Relative clauses; interactions with modals and definite article choice in Fering and Akan

Keny

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Summary

➤ In this talk, I will present a semantics for relative clauses that bring them closer to anaphora semantics.

➤ I propose to use this semantics to address 2 phenomena: intensional relative clauses and article choice in Fering and Akan.

1 Intensional Relational Clauses

In this section, I propose an alternative account to Grosu and Krifka (2007)'s classical account of **I**ntensional **R**elative **C**lauses such as (1) and (2).

(1) a. The gifted mathematician that the winner of the tournament **certainly** is **would** solve this problem in no time.

    b. The brilliant engineer that this incoming employee **might** turn out to be **would** prove invaluable to the company.

(2) a. The statement of purpose I **have to** write for this job **has to** contain a lengthy praise of the CEO's leadership.

    b. The letter of recommendation she **might** end up writing for me **might** help me get the job.

1.1 The path to Grosu & Krifka

- The standard analysis of relative clauses (as in Heim and Kratzer (1998)) assume that RCs denote properties of individuals (type et), derived by the movement of an operator to Spec(**CP**).

(3) OP (that/which/∅) λx_e. I read O̶P̶ $\rightarrow x$

- This classical account cannot extend to the case in (1a), repeated below.

(4) **Context:** *The results of the tournament are out but we didn't have time to consult them. We're wondering who can help us figure out some tough problem.*

The gifted mathematician that the winner of the tournament **certainly** is **would** solve this problem in no time.

(5) $[\![(4)]\!] = \lambda x.$ **certainly**$^{\mathrm{w}}$[the winner of the tournament$_{\mathrm{w}}$ is x]$=\varnothing$

(**standard approach**)

- If there is no individual known to have won the tournament, the noun phrase has an empty denotation.

- However, sentences like (1a) are fine, if not natural. Intuitively, they make the following contribution:

(6) The winner of the tournament -*whoever he is*- is certainly a gifted mathematician.
He would solve this problem in no time.

- The problem seems to stem from the fact that in (5), the variable x cannot *co-vary* with the world variable w that the modal contributes.

1.2 My analysis

1.2.1 The gist of the analysis

(7) a. The paper you have to write has to be more than 50 pp long.

    b. *in the deontically accessible worlds, there is only one book written.*

(8) a. Patricia has$^{\mathbf{w}}$ to submit [**the** semantic paper she writes]$_{\mathbf{w}}$ through Stellar.

    b. *in the deontically accessible worlds, there is only one semantic paper written.*

- Comparing (7a) and (8a): when there is no intensional RC, and the DP is interpreted in the scope of the modal the presupposition arises naturally: the uniqueness is evaluated wrt each world being quantified over.

(9) Patricia has$^{\mathbf{w}}$ to submit [**the** semantic paper]$_{\mathbf{w}}$ through Stellar.
$\rightarrow$ *for every accessible world w, is there a unique semantic paper x?*

- An analysis would therefore be to exploit this fact to create the uniqueness presuppositions.

- **Idea:** Evaluate uniqueness in the scope of the matrix modal.

- For that to be possible, the definite has to be interpreted under the scope of the matrix modal.

- This raises an issue: the RC cannot be interpreted under the scope of the modal. Otherwise, one would either get a "chained modal" meaning akin to what we get in (10).

(10) **Context:** *I am a spy trying to get info about the godfathers of Léon, a minor mobster. Any order given to him is a clue to what his superiors might be up to.*
I have$^{\text{w}}$ to report on any letter Léon has$_{\text{w}}$ to write.

- **Idea:** Evaluate the RC outside the scope of the matrix modal.
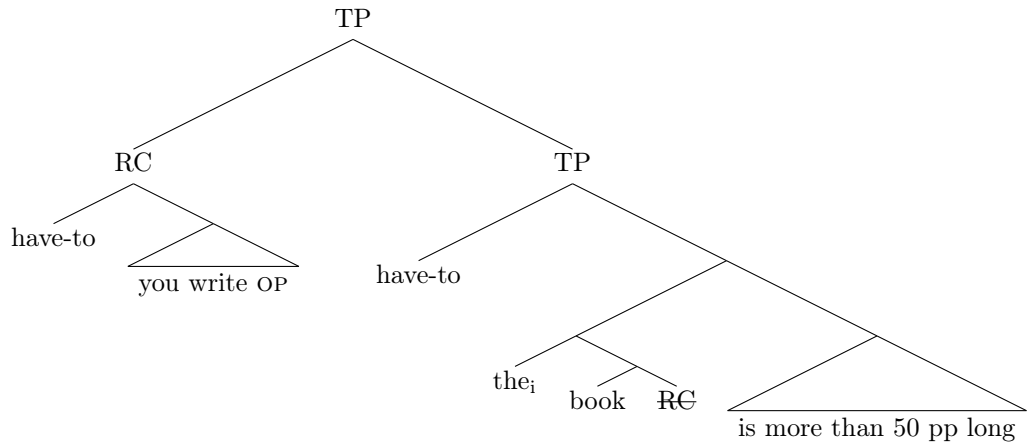
- (Set aside interpretation issues for now)

