

This printout has been approved by me, the author. Any mistakes in this printout will not be fixed by the publisher. Here is my signature and the date: \_\_\_\_\_

# German relative clauses and the severed index hypothesis

Emily Hanink and Julian Grove

## 1. Introduction

The German definite article may contract with a preceding preposition under certain conditions, as shown in (1) (Schwarz 2009, *inter al.*). In the literature, the contracted form is referred to as “weak” (1a), while the non-contracted form is referred to as “strong” (b).

- |   |  |
|---|--|
| (1) a. Hans ging <b>zum</b> Haus.<br>Hans went to+the house<br><i>Hans went to the house.</i> | b. Hans ging <b>zu dem</b> Haus.<br>Hans went to the house<br><i>Hans went to the house.</i> |
|---|--|

Schwarz (2009) analyzes the distinction between the two form as follows. The weak form is used 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. However, as Schwarz (2009) himself points out, restrictive relative clauses likewise require the use of the strong form, both in the form of the matrix determiner (*in dem*) and in the form of the relative pronoun (*von dem*):

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

Because restrictive relative clauses do not appear *prima facie* to constitute instances of anaphora, this puzzle poses a challenge for the generalization that it is anaphoric uses *per se* that require the strong form. To account for this puzzle, the present analysis proposes that the strong form of the article selects for an index-hosting head (*idx*) that intervenes between D and N (cf. Schwarz 2009). This index i) is bound in the relative clause, just like in other instances of anaphora; ii) acts itself as a *binder* in the matrix clause, binding the variable in the subordinate DP. These two notions of indices correspond to what Heim (1998) termed *inner* and *outer* indices, respectively. In this way, both strong form uses and restrictive relative clauses are accounted for.

The structure of this paper is as follows. §2 describes the distribution of the strong and weak forms of the definite article. In §3 proposes an account for cross-sentential anaphora. §4 extends this analysis to the puzzle posed by restrictive relatives. §5 gives structural evidence for the proposal based on the behavior of the modifier *same*, and §6 concludes.

---

\* University of Chicago. We express our thanks to Karlos Arregi, Rajesh Bhatt, Amy Rose Deal, Itamar Francez, Anastasia Giannakidou, Caroline Heycock, Chris Kennedy, Jason Merchant, Kjell Johann Sæbo, Florian Schwarz, and Ming Xiang for their invaluable feedback. We also thank the audiences at WCCFL 34, CLS 52, and the Linguistics and Philosophy Workshop at the University of Chicago. We thank as well the participants of the agreement seminar taught by Ruth Kramer at the University of Chicago in the Spring of 2015. All errors are our own.

## 2. Distribution

The canonical use of the strong form is in anaphora following an indefinite antecedent:

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

*Fritz has lived in a big house for years. He still raves about **the house**.*

The other use discussed in this paper, as mentioned above, is in the context of restrictive relative clauses, as in (4).<sup>1</sup> Other uses discussed in Schwarz (2009) are not addressed for reasons of space.

- (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/from+REL he always still raves.

*Fritz is now living in **the house** he's still raving about.*

Uses of the strong form stand in contrast to uses of the weak form, which surface in so-called *situational* uses of the definite article. (5) gives an example of an *immediate situation*, while (6) gives an example of a *larger situation* (Hawkins 1978; Schwarz 2009). In both cases, the definite is not anaphoric but picks out a salient individual unique in the context.

- (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**.*

- (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**.*

## 3. Proposal

The core of the proposal is that the strong and weak forms of the definite article have the same meaning, but that their distribution is determined by how their presuppositions are satisfied, in a way to be defined below. Aside from this difference, the two forms vary also in their external structure. The structure of strong-article DPs is more complex than that of their weak form counterparts. On the one hand, the weak form has a simple syntax and a standard presupposition of uniqueness. On the other hand, the strong form involves the presence of *idxP*, a projection whose property-denoting head *idx* introduces an extra presupposition that is satisfied by discourse familiarity.

