandarin	-	-	✓	-	-



[-wh] Tsez headless relatives

wh-word	types	determiner	fronted wh	nominalizer	rel/ comp	in-situ wh
[-wh]	Tsez	-	-	✓	-	✓



Chapter summary

Summary

- This work examined the [-wh] headless relatives in two unrelated languages, Mandarin and Tsez.

Summary

- This work examined the [-wh] headless relatives in two unrelated languages, Mandarin and Tsez.
- In Mandarin and Tsez nominal headless relatives, no wh-phrase overtly moves, and a nominalizer is obligatory.

Summary

- This work examined the [-wh] headless relatives in two unrelated languages, Mandarin and Tsez.
- In Mandarin and Tsez nominal headless relatives, no wh-phrase overtly moves, and a nominalizer is obligatory.
- I propose that the overt fronted wh-phrase provides [N]/[D] in [+wh] headless relatives while an extra nominalizer is externally merged to supply [N]/[D] in [-wh] headless relatives.
- This analysis can be extended to account for headless relatives in Spanish, Polish, and Bulgarian.

This dissertation

Syn The categorical transformations of nominal headless relatives (CP $\rightarrow$ NP/DP; cross-linguistic)

Syn Whether all arguments can be equally relativized (Mandarin SFR)

Sem The semantic composition of headless relatives (English FR)

Sem The semantics of headless relatives and modified bare nouns (English FR)

The semantic compositions of headless relative clauses: a case study of English free relatives

Overview

- Pied-piping refers to a movement where a given expression brings along an encompassing phrase with it when it moves.

  (84) Mary saw the person [to whom Egbert would never talk].

  (85) Whose children died in the war?

Overview

- Pied-piping refers to a movement where a given expression brings along an encompassing phrase with it when it moves.

  (86) Mary saw the person [to whom Egbert would never talk].

  (87) Whose children died in the war?

- Pied-piping is degraded in English free relatives.

Overview

- Pied-piping refers to a movement where a given expression brings along an encompassing phrase with it when it moves.

  (88) Mary saw the person [to whom Egbert would never talk].

  (89) Whose children died in the war?

- Pied-piping is degraded in English free relatives.
- Two types of degradedness in English FRs:
  - **Absolute bad (*):** Completely unacceptable.
  - **Acceptable to some speakers (*/??):** Marginally acceptable.

*Select-into-fronted-element

Absolute bad (*): A noun-selecting verb cannot take a [P+ wh-noun]-FR, and a who-selecting verb cannot take a [whose+N]-FR (Grosu 1994; a.o.).

(90) * She found [with what she used to draw].
She found [what she used to draw with].

(91) * I consoled [whose children died in the war].
I consoled [the persons whose children died in the war].

?Select-the-whole-fronted-element

Acceptable to some speakers (*/?(??)): When the whole wh-phrase is selected by the matrix verb, native speakers agree that these are “not what people usually say" or “not perfect," with variations in acceptability.

(92) */? John is digging (precisely) [with what] his father was digging *t* a moment ago.

(93) */?? I am sure that my dad will pay for [whose car I damaged].

Two Constraints in FRs

- **FR-external constraint (rigid):** The fronted string of free relatives denotes a meaning in a form that is required by the matrix predicate.
- **FR-internal constraint (violable):** The fronted string contains only wh-expressions.

Constraint Examples

	Examples	FR-external	FR-internal	Judgments
a	She found [**what** she used to draw with]	✓	✓	✓

Constraint Examples

	Examples	FR-external	FR-internal	Judgments
a	She found [**what** she used to draw with]	✓	✓	✓
b	John works [**for whom** his father used to work] My dad will pay for [**whose car(s)** I damage]	✓	✗	✓/* (w variations)

Constraint Examples

	Examples	FR-external	FR-internal	Judgments
a	She found [**what** she used to draw with]	✓	✓	✓
b	John works [**for whom** his father used to work] My dad will pay for [**whose car(s)** I damage]	✓	✗	✓/* (w variations)
c	I met [**what** you gave him]	✗	✓	#