- This structure avoids **chained modal meaning** while enforcing **uniqueness** ; that is the *desideratum*.

- Next section sets up the dynamic fragment that can interpret the above structure.

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1.2.2   The dynamic fragment

- **Dynamic Semantics**

  - Contexts are sets of assignments.
  - Sentences are **context-change potentials**, i.e. function from contexts to contexts.

(11)   A woman[i] t_i walked in. She[i] ordered a beer.

(12)   a. $\varnothing$

     b. $\{g \mid g(i) \text{ is a woman}\}$

     c. $\{g \mid g(i) \text{ is a woman who walked in}\}$

     d. $\{g \mid g(i) \text{ is a woman who walked in and ordered a beer}\}$

  - Syntax will make sure that predicates only combine with traces and pronouns by QR. (not necessary)

- **Syntax**

  - **N** heads come in two flavours: *new* and *old*. The *new* heads have a referent-introducing operator **[i]**. ([±def] in Irene's presentation)
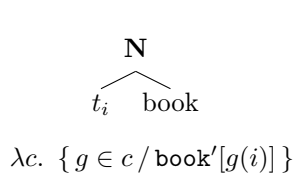

$$\lambda c. \ \{ \, g \in c \, / \, \texttt{book}'[g(i)] \, \}$$

Figure 1: *old* **N** heads

$$\lambda c. \ \{ \, g' \, / \, g' = g^{[i \mapsto x]}, \ g \in c, \ \texttt{book}'[g(i)] \, \}$$
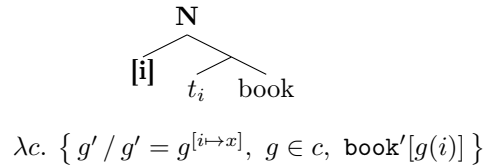
Figure 2: *new* **N** heads

  - To simplify, "[t_i book]" will be written as "book$_i$"
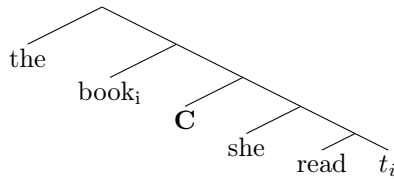 - Relative clause arise from matching or raising structures:

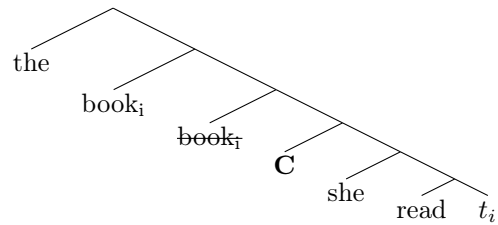Figure 3: *raising* structure

Figure 4: *matching* structure

Illustrated with *old* **N** heads.

  - Whichever **N**-head has moved can optionally reconstruct.

– When a constituent **AP** reconstructs to a position **P**, the higher elements of the chain are deleted or ignored for the semantics, and the trace in position **P** is replaced with **AP**.
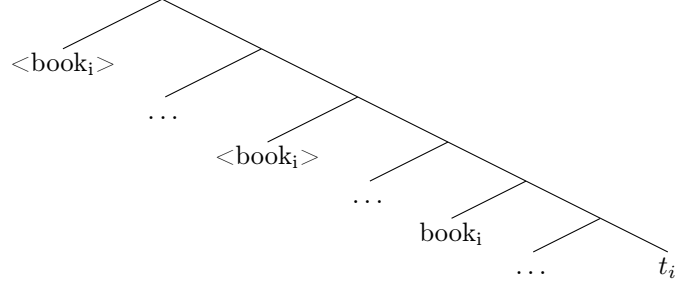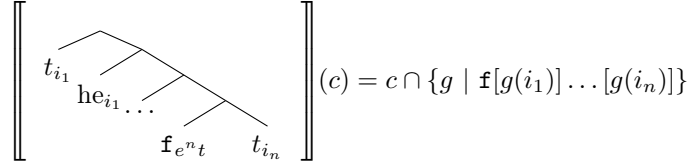

Figure 5: Reconstructing up to a certain point
$<$**N**$>$ means that **N** is ignored in the semantics.