Schwarz (2009) focuses on the difference between anaphoric and unique uses of the article. The present proposal contends 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), the account adopts 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 description, 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*.

<sup>1</sup> While such examples are not accounted for in Schwarz (2009), see Simonenko (2014, 2015) for a non-anaphoric explanation of the use of the strong form in the matrix clause based on Wiltchko (2013).

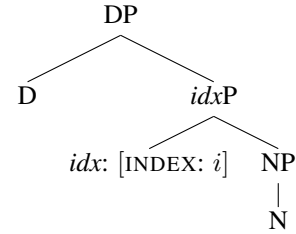
### 3.1. Encoding anaphoricity

In the structure of the strong form, *idxP* intervenes between DP and NP, whose head *idx* is property-denoting and undergoes Predicate Modification with the NP (cf. Schwarz 2009, for whom the index is a specifier and of type *e* (cf. Elbourne 2005)). In the present account, the same Strawsonian denotation for the definite article is available for both forms. (8) gives the denotation of *idx* and D, as well as the proposed structural configuration.

(8) *Strong form*

a.  $\llbracket \text{INDEX: } i \rrbracket^{g, C}: \lambda x_e. x = g(i)$

c.



b.  $\llbracket D \rrbracket^{g, C}: \lambda P_{\langle e, t \rangle}. (\iota x_e. P(x) \ \& \ C(x))$

Anaphoric (strong) definites therefore require the extra head *idx*, as formulated in (9):

(9) **The Severed Index Hypothesis:**

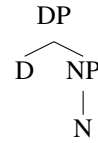
The strong form of the definite article selects a phrase headed by its own anaphoric index.

In the structure of the weak form, there is no such index-hosting head present:

(10) *Weak form*

a.  $\llbracket D \rrbracket^{g, C}: \lambda P_{\langle e, t \rangle}. (\iota x_e. P(x) \ \& \ C(x))$

b.



Above, the C parameter serves to narrow down the set of contextually salient individuals (Etcheberry & Giannakidou 2010, a.o.). C is of type  $\langle e, t \rangle$ ; it is true of individuals who are *contextually salient*. Hence, given a property *P*, the presuppositional content of the article is always the same:

(11)  $(\exists! x_e. (P(x) \ \& \ C(x)))$

How the presuppositions are satisfied will depend on the property *P* fed to the meaning of D: in the case of the weak form, the meaning of D will just compose with the property denoted by the NP. In the case of the strong form, the meaning of D will compose with the property denoted by the NP, as modified by the meaning of *idx*. In this way, D always carries the same presupposition. What determines the form of the article is how this presupposition is satisfied.

In the next section the account is extended to relative clauses, which requires a change in assumptions about the model. In what follows, assignment functions themselves are in the model—they do not parameterize the interpretation function (Sternefeld 1997, 2001; Kobele 2006, 2010; Kennedy 2014; Klecha & Martinović to appear). In particular, the following types are assumed:

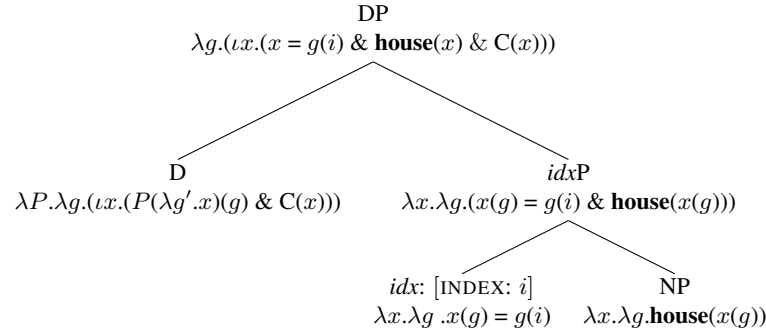
- (12)
- a. *a* is the type of assignment functions
  - b. *e* is the type of individuals
  - c.  $\langle a, e \rangle$  is the type of functions from assignments to individuals
  - d. *t* is the type of truth values

Below, (13) gives an example of how these assumptions work in the analysis of cross-sentential anaphora.

