German relative clauses and the severed index hypothesis*

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1 Introduction

- The German definite article may contract with a preceding preposition under certain conditions:

(1) a. Hans ging **zum** Haus.
Hans went to+the house
'*Hans went to the house*.'

b. Hans ging **zu dem** Haus.
Hans went to the house
'*Hans went to the house*.' (Schwarz 2009)

  - The contracted form is called "weak" (1a).
  - The non-contracted form is called "strong" (1b).
  - Schwarz (2009): The weak form is required when an NP's referent is *unique*, while the strong form is required when it is also *anaphoric*, i.e., when it refers back to an antecedent.

- **Problem**: As Schwarz (2009) points out, restrictive relative clauses likewise require the use of the strong form, both in the matrix (*in dem*) and relative clauses (*von dem*):

(2) Fritz wohnt jetzt {**in dem**, #**im**} Haus, {**von dem**, ***vom**} er schon seit Jahren schwärmt.
Fritz lives now in the in+the house, from the from+the he already since years raves
'*Fritz now lives in the house that he has been raving about for years*.'

  - Restrictive relative clauses do not appear prima facie to constitute instances of anaphora.
  - This puzzle poses a challenge for the generalization that anaphoric uses require the strong form.

- **Proposal**: The strong form of the article selects for an index-hosting head (*idx*) that intervenes between D and N (cf. Schwarz 2009). This index:
  - is bound in the relative clause, just like in other instances of anaphora (*inner index*).
  - acts itself as a *binder* in the matrix clause, binding the variable in the lower DP (*outer index*).

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Outline of this talk

- Distribution of the strong and weak forms
- Proposal for cross-sentential anaphora
- Extension to relative clauses
- Morphological evidence for the structural presence of *idx* from the modifier *same*

2 Distribution of strong and weak forms

2.1 Strong form: anaphoric uses

- Anaphora: *indefinite antecedent*[1]

(3) Fritz wohnt seit Jahren in einem groβen Haus. Er schwärmt immer noch **von**
Fritz lives since years in a big house. He raves always still from
dem/#vom Haus.
the/from+the house
'*Fritz has lived in a big house for years. He still raves about* ***the house***.'

- Restrictive Relative Clauses

(4) Fritz wohnt jetzt **in dem/#im** Haus, **von dem/*vom** er immer noch schwärmt.
Fritz lives now in the/in+the house from REL he always still raves.
'*Fritz is now living in* ***the house*** *he's still raving about*.'

– Not accounted for in Schwarz (2009), but see Simonenko (2014, 2015) for a non-anaphoric explanation of the use of the strong form in the matrix clause based on Wiltschko (2013).

2.2 Weak form: unique uses

- Immediate situation uses (Hawkins 1978)

(5) Das Buch, das du suchst, steht **im/#in dem** Glasschrank.
the book that you look-for stands in+the/in the glass-cabinet
'*The book that you are looking for is in* ***the glass-cabinet***.'

- Larger situation uses (Hawkins 1978)

(6) Der Empfang wurde **vom/#von dem** Bürgermeister eröffnet.
the reception was by+the/by the mayor opened
'*The reception was opened by* ***the mayor***.'

[1] All data here come from Schwarz (2009). Schwarz discusses further uses of both forms that we do not present here for reasons of time.

3 Proposal

- The strong and weak forms of the definite article carry the same presupposition.
  - Their distribution is determined by how this presupposition is satisfied (more below).
- The structure of strong-article DPs is more complex than that of their weak form counterparts.
  - The weak form has a simple syntax and a standard presupposition of uniqueness.
  - The strong form requires the presence of *idx*P, a projection whose property-denoting head *idx* introduces the extra part of the presupposition that is satisfied by discourse familiarity.