- **Syncategorematic rules**
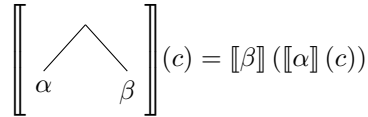
  ➢ **Predicates.**

$$\left[\!\!\left[\begin{array}{c} t_{i_1} \\ \text{he}_{i_1} \ldots \\ \mathtt{f}_{e^n t} \quad t_{i_n} \end{array} \right]\!\!\right] (c) = c \cap \{g \mid \mathtt{f}[g(i_1)]\ldots[g(i_n)]\}$$

(13) $[\![t_i \text{ mother-of her}_j]\!] (c) = \{g \in c \mid g(i) \text{ is the mother of } g(j)\}$
   $\hookrightarrow$ *select from c the assignments in which g(i) is the mother of g(j)*

  ➢ **CCP conjunction.**

$$\left[\!\!\left[\begin{array}{cc} \alpha & \beta \end{array} \right]\!\!\right] (c) = [\![\beta]\!] \left([\![\alpha]\!] (c)\right)$$

  where α and β are *context-change potentials* (type $\omega\omega t$).

  ➢ **Introducing Discourse Referents.**
  $[\![[i]\ \alpha]\!] (c) = [\![\alpha]\!] (c')$
  where $c' = \left\{ g^{[i \to x]} \mid g \in c,\, x \in D_e,\, i \notin g \right\}$

6

(14)   a.   A woman came in. She sat.

    b.   [i] ; t_i woman ; t_i came in ; she$_i$ sat.

    c. $c' = \left\{ g^{[i \to x]} \;\middle|\; \begin{array}{l} \texttt{woman}'(x) \\ \texttt{came-in}'(x) \\ \texttt{sat}'(x) \end{array}, g \in c \right\}$

    ➢ **Uniqueness Tests.**
    $[\![\text{the}_i\ \alpha]\!]\,(c) = \bigcup \{ \mathcal{C} \in ([\![\alpha]\!]\,(c) : =_i) \mid \mathcal{C}(i) \text{ is a singleton}\}^1$

- The last rule deserves some unpacking. We want to test for uniqueness of a referent introduced by a **[i]**.

  - If "*the* **DP**" does not contain any reference to other elements in the discourse (e.g *the moon*):
    1. introduce **i**
    2. update it with "t_i *moon*"
    3. check whether each assignment in the new context C assigns the same value to **i** (i.e. $C(i)$ is a singleton)
  - But what if "*the* **DP**" is dependent on some discourse object (e.g. *her$_i$ book*)?
  - As the referent assigned to *her$_i$* may vary from assignment to assignment, so varies the referent of *her$_i$ book*.
  - $C(i)$ in 3. is not unique
  - A more appropriate procedure checks whether the referent assigned is unique, **all other referents being kept equal**.

- This allows interpretation of simple matching RCs as in fig. 6. The procedure goes as follows:

  1. introduce a discourse referent associated with i and select assignments where $g(i)$ is a book.
  2. select assignments where $g(i)$ is a book. *(vacuous)*
  3. select assignments where $g(j)$ read $g(i)$.
  4. keeping values for $g(j)$ constant, check whether $g(i)$ receives a single value.

- Here, we've been working with *partial assignments*. This allows us to formulate **Novelty Condition** as a presupposition on the meaning of the operator **[i]**: don't overwrite indices!

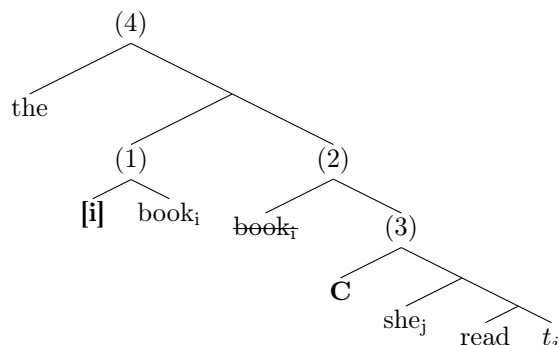[1] If E is a set and $\equiv$ an equivalence relation, I call $(E :\equiv)$ the set of its equivalence classes: the set of set

Figure 6: Interpreting RCs

- The **Novelty Condition** also entails that in the matching structure, only the first noun can be *new*.