- (13) a. Fritz wohnt seit Jahren in einem großen 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.*

b.



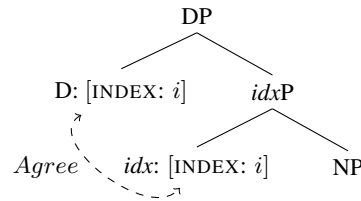
#### 4. Extending the account to relative clauses

The account crucially extends to the puzzle of restrictive relative clauses. The problem with restrictive relatives is the use of the strong form of the article in seemingly non-anaphoric contexts, as in (14) (repeated from (2)):

- (14) 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.'*

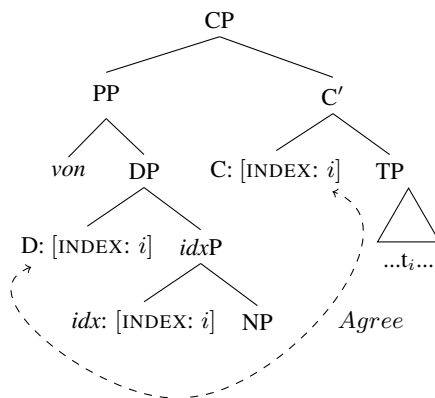
The first part of the puzzle is the use of the strong form in the relative pronoun itself. We follow Wiltschko (1998) in the proposal that the relative pronoun in German simply *is* the definite article. The relative-clause internal pronoun is then a strong form of the definite article that selects for *idxP* before undergoing movement to [Spec, CP]. The *idx* heading *idxP* 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 (15) illustrates:

(15)



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  $\lambda$ -abstraction, where the agreement probe that triggers movement is also responsible for binding the trace of the moved element:

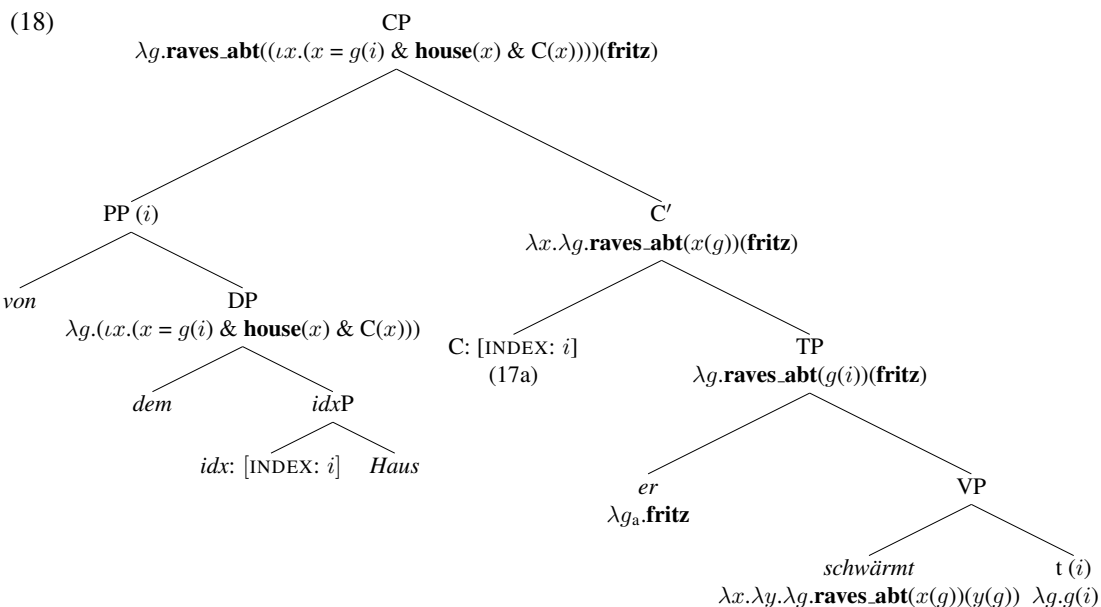
(16)