Constraint Examples

	Examples	FR-external	FR-internal	Judgments
a	She found [**what** she used to draw with]	✓	✓	✓
b	John works [**for whom** his father used to work] My dad will pay for [**whose car(s)** I damage]	✓	✗	✓/* (w variations)
c	I met [**what** you gave him]	✗	✓	#
d	She found [**with what** she used to draw] John consoled [**whose child** died in the war]	✗	✗	*

Two Constraints in FRs

- **FR-external constraint (rigid):** The fronted string of free relatives denotes a meaning in a form that is required by the matrix predicate.
- **FR-internal constraint (violable):** The fronted string contains only wh-expressions.

The semantic composition

The meaning of a free relative hinges on its fronted string, thereby granting the matrix predicate access to the semantics of the fronted strings.

Previous studies

- Despite the differences, previous studies on English FRs propose that free relatives denote the maximal entities that the wh-expression ranges over.

(94) $[\![\text{what was in the fridge}]\!] = \lambda x[\mathsf{thing}(x) \wedge \mathsf{in\text{-}fri}(x)]$
$[\![\text{what was in the fridge}]\!] = \lambda x : \mathsf{thing}(x) = 1.\mathsf{in\text{-}fri}(x)$

Previous studies

- These analyses predict the same semantics for pied-piping and non-pied-piping FRs.

(95) $[\![\text{to whom John gave the money}]\!] =$
$\lambda x[\mathsf{human}(x) \wedge \mathsf{give\text{-}to}(j, \mathsf{the\text{-}money}, x)]$
$[\![\text{whom John gave the money to}]\!] =$
$\lambda x[\mathsf{human}(x) \wedge \mathsf{give\text{-}to}(j, \mathsf{the\text{-}money}, x)]$

(96) $[\![\text{to whom John gave the money}]\!] =$
$\lambda x : \mathsf{human}(x).\mathsf{give\text{-}to}(j, \mathsf{the\text{-}money}, x)]$
$[\![\text{whom John gave the money to}]\!] =$
$\lambda x : \mathsf{human}(x).\mathsf{give\text{-}to}(j, \mathsf{the\text{-}money}, x)]$

The main idea

Instead of having:

$[\![\text{to whom John gave the money}]\!] = \lambda x : \mathsf{hmn}(x).\text{give-to}(j, \text{t-m}, x)]$

The main idea

Instead of having:

$[\![\text{to whom John gave the money}]\!] = \lambda x : \mathsf{hmn}(x).\mathsf{give\text{-}to}(j, \mathsf{t\text{-}m}, x)]$

We want something like:

$[\![\text{to whom John gave the money}]\!] = \lambda x : x \in \{\mathsf{to}\text{-}y | \mathsf{hmn}(y)\}.\mathsf{give}(j, \mathsf{t\text{-}m}, x)]$

The semantic composition: pied-piping strings

The ∃-account of fronted pied-piping strings

Step-1 Within the pied-piping string (to whom), wh-indefinite moves to the edge of the pied-piping string to scope over the pied-piping string.

(97) [whom$_1$ [to t$_1$]]

$= \lambda R_{\langle v,t\rangle}.\exists x \in \mathsf{hmn}_{@}[R = [\lambda e.\textsc{goal}(e) = x]]$