3.1 Familiarity

- Schwarz (2009) focuses on the difference between anaphoric and unique uses of the article.
  - We argue that his semantic distinction is essentially right, but that it can be captured with a single meaning for the definite determiner (his proposal requires at least two different forms).
- Building on Heim (1982) and Roberts (2002), we assume the following types of familiarity:

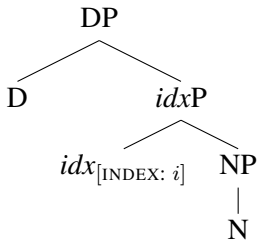
(7) a. **Discourse familiarity**: the DP is anaphorically related to another discourse referent in the immediate context.
  b. **Contextual familiarity**: the DP refers to an entity that is familiar from the context, but which has not been linguistically introduced into the discourse.

- Both types of familiarity satisfy presuppositions of the definite determiner, but in different ways.
  - The strong form of the article surfaces when the referent of a DP is *discourse familiar*.
  - The weak form of the article surfaces when the referent of a DP is *contextually familiar*.

3.2 Encoding anaphoricity

- In the strong form, *idx*P intervenes between DP and NP.
  - *idx* is property-denoting and undergoes Predicate Modification with NP.
  - cf. Schwarz 2009, for whom the index is a specifier and of type e.
  - The same Strawsonian denotation for the definite article is available for both forms.

(8) *Strong form*
  a. $[\![\text{INDEX: } idx]\!]^{g,\,C}$: $\lambda x_e.x = g(i)$
  b. $[\![\text{D}]\!]^{g,\,C}$: $\lambda P_{\langle e,\,t\rangle}.\iota x_e[P(x)\ \&\ \text{C(x)}]$
  c.

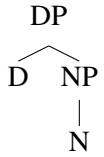


- Anaphoric definites require an extra head, as formulated below:

  (9) ***The Severed Index Hypothesis***:
  The strong form of the definite article selects a phrase headed by its own anaphoric index.

- Compare this to the weak form, where no such index is present:

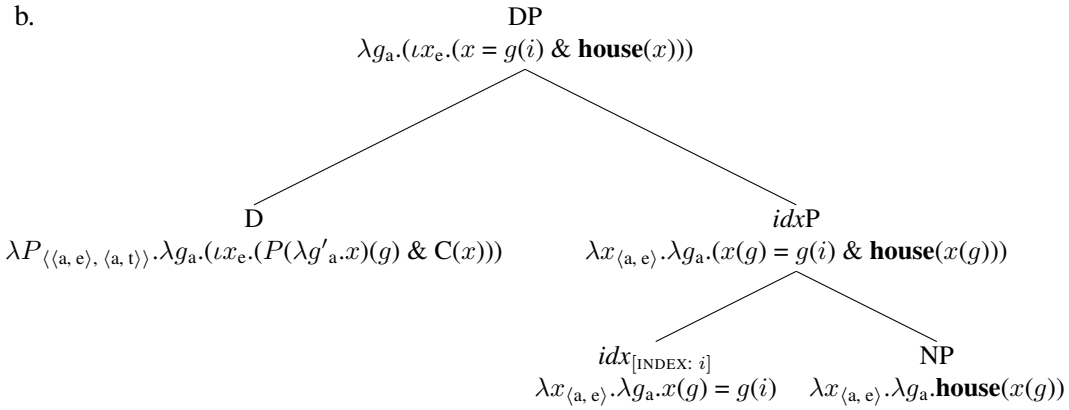
  (10) *Weak form*
  a. $[\![\text{D}]\!]^{g,\text{C}}$: $\lambda P_{\langle \text{e, t}\rangle}.\iota x_{\text{e}}[P(x)$ & C(x)]
  b.



- Above, the C parameter serves to narrow down the set of contextually salient individuals (Etxeberria and Giannakidou 2010, a.o.).
  - C is of type $\langle$e, t$\rangle$; it is true of individuals who are *contextually salient*.
- Below, assignment functions are in the model — they do not parameterize the interpretation function (Sternefeld 1997, 2001; Kobele 2006, 2010; Kennedy 2014; Klecha and Martinović to appear).
  - a is the type of assignment functions
  - e is the type of individuals
  - $\langle$a, e$\rangle$ is the type of functions from assignments to individuals
  - t is the type of truth values
- The presuppositional content of the article is always the same: ($\exists!x_{\text{e}}$.(P(x) & C(x)))
  - for P, the property it composes with.
  - for C, the context.
- How the presuppositions are satisfied will depend on the property fed to D.
  - In the case of the weak form, D will just compose with the property denoted by the NP.
  - In the case of the strong form, D will compose with the property denoted by the NP, as modified by the meaning of *idx*.
- How it works for cross-sentential anaphora:

  (11) a. Fritz wohnt seit Jahren in einem groβen Haus. Er schwärmt immer noch **von dem/#vom** Haus.
  Fritz lives since years in a big house. He raves always still from the/from+the house
  '*Fritz has lived in a big house for years. He still raves about* ***the house***.'

b.



4 Extension to relative clauses

- Strong form required in both the matrix clause and the relative clause:

  (12) Fritz wohnt jetzt **in dem** Haus, **von dem** er immer noch schwärmt.
  Fritz lives now in the house from REL he always still raves.
  '*Fritz is now living in the house he's still raving about*.'

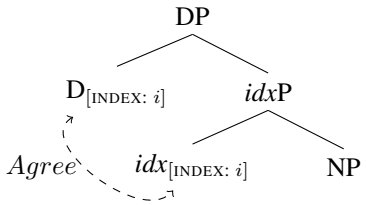
  – Wiltschko (1998): The relative pronoun in German *is* the definite article.

- **Relative Pronoun**: The relative-clause internal pronoun is the strong form and selects for *idx*P.

  – The *idx* heading *idx*P hosts the feature corresponding to Heim (1998)'s "inner" index, i.e., that of a pronoun, and triggers agreement with an "outer" index on the determiner itself (see Kennedy (2014) for a similar analysis of agreement with relative pronouns).

  – This proposal presupposes that indices are features on heads that, like other features, may come into the derivation with or without values and participate in agreement, as (13) illustrates:

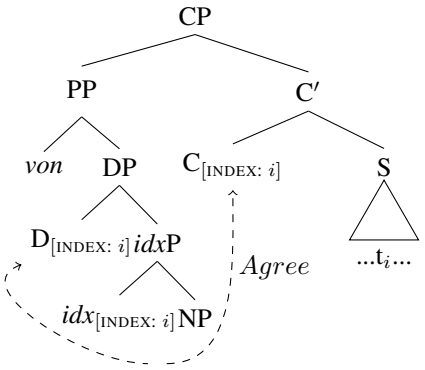
  (13)



- The resulting definite description moves to [Spec, CP], triggering agreement of C with the index on the determiner, which results in binding of the definite description's trace, as in (14), below.

  – This follows Klecha and Martinović's (to appear) compositional treatment of λ-abstraction, where the agreement probe that triggers movement is also responsible for binding the trace of the moved element:

(14)



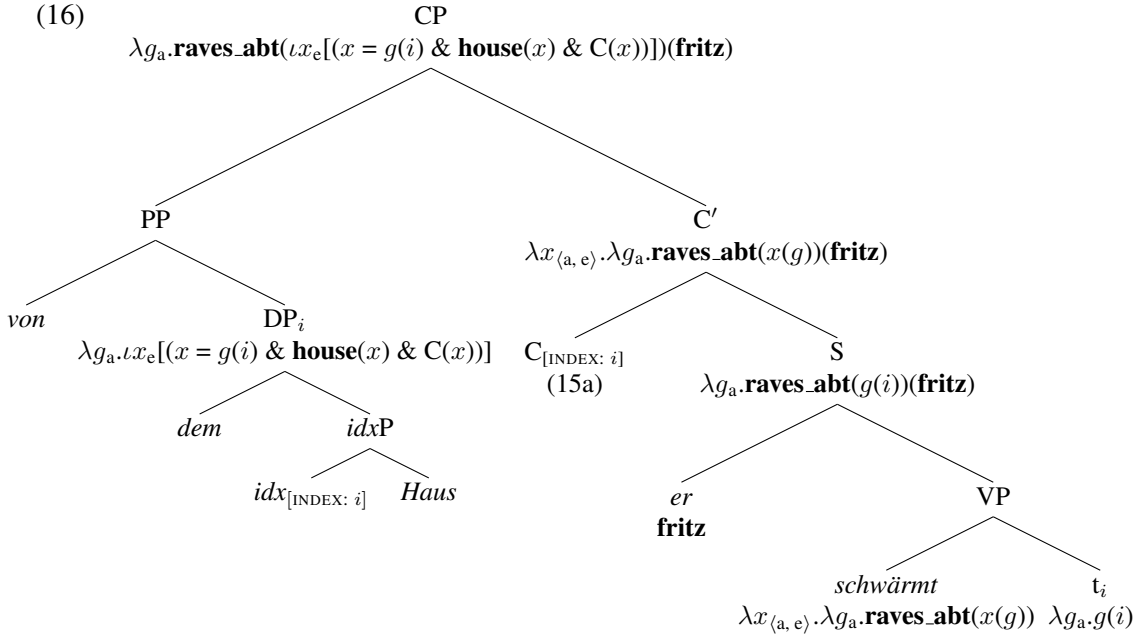
- These proposals are illustrated by the following denotations for C and INDEX: i:

(15) a. $[\![\text{C}_{[\text{INDEX: } n]}]\!]$ = binder
$\lambda\phi_{\langle \text{a, t}\rangle}.\lambda x_{\langle \text{a, e}\rangle}.\lambda g_{\text{a}}.\phi(g[x(g)/n])$

b. $[\![\text{INDEX: } i]\!]$ = bindee
$\lambda x_{\langle \text{a, e}\rangle}.\lambda g_{\text{a}}.x(g) = g(i)$

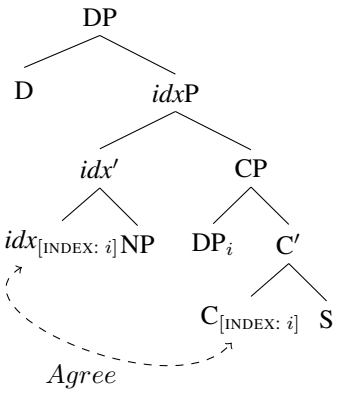
- Composition of the relative clause's meaning is as shown in (16) (ignoring the meaning of P):

(16)



- The index in the relative-clause-internal strong form is still unbound *after* the composition of CP.
- **Matrix Determiner**: the article in the matrix clause must be strong so that it can bind the index of the moved definite description, which remains unbound throughout the composition of the relative clause.
  - Consistent with the fact that these constructions lack true relative pronouns (e.g., *wh*-words).
  - The relative clause is then selected by *idx* in the matrix clause. The value of this matrix index is determined by agreement with C that occurs upon selection, as illustrated in (17):

(17)



- Assuming agreement with C as a result of selection, *idx* can bind the relative-clause internal index if, in addition to the denotation in (15b), the feature it hosts may have the one in (18) (putting it on a par with C; cf. (15a)):

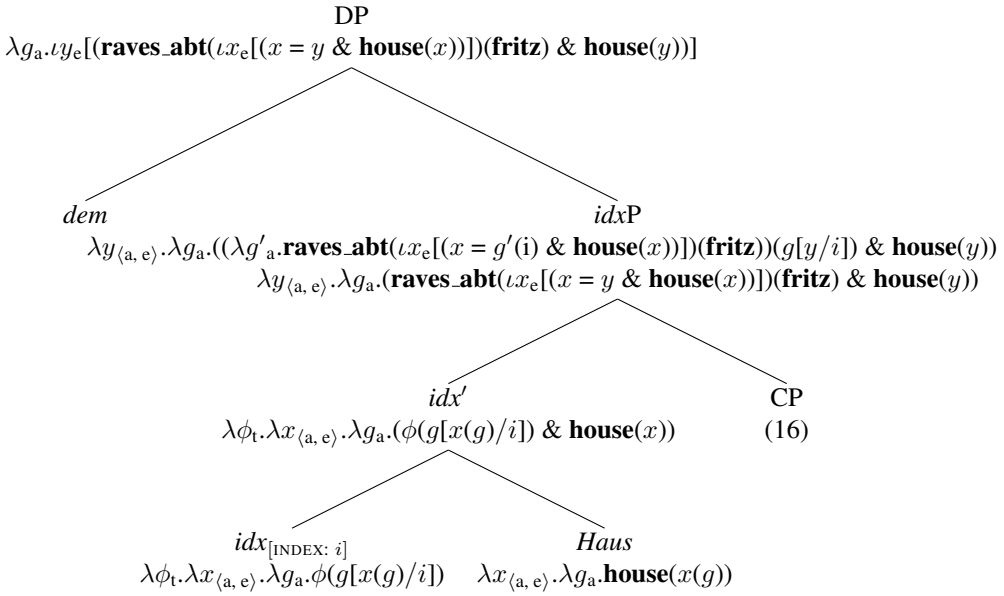
  (18) $[\![\text{INDEX: } i]\!] = \lambda\phi_{\langle a,\, t\rangle}.\lambda x_{\langle a,\, e\rangle}.\lambda g_a.\phi(g[x(g)/i])$