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

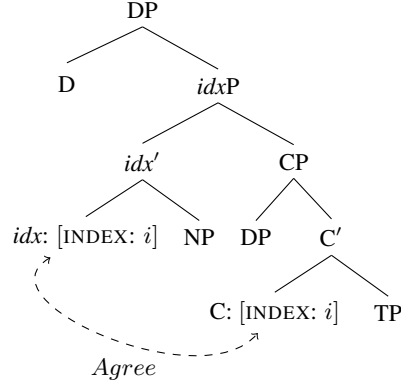
- (17) a.  $\llbracket C: [INDEX: n] \rrbracket = \text{binder}$   
 $\lambda\phi_{\langle a, t \rangle} . \lambda x_{\langle a, e \rangle} . \lambda g_a . \phi(g[x(g)/n])$   
 b.  $\llbracket INDEX: i \rrbracket = \text{bindee}$   
 $\lambda x_{\langle a, e \rangle} . \lambda g_a . x(g) = g(i)$

Composition of the relative clause's meaning is as shown in (18) (ignoring the meaning of *von* for purposes of clarity):



The second part of the puzzle is the use of the strong form in the matrix clause. Note that the index in the relative-clause-internal strong form is still unbound *after* the composition of CP. As a result, 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—this need for binding is consistent with the fact that these constructions lack true relative pronouns (e.g., *wh*-pronouns). The relative clause is therefore selected by *idx* in the matrix clause, and the value of this matrix index is determined by agreement with C that occurs upon selection, as illustrated in (19):

(19)



Given agreement with C as a result of selection, *idx* can bind the relative-clause internal index if, in addition to the denotation in (17b), the feature it hosts may have the one in (20) (putting it on a par with C; cf. (17a)):

$$(20) \quad \llbracket \text{INDEX: } i \rrbracket = \lambda\phi_{\langle a, t \rangle} . \lambda x_{\langle a, e \rangle} . \lambda g_a . \phi(g[x(g)/i])$$

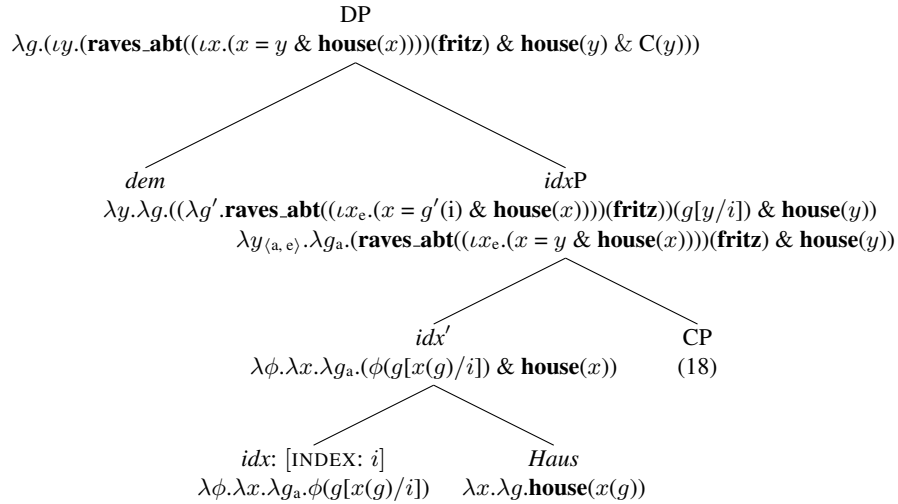
In order for composition to work, *idx* and NP must compose via a generalized version of Kratzer's (1996) Event Identification, as in (21):