The semantic composition: pied-piping strings

The ∃-account of fronted pied-piping strings

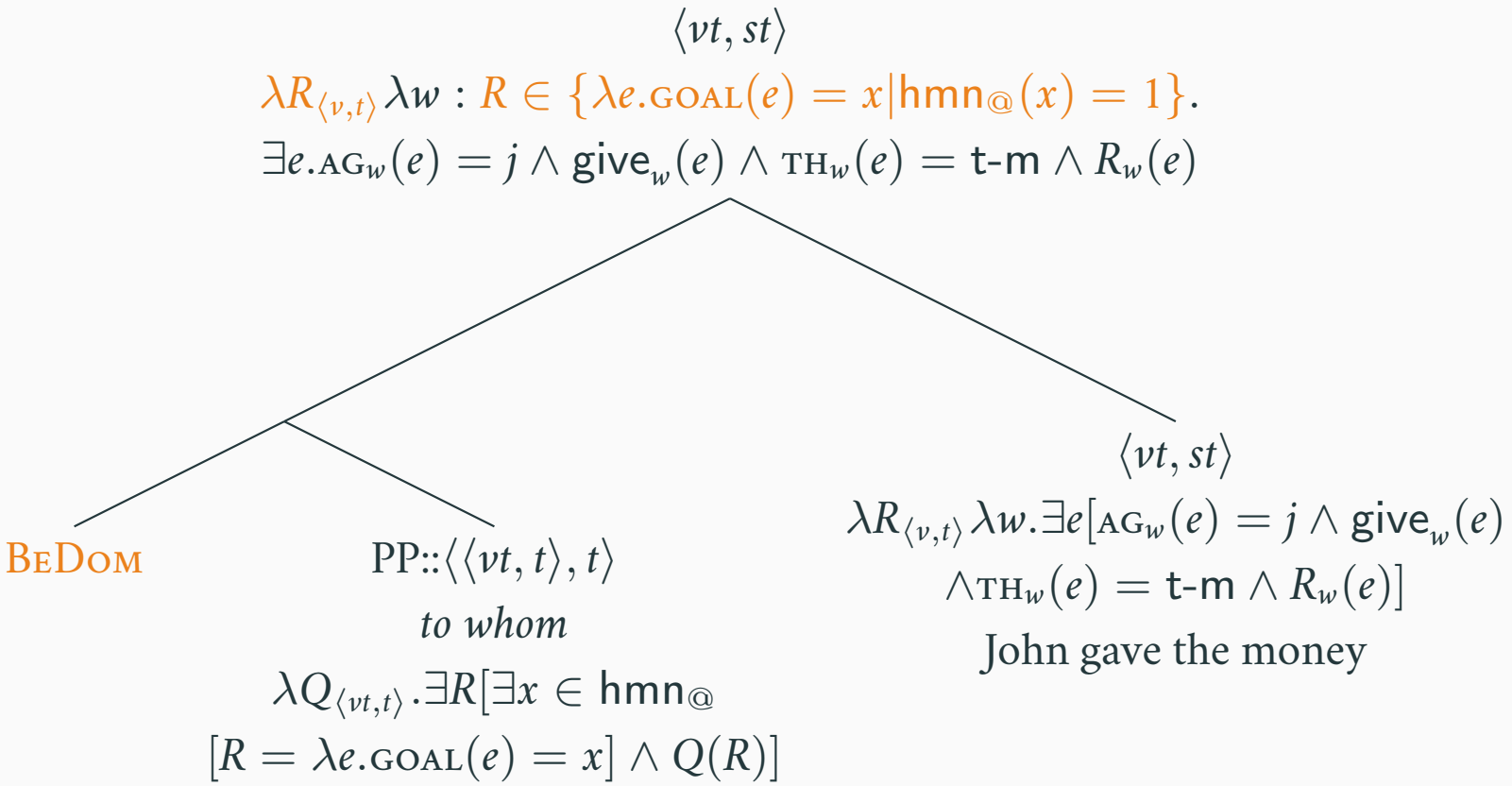
Step-2 The fronted pied-piping string as a whole is lifted to an ∃-quantifier, whose restriction is the set that the pied-piping string denotes.

