Interpreting quantification within internally headed relative clauses

Mary Moroney, *Cornell University*
mrm366@cornell.edu
August 6, 2019

- Yǔn Shan (Southwestern Tai) internally headed relative clauses (IHRCs) have a non-maximal interpretation available, unlike IHRCs in languages like Japanese.

- Of current IHRC analyses, Shimoyama's (1999) E-type analysis fits the data best if it can allow for a non-maximal interpretation.

- This non-maximal interpretation is similar to the non-maximal interpretation of anaphoric bare nouns in Inuttut (Gillon 2015).

1 Non-maximal IHRCs in Yǔn Shan

- In the IHRC literature there are several analyses for Japanese (Grosu & Landman 2012; Erlewine & Gould 2016; Grosu & Hoshi 2018; Kitagawa 2019; a.o.), and some for Korean (Kim 2004, a.o.).

- There have been fewer analyses for IHRCs in other languages (see, e.g., Williamson 1987 for Lakhota; Hastings 2004 for Quechua, and Bogal-Allbritten & Moulton's (2018) analysis of Navajo).

- This means that there is a gap in the literature about what analyses to use for internally headed clauses in other languages.

- Moroney (2018) introduced Yǔn Shan IHRCs, which are CNPC-island sensitive, non-maximalizing IHRCs.

- In Japanese sentence (1), the numeral 'three' describes both the number of apples peeled and eaten.

- In the corresponding Yǔn Shan sentence in (2), the numeral 'three' only tells the number of apples that were peeled.

(1) John-wa [[Mary-ga **san-ko-no** **ringo-o** muitekureta]
John-TOP Mary-SUBJ three-CL-GEN apple-ACC peeled
-no]-o tabeta.
NO-ACC ate
'Mary peeled three apples and John ate them all.'
(Shimoyama 1999, citing Hoshi 1995)

  - Apples Mary peeled: 3

  - Apples John ate: 3

(2) Nan Lǐ cǐn pěn [ʔǎn Saj Kham pɤ̀k **màmɔ̂ sǎam hwí**
Nan Li eat up COMP Saj Kham peel apple 3 CL.RND
nâj].
this
'Nan Li ate up apples that Saj Kham peeled of which there are three.'
(Moroney 2018: (18))

  - Apples S.K. peeled: 3

  - Apples N.L. ate: some of the peeled apples

- The difference: at the matrix clause level, the noun phrase denoted by the IHRC is maximal for Japanese but need not be for Yǔn Shan.

Road map

2 Analyses for Japanese.

- For Lakhota, another language with non-maximal IHRCs, an unselective binding analysis has been proposed (Bonneau 1993).

- **The problem:** relies on overt determiners, which Shan lacks, and predicts no IHRC island-sensitivity, which Shan has.

- This section discusses the analyses for Japanese in Shimoyama 1999 (S), Grosu & Landman 2012 (G&L), and Erlewine & Gould 2016 (E&G).

- Accounts of Japanese have focused on accounting for

  - maximality of the RC

  - construal of quantifiers inside the relative clause

  - island sensitivity of IHRCs

- Analyses for Japanese attribute this definite/maximal interpretation to a 'THE' or σ operation at the top of the relative clause, though the source of this definiteness operation is not agreed upon.

- Examples (3a-3c) represent my interpretation of how each of these previous accounts would each analyze the IHRC in (1).

(1) John-wa [[Mary-ga **san-ko-no** **ringo-o** muitekureta]
     John-TOP Mary-SUBJ three-CL-GEN apple-ACC peeled
     -no]-o tabeta.
     NO-ACC ate

     'Mary peeled three apples and John ate them all.' (Shimoyama 1999, citing Hoshi 1995)

     - Apples Mary peeled: 3

     - Apples John ate: 3

Japanese

(3) a. $\sigma(\lambda x.\exists e[PEEL(e) \wedge Ag(e) = m \wedge Th(e) \in {}^*APPLE \wedge |Th(e)| = 3 \wedge Th(e) = x])$