  $\checkmark$ $\text{book}_i \ldots \text{book}_i$ $*$ $\text{book}_i \ldots \textbf{[i]} \text{book}_i$
  $\checkmark$ $\textbf{[i]} \text{book}_i \ldots \text{book}_i$ $*\textbf{[i]} \text{book}_i \ldots \textbf{[i]} \text{book}_i$

- Except if for some reason, the RC (which contains the second noun) has moved before the DP.

  $\text{book}_i \ldots \textbf{[i]} \text{book}_i$ $(\checkmark)$

- To deal with cases of modal subordination/paycheck dependencies, I'll have to enrich the fragment with the **Van den Berg** innovation (see Brasoveanu (2007) for a complete spell-out of this idea).

  - So in truth, we'll be working with sets of assignments instead of simple assignments.
  - I gloss over the technical details but there is an important point: quantifiers like *every* or modals project referents introduced in their scope.

(15) I must^j write a book$_i$.

Standard view: $\varnothing \longrightarrow \varnothing$

VDB view: $\varnothing \longrightarrow \left\{ \begin{array}{ll} i \mapsto b_1 & j \mapsto w_1 \\ i \mapsto b_2 & j \mapsto w_2 \\ \ldots & \end{array} \right.$

 - Further quantifiers may then distributively quantify over this set as in (16).

(16) You have[j] to write a book[i]. It[i] has[j] to be very good.

# Main features of the fragment

- ➤ **N** heads introduce referents, depending on whether they're *new* or *old*.
- ➤ *the* tests for uniqueness directly on the **context set**.
- ➤ RCs conform to standard assumptions in syntax.
- ➤ VDB was introduced to deal with cases of modal subordination.

1.2.3 Interpreting extraposition

- Let's focus on RCs with the following **matching structure**:

DP
the$_i$
book$_i$ CP
[i] book$_i$ C
I read t_i
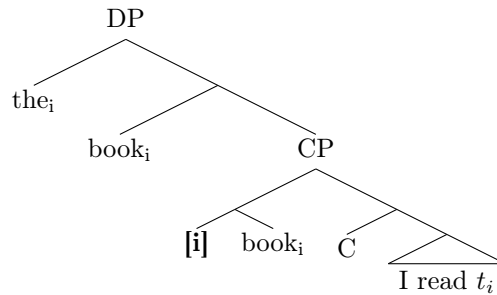
- The RC can then be extraposed (preposed really). I assume this extraposition doesn't leave any trace. (Or that the trace is "converted" to nothing.)

CP
[i] book$_i$ C
I read t_i
. . . DP
the$_i$ book$_i$
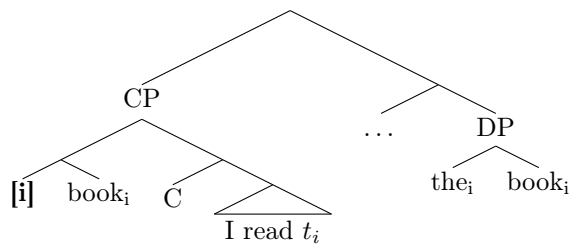
- This movement operation has no effect whatsoever in interpretation.

- But it is useful in the case of **intensional RCs**:

  - Assume **intensional RCs** are extraposed and that the noun is reconstructed.

CP

⟨**N**⟩
[i] book$_i$ C (3)

have-to^j

(1)
N
[i] book$_i$

(2)
I write t_i

(4)