(98) $\exists$ [whom$_1$ [to t$_1$]]

$= \lambda Q_{\langle vt,t\rangle}.\exists R[\underline{\exists x \in \mathsf{hmn}_@[R = [\lambda e.\textsc{goal}(e) = x]]} \wedge Q(R)]$

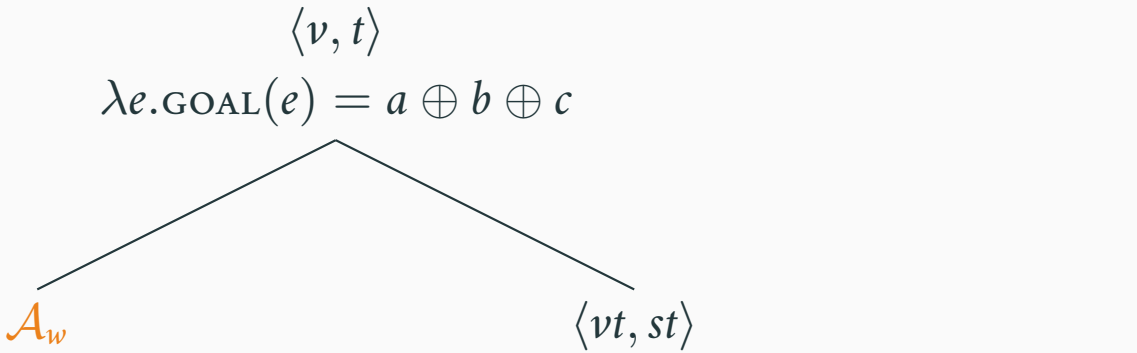
The semantic composition: composing with the remnant

Then, we restrict the domain of the remnant to the set that the fronted pied-piping string denotes.



The semantic composition: composing with the remnant

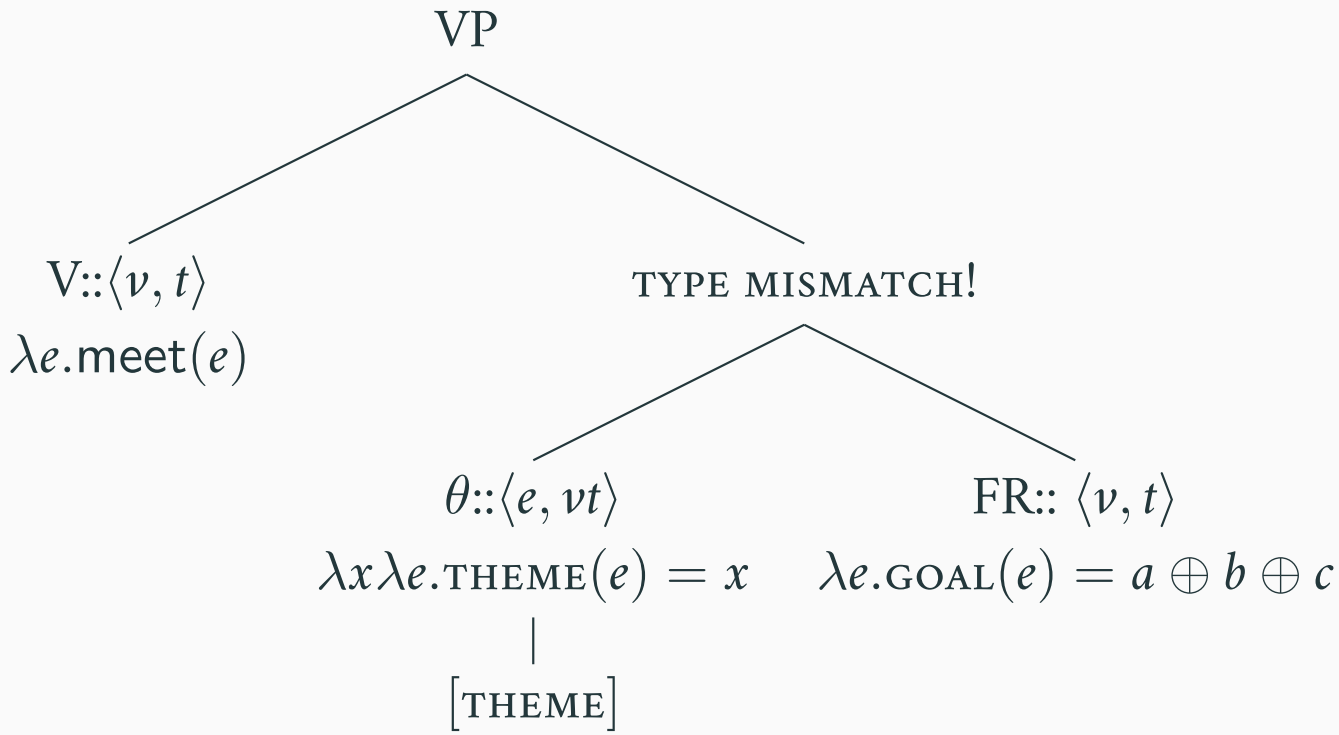
Finally, we pick out the maximal element.