         (G&L style: see (48))

     b. (THE)$[\lambda X.X$ apple(s) $\wedge m$ peeled 3[apple parts of X]]

         (E&G style: see (46c))

     c. the maximal individual a such that $[\lambda x \in D_e. x$ is apples m peeled$](a) = 1$

         (S style: see (37-38))

- Grosu & Landman (2012)

  1. Chose Role (ChR) projection: chooses salient role in event VP to abstract over

  2. SpecChR: launches operator to capture island sensitivity

  3. σ: maximal interpretation

- Erlewine & Gould (2016)

  1. Copy DP and late-merge CP to copied DP by adjoining to NP

  2. Trace conversion (Fox 2002) of lower copy or Inverse trace conversion (Erlewine 2014) of the higher copy:
     - variable insertion ($\lambda y.y = x$ or $\lambda y.y \sqsubseteq x$) at lower copy
     - determiner replacement for quantifier of lower (Trace conversion) or higher (Inverse trace conversion) copy

  3. Minimize Mismatch (Bobaljik 1995): determiner replacement for the un-pronounced quantifier copy

  4. Definiteness from THE modeled as maximal informativeness

- Shimoyama (1999)

  1. IHRC moves from SpecDP to adjoin to IP at LF

  2. null pro-form in N: gets $\langle e,t \rangle$ denotation from assignment function

  3. *-no*: occupies D and generates maximal interpretation

3 Yǔn Shan Relative Clauses

- Yǔn Shan is an SVO, classifier language.

- This language has post-nominal externally headed relative clauses (EHRCs), which can have the same interpretation as the IHRC.

(4) Nan Lǐ cǐn pěn **màmɔ̂** [ʔǎn   Saj Kham pɤ̀k **sǎam hwí**
   Nan Li eat up apple   COMP Saj Kham peel 3   CL.RND
   nâj].
   this

   'Nan Li ate up apples that Saj Kham peeled of which there are three.'

   - Apples S.K. peeled: 3

   - Apples N.L. ate: some of the peeled apples

- The internal head might be quantified or bare, as in (5).

(5) Nan Lǐ khaj cǐn [ʔǎn   Saj Kham tě   lâaŋ **màmɔ̂** nâj]. Mán
   Nan Li want eat COMP Saj Kham IRR wash apple   this 3.SG
   khaj cǐn **hwí**.
   want eat CL.RND

   'Nan Li wants to eat apples that Saj Kham will wash. She wants to eat one.'   (Moroney 2018: (17))

(6) Nan Lǐ cǐn pěn [ʔǎn   Saj Kham pɤ̀k **màmɔ̂ mɤmót/khɯɯŋ**
   Nan Li eat up COMP Saj Kham peel apple   all/half
   nâj].
   this

   'Nan Li ate up apples from the all/half of them that Saj Kham peeled.'

   - Apples S.K. peeled: all/half the apples in the context

   - Apples N.L. ate: some of the peeled apples

4 Adapting analyses for Shan.

- Analyses that assume a maximal IHRC interpretation cannot be applied directly to this new data.

- Kotek & Erlewine (2016) proposed that for indefinite free relatives, the presence/absence of a DP layer leads to the maximal/non-maximal interpretation.

- (7a-7c) are possible IHRC interpretations for (2) adapted from (3a-3c) to exclude the definiteness operation.
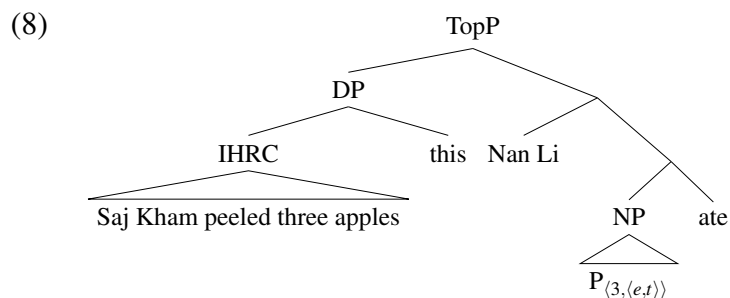
Yǔn Shan
(7) a. $\lambda x.\exists e[PEEL(e) \wedge Ag(e) = sk \wedge Th(e) \in {}^*APPLE \wedge |Th(e)| = 3 \wedge Th(e) = x]$
   b. $[\lambda X.X \text{ apple(s)} \wedge sk \text{ peeled } 3[\text{apple parts of } X]]$
   c. $\lambda x \in D_e. x \text{ is apples } sk \text{ peeled}$