have-to^j

(5)
DP
the$_i$ book$_i$

(6)
t_i be less than 50pp long
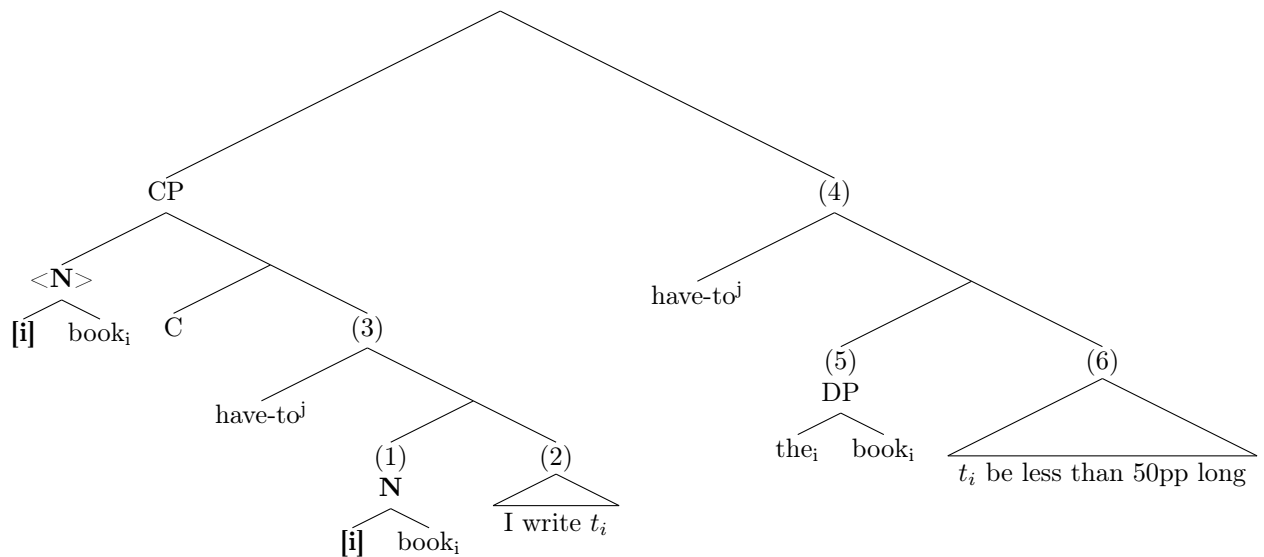
- The interpretation runs as follows:

  1. introduce a discourse referent associated with i and select assignments where $g(i)$ is a book.

  2. select assignments where I write $g(i)$.

  3. pair each accessible world with the $g(i)$ evaluated as above.

     Result: *a set of assignments where $g(j)$ is an accessible world and $g(i)$ the book I write in that world.*

  4. distribute over values in $g(j)$

  5. over these distributed values, check that $g(i)$ has a unique value throughout the context set.

  6. select assignments in which $g(i)$ is less than 50pp long

- **Result:** The uniqueness is tested in each individual world, and the referent is introduced outside the scope of the matrix modal.

Results and Predictions

➤ The present framework derives the uniqueness effect without resorting to *ad hoc* operators.

➤ All the mechanics here is standard and is used for simple RCs as well, to the exception maybe of covert RC movement.

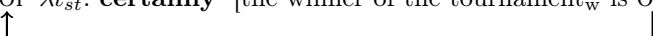➤ As a preliminary justification, cases of overt RCs do exist (to the right though)

- ➤ Another prediction is that the *De Re* reading only arise when there is reconstruction. Evidence from Hebrew suggests this is the case (Bassi and Rasin, submitted).

- ➤ This connects intensional RC with cases of *modal subordination.*

- ➤ The prediction is that every time it is possible to form a modal subordination dependency, an intensional RC should also be possible.

(17) a. I have to bake a cake. It should contain some fruits.

    b. The cake I have to bake should contain some fruits.

(18) a. A wolf may come in. It would eat you first

    b. The wolf that may come in would eat you first.

## 1.3 Comparison with G&K's account

- To solve the problem, Grosu and Krifka (2007) assume that the relative clause operator OP can abstract over **individual concepts** (functions from worlds/situations to individuals).

(19) OP $\lambda\iota_{st}$. **certainly**$^{\mathrm{w}}$[the winner of the tournament$_{\mathrm{w}}$ is OP $\rightarrow \iota(w)$]

- That way, the co-variation between the variable and the modal inside the RC is captured.

- In this set-up, the definite description will end up denoting denoting an individual concept, not an individual. (Type-shifting ensures that individual concepts can act as arguments).

- In this approach, there is a problem in getting the uniqueness presupposition right.

(20) a. The brilliant engineer that this incoming employee **might** turn out to be **would** prove invaluable to the company.

    b. $[\![\mathrm{NP+RC}]\!] = \lambda\iota.\,\exists w \in \mathbf{Epis},\, \iota(w) = \mathtt{employee}'(w) \wedge \mathtt{b\text{-}engin.}'(\iota(w))(w)$
       individual concepts that coincide with the incoming employee and are brilliant engineers in one epistemically accessible world.