Account for the FR-external constraint

FR-external constraint: The fronted string of free relatives denotes a meaning in a form that is required by the matrix predicate.

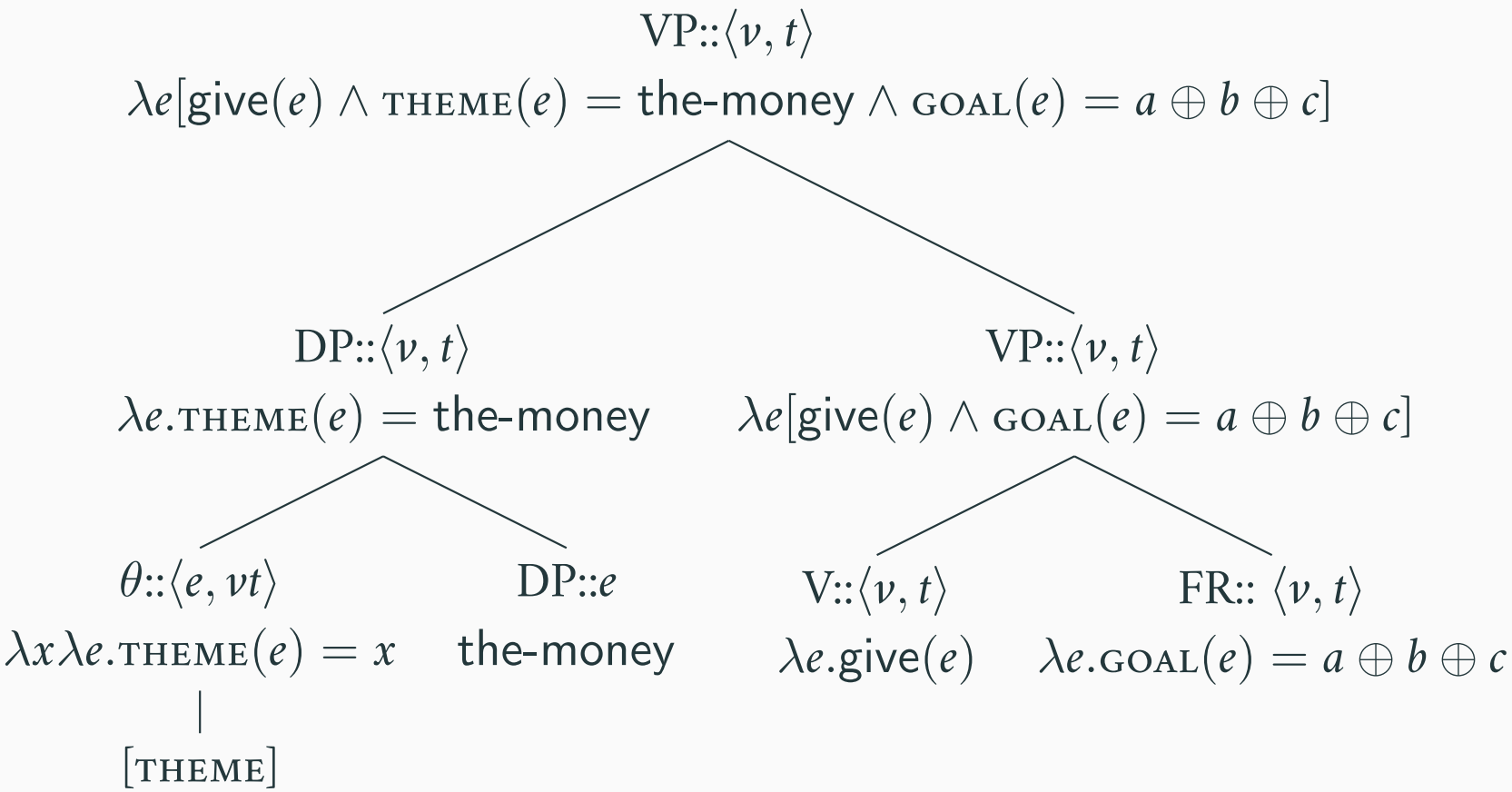
(99) (Context: John gave the money to Andy, Billy and Cindy.)
*(I) met [to whom John gave the money]$_{\text{FR}}$