- Grosu & Landman (2012): (7a)

  - **The problem**: each x in the set has to have the measure 3, meaning the matrix clause verb must apply to all three peeled apples.

  - We want it to be possible for only 1 or 2 apples to be eaten.

- Erlewine & Gould (2016): (7b)

  - **The problem**: Each X described would have to contain at least 3 apples.

  - No salient set reading has been found in Yǔn Shan.

- Shimoyama (1999): (7c)

  - IHRC is interpreted separately from the matrix clause

  - Does not make reference to number of apples peeled

  - Can work if definiteness operator is removed

- My proposal:

  - The IHRC DP moves at LF to a higher projection.

  - In place of the IHRC, a free variable that receives its denotation from an assignment function in the utterance context.

  - Unlike in Japanese, there is no definitenesss operator like -*no*.

  - Then, the argument of the matrix clause would be something of type $\langle e,t \rangle$, that would function as a bare argument.

  - The IHRC would be in an independently used topic position.

(8)

```
                        TopP
                   ┌──────┴──────┐
                  DP              │
              ┌────┴────┐    ┌────┴────┐
            IHRC      this  Nan Li     │
          ┌──┴──┐            ┌─────┴─────┐
   Saj Kham peeled three apples        NP        ate
                                      ┌──┴──┐
                                 P_{⟨3,⟨e,t⟩⟩}
```

- This topic position is usually filled by a noun or a dependent clause.

- (9) shows the IHRC from (2) in the topic position

(9) [ʔăn Saj Kham pɤ̀k **màmɔ̂ sǎam hwí**   nâj] Nan Lǐ cǐn
     COMP Saj Kham peel apple 3   CL.RND this Nan Li eat
     pĕn mómót.
     up all
     'The three apples that Saj Kham peeled, Nan Li ate them all.'

    - Apples S.K. peeled: 3 apples

    - Apples N.L. ate: all 3 peeled apples

4.1   Other Shan Varieties: Southern Shan

- Southern Shan—a variety of Shan spoken in southern Shan State—has what looks like IHRCs in topic position, as in (10).

Southern Shan

(10) [ʔăn Tsáaj Khám pɔ̀k **màak-moŋ sì hòj**   nân] Náaŋ ʔɔ̀n
      COMP Mr.   Kham peel fruit-mango 4 CL.RND that Ms. Orn
      kĭn pɛt.
      eat DETR

      'Nan Orn ate mangoes that Saj Kham peeled of which there are four.'

    - Mangoes S.K. peeled: 4 mangoes

    - Mangoes N.O. ate: some peeled mangoes

- Both varieties of Shan have a topic position available.

- The difference: Southern Shan has no IHRCs in object position.

- Outside of this data, I have not found that other varieties of Shan or Thai—the best studied Southwestern Tai—have IHRCs.

- This could be because IHRCs in Southern Shan cannot raise at LF.

4.2   Internal IHRC structure

- Yŭn Shan IHRCs and EHRCs are sensitive to CNPC islands:

(11) *[ʔăn Nan Lǐ waa kăn   táŋhen [ʔăn **kón**   ʔàan **lik**
      COMP Nan Li spoke together with   COMP person read book
      nâj]] mán lĕŋ.
      this 3   red
      Intended: 'The book that Nan Li spoke with the people who read (it) is red.'   (Moroney 2018: (16))

- As (12) shows, multiply embedded IHRCs are acceptable.