(21) Accessible worlds for *might* in (20a).

$$w_1 \quad w_2 \quad w_3 \quad w_4 \quad w_5$$
$$\boxed{e_1} \quad e_2 \quad \boxed{e_2} \quad \boxed{e_3} \quad e_4$$
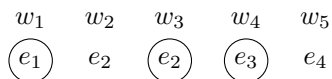
(22) Individual concepts that satisfy the description.

$$\iota_1 \qquad\qquad \iota_2 \qquad\qquad \iota_3 \qquad\qquad \iota_4$$

$$\left\{ \begin{array}{ccc} w_1 & \mapsto & e_1 \\ w_3 & \mapsto & e_2 \\ w_4 & \mapsto & e_3 \end{array} \right. \qquad \left\{ \begin{array}{ccc} w_3 & \mapsto & e_2 \end{array} \right. \qquad \left\{ \begin{array}{ccc} w_1 & \mapsto & e_1 \\ w_4 & \mapsto & e_3 \end{array} \right. \qquad \left\{ \begin{array}{ccc} w_1 & \mapsto & e_1 \\ w_3 & \mapsto & e_2 \\ w_{56} & \mapsto & e_{37} \\ w_{128} & \mapsto & e_{89} \end{array} \right.$$
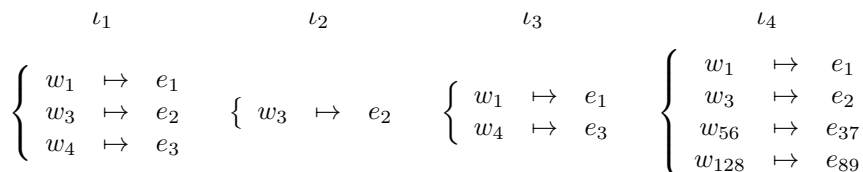
- Grosu & Krifka employed two operators to ensure that uniqueness is satisfied: **min** and $\cup$.

(23) **the** $[\ \cup\ $**min** gifted-math.$'$ $[\ \lambda\iota.$ you may become $\iota\ ]\ ]$

- These operators get the meaning right but they do not have any use outside of the functional RCs Grosu& Krifka is studying. At best, they are generalization of operators one can find in the literature.

- This begs a learnability issue: how would one ever realize the need for those operators? The structures under study have essentially 0 frequency.

Conclusion

➢ The present framework derives the uniqueness effect without resorting to *ad hoc* operators.

➢ All the mechanics here is standard and can be used for simple RCs as well, to the exception maybe of covert RC movement.

➢ As a preliminary justification, cases of overt RCs do exist (to the right though)

➢ The hope was to extend it to Sharvit's cases ; I was not super sucessful at that.

➢ Part of the reason has to do with singling out what makes *every* so special in allowing those readings. Several options:

- Only distributive quantifiers Pair-List readings.
- Only distributive quantifiers may bind inter-sententially.

2 D- and A-determiners

The possibility of covertly extraposing needs justification. In this section, I show how it can explain some patterns observed in languages with D/A distinction.

2.1 D/A languages and RCs

- Some languages have two forms for the definite article:

  A-form radically unique descriptions, uniqueness in the topic situation, referent-introducing, . . .

  D-form anaphoric

- Languages reported to have this difference: Fering, Austro-Bavarian, Swiss German, Standard German (Germanic), Akan (Niger-Congo), Hausa (Chadic), Haitian, Mauritian Creole (French-based creoles), and others.
  (Schwarz (2012), Wespel (2008), Arkoh (2011))

- The **A-form** denotes objects presupposed to be unique in the relevant situation ; they can appear out of the blue.

(24) *A   köning kaam   tu bishück*
      The king   comes to visit

      "*The king comes to visit.*"

                                                          (Fering, Ebert (1971b))

(25) *Amstrɔŋ   nyi nyimpa aa   odzii   kan tuu*
      Armstrong is   person REL 3SG.SUBJ-eat-PAST first fly-PAST

      kɔɔ   ∅ ɔsiran dʊ
      go-Past ∅ moon TOP

      "*Armstrong was the first person to go to ∅ moon.*"
                                          (Akan, Arkoh and Matthewson (2013))

- The **D-form** is used to refer to objects that were mentioned in the discourse[2].

(26) *Oki hee an hingst keeft.   Di/*A   hingst haaltet.*
      Oki has a   horse bought. The(**D/*A**) horse is-lame(?).

      "*Oki bought a horse. The horse is lame.*"

                                                          (Fering, Ebert (1971a))

_____

[2]Ask me for a more complete description of the contexts of use.

(27) *Mʊtɔɔ*   *ekutu. Ekutu   nʊ   yɛ dɛw papa*
      1SG.SUBJ-buy-PAST orange. Orange NU be nice good

      "*I bought an orange. The orange was really tasty*"
                                                    (Akan, Arkoh (2011))

- These two language differ wrt to article choice in RCs.

- First-mention relative clauses in **Fering can** (but need not to) take a
  D-form, even if there is no antecedent in the previous discourse.