Account for the FR-external constraint

(Context: John gave the money to Andy, Billy and Cindy.)

?I gave the money [to whom John gave the money]$_{\text{FR}}$



Account for the FR-internal constraint

FR-internal constraint: The fronted string contains only wh-expressions.

(Context: John gave the money to Andy, Billy and Cindy.)

a. $[\![\text{whom John gave money to}]\!] = \{a, b, c, a \oplus b, a \oplus c, b \oplus c, a \oplus b \oplus c\}$

b. $[\![\text{to whom John gave money}]\!] = \{\lambda e.\mathsf{goal}(e) = a, \lambda e.\mathsf{goal}(e) = b,$
$\lambda e.\mathsf{goal}(e) = c, \lambda e.\mathsf{goal}(e) = a \oplus b,$
$\lambda e.\mathsf{goal}(e) = a \oplus c, \lambda e.\mathsf{goal}(e) = b \oplus c,$
$\lambda e.\mathsf{goal}(e) = a \oplus b \oplus c\}$

Account for the FR-internal constraint

FR-internal constraint: The fronted string contains only wh-expressions.

(Context: John gave the money to Andy, Billy and Cindy.)

a. $[\![\text{whom John gave money to}]\!] = \{a, b, c, a \oplus b, a \oplus c, b \oplus c, a \oplus b \oplus c\}$

b. $[\![\text{to whom John gave money}]\!] = \{\lambda e.\mathsf{goal}(e) = a, \lambda e.\mathsf{goal}(e) = b,$
$\lambda e.\mathsf{goal}(e) = c, \lambda e.\mathsf{goal}(e) = a \oplus b,$
$\lambda e.\mathsf{goal}(e) = a \oplus c, \lambda e.\mathsf{goal}(e) = b \oplus c,$
$\lambda e.\mathsf{goal}(e) = a \oplus b \oplus c\}$

The input for the picking operation of $\mathcal{A}_w$ should be minimized to include only relevant information, making the derivation in (a) preferable to (b) due to its greater economy in encoding.

Account for the FR-internal constraint

This preference for minimization aligns with findings in the study of focus.

(100) (What does Kim do in Paris?—)

1. Kim [WORKS]$_F$ in Paris.
2. #Kim [works in PARis]$_F$.
3. #[Kim works in PARis]$_F$. (Büring 2016: 65)

(101) **Maximize Background (Büring 2016)**
In any tree, maximize the number of (non-synonymous) constituents that are in the background.

Summary

- FR-internal and FR-external constraints suggest that the meanings of English FRs should be sensitive to the form of fronted strings.

Summary

- FR-internal and FR-external constraints suggest that the meanings of English FRs should be sensitive to the form of fronted strings.
- A compositional analysis is proposed to account for the FR-external constraint.

Summary

- FR-internal and FR-external constraints suggest that the meanings of English FRs should be sensitive to the form of fronted strings.
- A compositional analysis is proposed to account for the FR-external constraint.
- This analysis generates different meanings for pied-piping FRs and non-pied-piping FRs, thereby providing the basis for explaining the FR-internal constraint.

Thank you!