(12) [Ɂǎn Nan Lǐ cɤk [Ɂǎn **kón** sɯ̂ lik nâj]] mán kêŋ.
COMP Nan Li like COMP person buy book this 3 clever

Intended: 'The person that Nan Li likes who bought the books is smart.'

- **Raising account:** Head or operator raises, causing island violation.

- **Topic account:** it is not possible to identify the topic since there are two?

- If there is no IHRC internal raising going on it is harder to predict why (11) is ungrammatical and (12) is grammatical.

5 Implications of indefinite E-type analysis

- Is it a problem that this 'E-type' analysis involves $\langle e,t \rangle$ type anaphora? —Perhaps not.

- Bare nouns do not always have to refer anaphorically to the maximal entity, as Gillon (2015) shows for Inuttut.

- Yǔn Shan allows non-maximal bare nominal anaphora, as in (13).

(13) **Mǎa haa tǒ** táŋheŋ mjaw sǎam tǒ khópkǎn.
dog five CL.ANML and cat three CL.ANML fight
pejâwne **mǎa nâj** Ɂɛ̌n pěn
then dog this run be
'Five dogs and three cats were fighting. Then, dogs ran away.'
Consultant comment: Could be all dogs or some that ran away.

- *Mǎa* 'dog' in the second clause refers back to the five dogs described in the first, yet the interpretation can be non-maximal.

6 Conclusion

Yǔn Shan

- Topic position: $\langle e,t \rangle$ anaphora

- IHRCs can move at LF to topic position: non-max interpretation

- Covert head raising: island effect

Southern Shan

- Topic position: $\langle e,t \rangle$ anaphora

- Neither IHRCs nor heads can move at LF: no IHRCs

Broader Questions

- What kinds of anaphora are available?

- How does anaphora type affect other semantic properties?

Thanks

Data notes

The Yǔn Shan data comes from fieldwork with a speaker in Ithaca, NY from January 2016 to September 2017. My consultant is from Mei Wai village, near Papun in Kayin (Karen) State, Myanmar. She also speaks Karen, Burmese, and English and live in the United States. The Southern Shan (*Tái Lǒng*) speaker is from Keng Tawng City, Southern Shan State, Myanmar and lives in Chiang Mai, Thailand. Data was collected from short stories, grammaticality judgments, and felicity judgments.

Glossing conventions

3: third person, ACC: accusative, ANML: animal, CL: classifier, COMP: complementizer, DETR: detrimental, GEN: genitive, IRR: irrealis, RND: round, SUBJ: subject, SG: singular, TOP: topic

References

BOBALJIK, JONATHAN DAVID. 1995. *Morphosyntax: The syntax of verbal inflection.* Massachussets Institute of Technology dissertation.

BOGAL-ALLBRITTEN, ELIZABETH, and KEIR MOULTON. 2018. Navajo in the typology of internally-headed relatives. *Semantics and Linguistic Theory*, vol. 27, 700–720.

BONNEAU, JOSÉ. 1993. *The structure of internally headed relative clauses.* McGill University dissertation.

ERLEWINE, MICHAEL YOSHITAKA. 2014. *Movement out of focus.* Massachusetts Institute of Technology dissertation.

ERLEWINE, MICHAEL YOSHITAKA, and ISAAC GOULD. 2016. Unifying Japanese relative clauses: copy-chains and context-sensitivity. *Glossa* 1.1.

FOX, DANNY. 2002. Antecedent-contained deletion and the copy theory of movement. *Linguistic Inquiry* 33.63–96.

GILLON, CARRIE. 2015. Investigating D in languages with and without articles. *Methodologies in semantic fieldwork*, ed. by M Ryan Bochnak and Lisa Matthewson, chap. 7, 175–203. Oxford: Oxford University Press.

GROSU, ALEXANDER, and KOJI HOSHI. 2018. On the unified analysis of three types of relative clause construction in Japanese, and on the salient reading of the internally headed type. a reply to erlewine & gould (2016). *Glossa: a journal of general linguistics* 3.