- (Matrix) *idx* and NP compose via a generalized version of Kratzer's (1996) Event Identification:

  (19) Generalized EI: If $[\![A]\!]$ is of type $\langle\beta,\, \langle\alpha,\, t\rangle\rangle$ and $[\![B]\!]$ is of type $\langle\alpha,\, t\rangle$, then $[\![[A\ B]]\!] = \lambda x_\beta.\lambda y_\alpha.([\![A]\!](x)(y)\ \&\ [\![B]\!](y))$.

- The complete result of composition is given in (20):

(20)

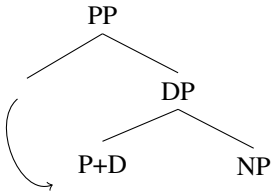


- Two possible denotations for INDEX: i, the feature hosted by the head *idx* that selects for NP:
  - *idx* acts like a variable (e.g., the relative-clause internal *idx* in (16)), or
  - *idx* acts like C, i.e., as a binder (e.g., the matrix *idx* in (20)).
  - *idx*, on its anaphoric use, is in the first category (i.e., variable).
- The denotation of the resulting DP is exactly what it would have been had binding been accomplished by a relative pronoun inside the relative clause.

5 Contraction and some independent evidence for the presence of *idx*

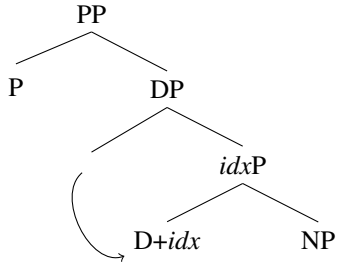
- P-D Contraction in the general case is captured by the post-syntactic movement operation *Lowering* (Embick and Noyer 2001) in the framework of *Distributed Morphology* (Halle and Marantz 1993).
  - P always lowers to D, resulting in the **weak form** (e.g. *am, vom*):

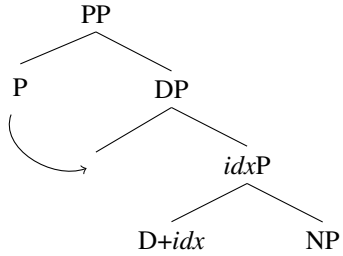
    (21) *P-to-D Lowering*



  - In the **strong form** (e.g. *an dem, von dem*), D lowers to *idx* and bleeds P-D contraction:

    (22) a. *D-to-idx Lowering* b. *P-to-D Lowering* (vacuous)





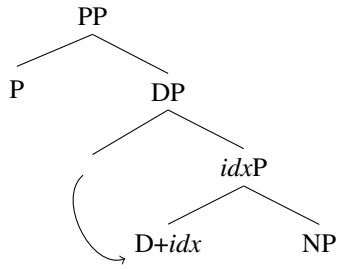
- **Apparent counterexample**: *selb-* (*same*) forces contraction in anaphoric uses:

  (23) Es hängt an einem Haus. **Am/#an dem** selben Haus findet ihr eine Jahreszahl...
  It hangs on a house. On+the/on the same house find you a date.
  '*It's hanging on a house. On the same house you'll find a date*...'