(28) *Det/At*   *iast bik, wat hi skrewen hee, docht   niks.*
      The$_D$/The$_A$ first book REL he written has be-worth nothing.

      "*The(**D/A**) first book he wrote he wrote is no good.*"
                                                    (Fering, Ebert (1971a))

- First-mention relative clauses in **Akan cannot** take a D-form.

(29) **Context:** *Esi visits her friend Ama. In conversation, Ama utters:*
      Esi fa   bankyi nʊ aa   ogu   kɛnstɛn mu nʊ bra.
      Esi take cassava NU that it-pour basket   in   NU come.

      ?? "*Esi, bring the cassava that is in the basket.*"
                                                    (Akan, Arkoh and Matthewson (2013))

- (Standard German and dialects go in neither of those two categories, ask
  me for details.)

- **Recap of the pattern**

  - Akan and Fering have two forms for the definite article: the A-form
    (*at*, ∅) encodes uniqueness in the discourse situation, the D-form
    encodes anaphoricity (*det*, *nʊ*).
  - Paradoxically, Fering can use a D-form in a non-anaphoric way in the
    presence of a (restrictive) RC.
  - Akan does not show any change of behaviour with RCs.

- **Goal:** Derive these two patterns of languages from the semantics introduced
  above.

2.2 Modeling the D/A distinction

Idea in a nutshell

- ➤ Akan A/D distinction transparently reflects uniqueness/anaphoric distinction.

- ➤ Fering A/D distinction tracks new vs. old discourse markers.

- ➤ Since these two distinctions often go hand in hand, Akan and Fering pattern together in most cases.

- ➤ The contrast surfaces (only?) in RC.

2.2.1 Two definite articles

- The uniqueness definite article, which signals uniqueness and correlates with discourse referents introduction (e.g. *new* **N**), is the item *the* we've looked at in the previous section.

- The anaphoric definite article has not been accounted for yet. Semantically, it seems to behave as a pronoun.

- **Semantic Assumptions**

  - **Uniqueness Tests.**

    $[\![\text{the}_i^{uniq}\ \alpha]\!](c) = \bigcup \{\mathcal{C} \in \{[\![\alpha]\!](c) : =_i\}\ /\ \mathcal{C}(i) \text{ is a singleton}\}$

    (repeated from previous section)

  - **Context Tests.**

    $[\![\text{the}_i^{ana}\ \alpha]\!](c) = \begin{cases} c & \text{if } [\![\alpha]\!](c) = c \text{ } \underline{(\text{and } i \in c)} \\ \varnothing & \text{else} \end{cases}$

  - In principle, we now have 4 possibilities (uniqueness/anaphoric article, new/old N head):

    $\text{the}_i^{uniq} \ldots \textbf{[i]}\ \text{N}_i \quad \text{the}_i^{ana} \ldots \textbf{[i]}\ \text{N}_i$
    $\text{the}_i^{uniq} \ldots \text{N}_i \qquad \text{the}_i^{ana} \ldots \text{N}_i$

  - We want to enforce a correlation between **noun novelty** and **article choice**.

    1. How do we make sure that *new* **N** heads do not appear in the scope of D-articles?

       We can hardwire a **non-novelty** condition in the meaning of the determiner. (This may not be required.)

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2. How do we make sure that *old* **N** heads do not appear in the scope of A-articles?

   This needs to be ruled out in the syntax, as below. (This may also not be required.)

- **Syntactic Assumptions**

  - The following constraint forces A-articles to co-occur with *new* **N** heads (may be seen as an agree requirement).
    A-articles have to have co-indexed new ***N** in their scope.*

2.3   Applying the model

- I propose to account for the difference in patterns between Akan and Fering in the following way:

  - Akan has different forms for uniqueness/anaphoric definite articles.

(30)
underlying form	the$^{\text{ana}}$ **NP**	the$^{\text{uniq}}$ **NP**
SPELL-OUT	nʊ	∅

  - Fering has different articles forms depending on whether it combines with a *new* or an *old* head.

(31)
underlying form	the **NP**$_{\text{old}}$	the **NP**$_{\text{new}}$
SPELL-OUT	D-form	A-form

- In most cases, this turns out to be similar since *uniqueness/anaphoric* articles co-occur with *old* and *new* heads (see assumptions above).

- This explains why the article choice in Fering and Akan is **the same outside RCs**.

- Difference starts to appear when one looks at restrictive RCs. Assume that RCs have the possibility to covertly extrapose, as in last section.