GROSU, ALEXANDER, and FRED LANDMAN. 2012. A quantificational disclosure approach to Japanese and Korean internally headed relatives. *Journal of East Asian Linguistics* 21.159–196.

HASTINGS, RACHEL ELIZABETH. 2004. *The syntax and semantics of relativization and quantification: The case of Quechua.* Cornell University dissertation.

HOSHI, KOJI. 1995. *Structural and interpretative aspects of head-internal and head-external relative clauses.* University of Rochester, PhD dissertation dissertation.

KIM, MIN-JOO. 2004. *Event-structure and the internally-headed relative clause construction in Korean and Japanese.* UMass Amherst dissertation.

KITAGAWA, CHISATO. 2019. The pro-head analysis of the Japanese internally-headed relative clause. *Glossa: a journal of general linguistics* 4.

KOTEK, HADAS, and MICHAEL YOSHITAKA ERLEWINE. 2016. Unifying definite and indefinite free relatives: Evidence from Mayan. *Proceedings of NELS*, vol. 46, 241–254.

MORONEY, MARY. 2018. Interpretation of internally-headed relative clauses in Shan. *Proceedings of the 44th Berkeley Linguistics Society Annual Meeting (BLS)*, 197–212.

SHIMOYAMA, JUNKO. 1999. Internally headed relative clauses in Japanese and E-type anaphora. *Journal of East Asian Linguistics* 8.147–182.

WILLIAMSON, JANIS. 1987. An indefiniteness restriction for relative clauses in Lakhota. *The representation of (in) definiteness*, 168–190.

Externally Headed Relative Clauses (EHRCs)

- EHRCs in Yǔn Shan can have quantificational material outside (14) or inside (4) the relative clause.

(14) Nan Lǐ cǐn pěn **màmɔ̂ khɯŋ** [ʔǎn Saj Kham pɤ̀k nâj].
    Nan Li eat up apple half COMP Saj Kham peel this
    'Nan Li ate up half the apples that Saj Kham peeled.'

    - Apples S.K. peeled: apples
    - Apples N.L. ate: half of the peeled apples

(4) Nan Lǐ cǐn pěn **màmɔ̂** [ʔǎn Saj Kham pɤ̀k **sǎam hwí**
    Nan Li eat up apple COMP Saj Kham peel 3 CL.RND
   nâj].
    this
    'Nan Li ate up apples that Saj Kham peeled of which there are
    three.'
    - Apples S.K. peeled: 3

    - Apples N.L. ate: some of the peeled apples

- We can incorporate the internal into the semantics by having the the raised head or operator trace to be type $\langle e, t \rangle$ instead of e.

(15)
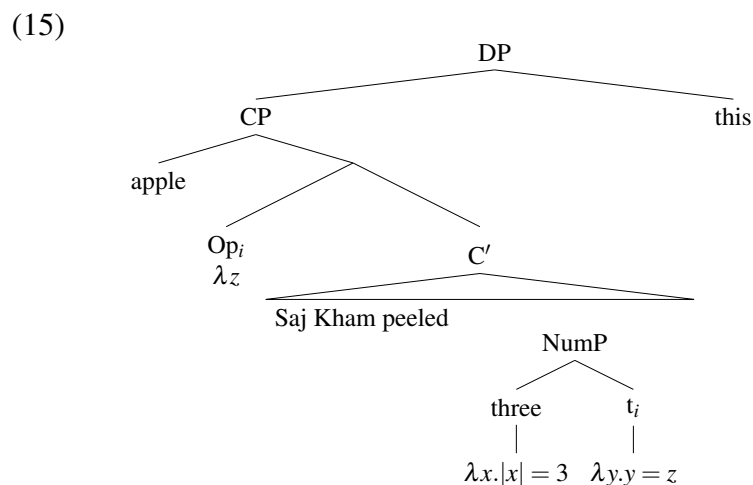
Alternative Analysis

- Instead of covert movement to topic position, change the quantifier to be a relation between sets rather than a predicate.