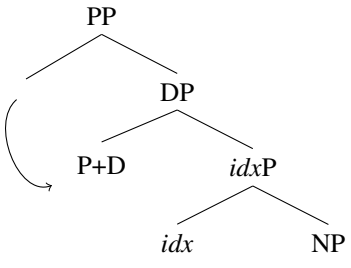
- Why do we see contraction when *same* is present?
  - *idx* is only realized as null when D lowers into this position. Otherwise, it spells out as *same*.
  - *Same* is the overt allomorph of *idx*.

    (24) **Same-allomorphy**:
    When *idx* is not occupied by D, insert *same*.

(25) a. *D-to-idx Lowering*



b. *No D-to-idx Lowering*



(26) a. [*an*] ↔ an — P
b. [D +dat +neut] ↔ dem — D
c. [*an* + D +dat +neut] ↔am — P+D
d. [D +dat +neut + *idx*] ↔ dem — D+*idx*
e. [*idx*] ↔ selbe — *idx*

- *Same* is accounted for as the *elsewhere form* whose contextual allomorph is null.
- *Same* acts like an adjective in German, though we abstract away from adjectival endings here. The connection between the category *idx* and the ability to inflect warrants further investigation.

- Further evidence for D-to-*idx* lowering:

(27) Es gab **in demselben** Haus auch eine Welt hinter den Kulissen...
It was in the+same house also a world behind the stage
'*In the same house there was also a world behind the scenes...*'

- Additional VI to account for the co-presence of both D and *same*:

(28) [D +dat +neut + *idx*] ↔ demselben — D+*idx*

- **Prediction**: *same* should be licensed in exactly those environments where the strong form is licensed:
  - Anaphora:

(29) Es hängt an einem Haus. **Am selben** Haus findet ihr eine Jahreszahl...
It hangs on a house. On+the same house find you a date.
'*It's hanging on a house. On the same house you'll find a date...*'

  - Restrictive relatives:[2]

(30) Die andere Person folgt der Richtung meines Fingers und sieht genau **dasselbe**
The other person follows the direction of+my finger and sees exactly the+same
Haus, das ich anzeige.
house that I indicate
'*The other person follows the direction of my finger and see exactly the same house that I'm indicating*.'

[2]https://www.mohr.de/en/book/das-innere-verbum-in-gadamers-hermeneutik-9783161499098?createPdf=true

5.1 Cross-linguistic evidence that *same* is *idx*

- In Hebrew, the 3rd person accusative pronoun *oto* shows that *same* acts like an index.[3]

  (31) ra'iti **oto**
  I.saw him
  '*I saw him.*'

- Can also take on the meaning of the adjective *same*:

  (32) karanu et **oto** sefer
  we.read ACC same book
  '*We read the same book.*'

- *Oto* can be used in the head of a restrictive relative (literary Hebrew):

  (33) karati et **oto** (ha)-sefer se-katavta
  I.read ACC same (the)-book that-you.wrote
  '*I read the book that you wrote. / I read the same book that you wrote.*'

- In English, *the same* also acts like a pronoun in its deep anaphoric uses (see also Hardt et al. 2012; Hardt and Mikkelsen 2015):

  (34) *John told Mary he loved her, but unfortunately she couldn't say **the same** to him.*

6 Summary and future questions

- The use of the strong form in restrictive relatives in German comes from the fact that anaphoric uses require a syntactically-encoded index.
- **The Severed Index Hypothesis**: The strong form of the article selects for the index-hosting head (*idx*), which intervenes between D and N. This index:
  - is what makes DPs anaphoric.
  - is bound in the relative clause, just like in other instances of anaphora.
  - acts itself as a *binder* in the matrix clause, binding the variable in the subordinate DP.
  - has an overt allomorph: the anaphoric modifier *same*.
- Relative pronoun must always be strong. What binds the free variable:
  - When the matrix head is an indefinite or a quantifier?

[3] Thanks are due to Itamar Francez for the data in this section.

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