- With covert extraposition, the following derivation is possible:

- When this extraposition movement occurs, the second head noun inside the CP <u>must</u> be the *new* head (because of the **Novelty Condition**).

- In Akan, the choice of the article is tied to the semantics, this extraposition will have no impact on the choice of the article.

- In Fering, the choice of the article depends on whether the head is *new* or *old*. The extraposition forces the noun selected by the determiner (the first noun) to be *old*. This forces a D-article.

- Since the extraposition movement is optional, so is the choice of the D-article in Fering.
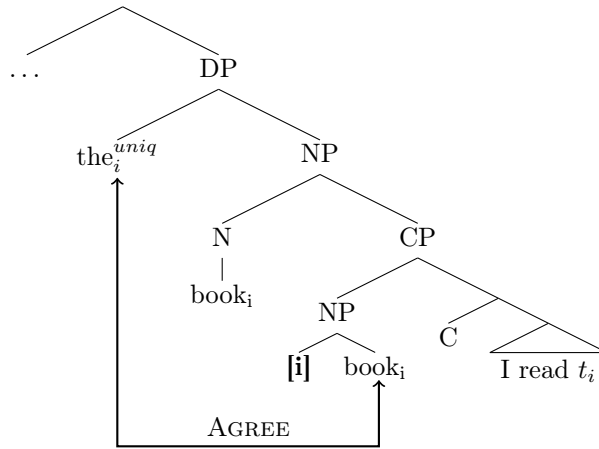
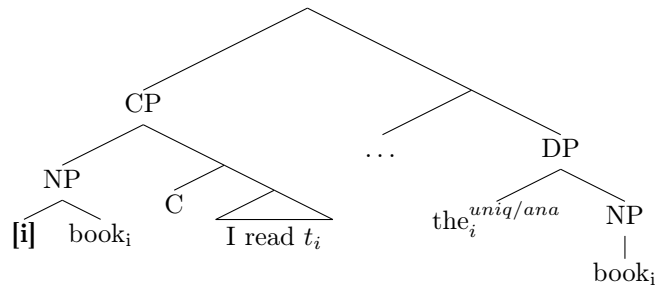Figure 7: Licensing of an *uniqueness* determiner

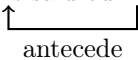Figure 8: Extraposition: the article can be *anaphoric*, even if it combines with an *old* **NP**
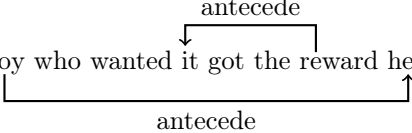
3 Conclusion and open issues

3.1 The message here

➤ I presented a framework that allows to keep our semantics of RC uniform, even in seemingly higher-type RCs (as studied in Grosu and Krifka (2007)).

➤ The semantics relies on properties of dynamic conjunction: in effect, a relative clause is interpreted pretty much as a separate conjoined sentence (except for uniqueness tests).

➤ The cost of this analysis is to assume a covert extraposition mechanism.

➤ I propose to justify this mechanism by studying languages that are sensitive to **noun novelty**.

3.2 Challenges and improvement

- The covert extraposition mechanism has some issues.

  - The movement is "to the left", unlike the overt extraposition mechanism.
  - The movement creates more possibilities of *cataphoras*. Cataphoras are possible but limited in their distribution.
  - In particular, it is not clear that they are tied to the presence of a RC (see (32)).

(32)   All the customers who had it said our ice-cream is the best.

antecede

  - In deriving Bach-Peters sentences (below), this proposal seems to get the presupposition wrong.

antecede

(33)   The boy who wanted it got the reward he deserved.

antecede

- **How to get rid of covert extraposition?**

  - Within VDB's system, one can rewrite the uniqueness test so that it applies even when the whole DP is outside the scope of the modal. The results seem more satisfactory for the following case.

(34)   [The paper I have to write]$_i$ can t_i be less than 50pp long.

  - Given that, how are we to get the Fering/Akan difference? This relied on the possiblity of covert extraposition
  - Bhatt (2002) suggests the correct structure for **raising relatives** is not (35) but (36).

(35)   [$_{NP}$ [book]$_N$ [$_{CP}$ which ~~book~~ C [I read ~~book~~]]]

(36)   [$_{XP}$ [book]$_{NP}$ X^0 [$_{CP}$ which ~~book~~ C [I read ~~book~~]]]

  - If I'm right about Fering being sensitive to features on the head of its complement, and Bhatt (2002) is right about the correct structure of RCs, then the article choice all depends on what features the X head bears.
  - To be continued with more data. . .

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