- This allows for the denotation of the IHRC to contain atomic entities in addition to sums.

- This would require that the set measure function to count the number of unique atoms that the set contains.

- The structure of the IHRC in (2) can be seen in (16).
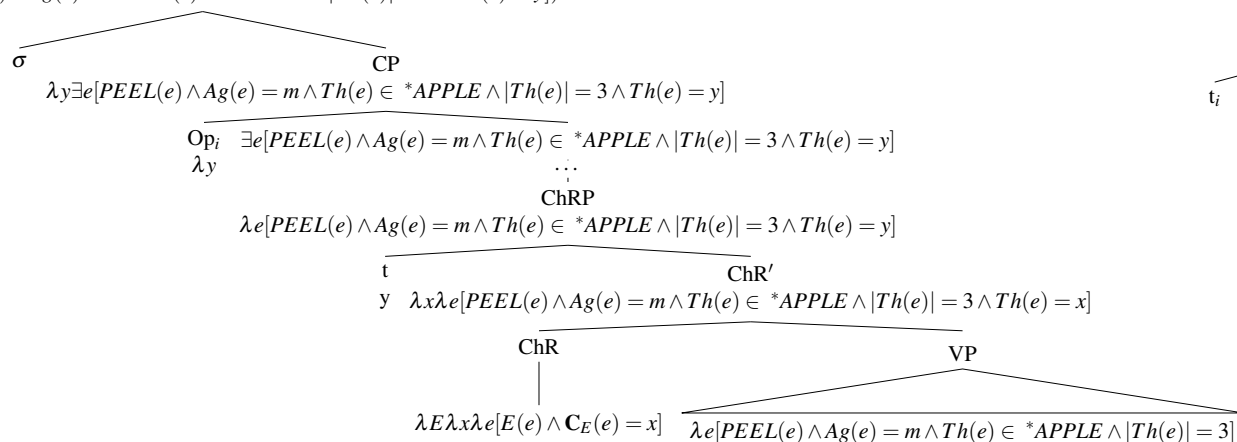
(16)
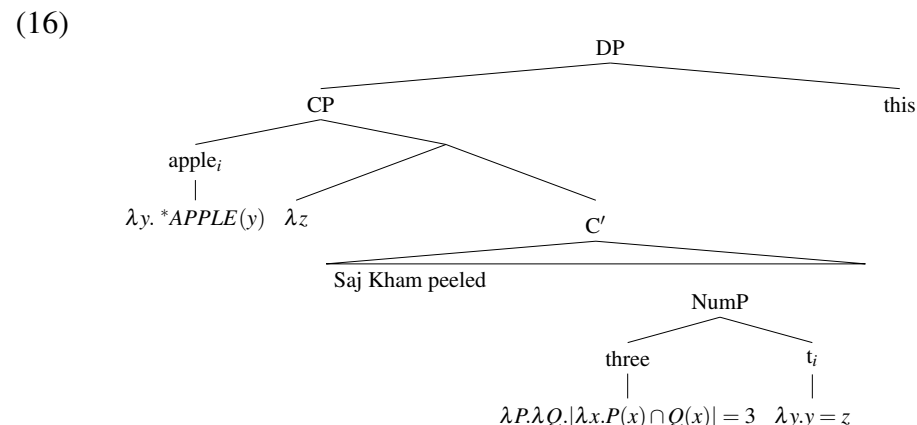
- If the head raise, this allows for a uniform analysis of Shan IHRCs and EHRCs: the head moves covertly or overtly.

- In Southern Shan, covert head movement is not possible.

- The apparent topical IHRCs would then be subordinate clauses where the 'head' is anaphorically retrieved in the main clause.
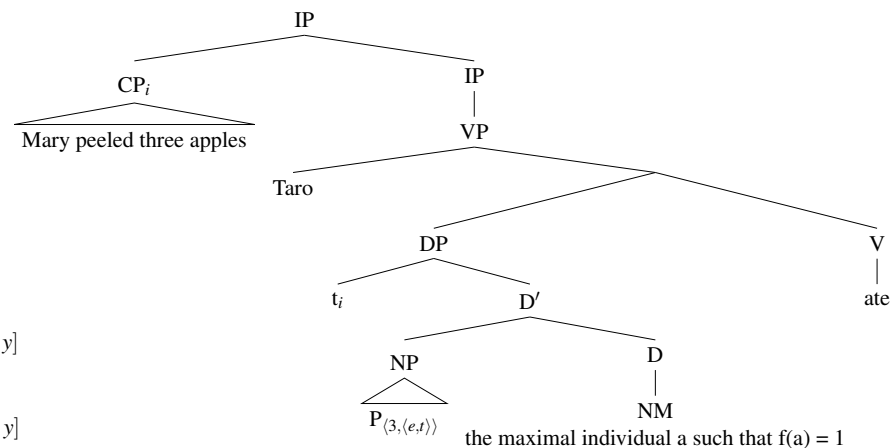
A Trees

S

G&L

$\sigma(\lambda y \exists e[PEEL(e) \wedge Ag(e) = m \wedge Th(e) \in {}^*APPLE \wedge |Th(e)| = 3 \wedge Th(e) = y])$

σ

CP
$\lambda y \exists e[PEEL(e) \wedge Ag(e) = m \wedge Th(e) \in {}^*APPLE \wedge |Th(e)| = 3 \wedge Th(e) = y]$

Op_i λy $\quad \exists e[PEEL(e) \wedge Ag(e) = m \wedge Th(e) \in {}^*APPLE \wedge |Th(e)| = 3 \wedge Th(e) = y]$

. . .

ChRP
$\lambda e[PEEL(e) \wedge Ag(e) = m \wedge Th(e) \in {}^*APPLE \wedge |Th(e)| = 3 \wedge Th(e) = y]$

t
y

ChR′
$\lambda x \lambda e[PEEL(e) \wedge Ag(e) = m \wedge Th(e) \in {}^*APPLE \wedge |Th(e)| = 3 \wedge Th(e) = x]$

ChR

VP

$\lambda E \lambda x \lambda e[E(e) \wedge \mathbf{C}_E(e) = x]$ $\quad \lambda e[PEEL(e) \wedge Ag(e) = m \wedge Th(e) \in {}^*APPLE \wedge |Th(e)| = 3]$

IP

CP$_i$

Mary peeled three apples

IP

VP

Taro

DP

V

t_i

D′

ate

NP

D

$P_{\langle 3, \langle e,t \rangle \rangle}$

NM
the maximal individual a such that f(a) = 1

E&G

DP
$THE(\lambda X[\exists y[peeled(m,y) \wedge y \sqsubseteq X \wedge {}^*APPLE(y) \wedge |y| = 3] \wedge {}^*APPLE(X)])$

D
$\lambda X[\exists y[peeled(m,y) \wedge y \sqsubseteq X \wedge {}^*APPLE(y) \wedge |y| = 3] \wedge {}^*APPLE(X)]$

NP

THE

NP
$\lambda y[{}^*APPLE(y)]$

CP
$\lambda X[\exists y[peeled(m,y) \wedge y \sqsubseteq X \wedge {}^*APPLE(y) \wedge |y| = 3]]$

λX $\quad \exists y[peeled(m,y) \wedge y \sqsubseteq X \wedge {}^*APPLE(y) \wedge |y| = 3]$

. . .

DP
$\lambda y[y \sqsubseteq X \wedge {}^*APPLE(y) \wedge |y| = 3]$

NP
$\lambda y[y \sqsubseteq X \wedge {}^*APPLE(y)]$

three
$\lambda x[|x| = 3]$

NP
apple
$\lambda x[{}^*APPLE(x)]$

$\lambda y[y \sqsubseteq X]$