(21) **Generalized EI**

If  $\llbracket A \rrbracket$  is of type  $\langle \beta, \langle \alpha, \langle a, t \rangle \rangle \rangle$  and  $\llbracket B \rrbracket$  is of type  $\langle \alpha, \langle a, t \rangle \rangle$ ,  
then  $\llbracket [A B] \rrbracket = \lambda x_\beta . \lambda y_\alpha . \lambda g_a . (\llbracket A \rrbracket(x)(y)(g) \ \& \ \llbracket B \rrbracket(y)(g))$ .

The complete result of composition is given in (22):

(22)

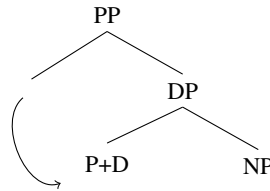


Importantly, the denotation of the resulting DP is exactly what it would have been had binding been accomplished by a relative pronoun inside the relative clause. In sum, there are two possible denotations for INDEX: *i*, the feature hosted by the head *idx* that selects for NP, which together account for its two uses in restrictive relatives. INDEX: *i* either acts like a variable (e.g., the relative-clause internal *idx* in (18)), or it acts like C, i.e., as a binder (e.g., the matrix *idx* in (22)). *idx*, on its anaphoric use, is in the first category (i.e., that of a variable).

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

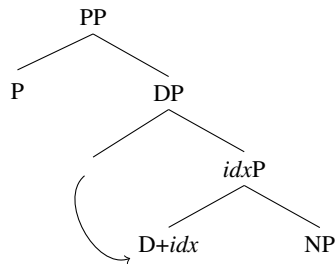
There is independent morphological evidence for the structural presence of *idx*. Hanink (To appear) proposes that P-D Contraction in the general case is captured by the post-syntactic movement operation *Lowering* (Embick & Noyer 2001) in the framework of *Distributed Morphology* (Halle and Marantz 1993). To generate the weak form, P lowers to D (e.g. *im*, *vom*):

(23) *P-to-D Lowering*

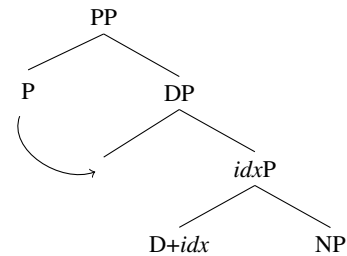


In the **strong form** (e.g. *in dem*, *von dem*), D lowers to *idx* and bleeds P-D contraction:

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



b. *P-to-D Lowering* (vacuous)

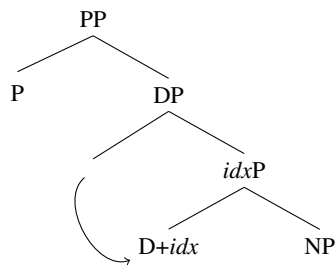


However, there is an apparent counterexample to the strong/weak distinction (pointed out by Schwarz (2009)): the modifier *selb-* (*same*) forces contraction even in anaphoric uses:

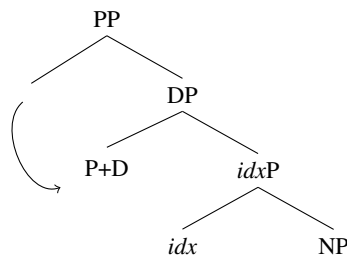
- (25) Es hängt an einem Haus. **Am/#an dem** selben Haus findet ihr eine Jahreszahl...  
 It hangs on a house. On+the/on the same house find you a date.  
 ‘It’s hanging on a house. On the same house you’ll find a date...’

This fact follows if *same* spells out *idx* when D has not lowered, leaving the environment for P-D contraction available even in certain anaphoric contexts; *same* appears to be an allomorph of *idx* (27):

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



b. *No D-to-idx Lowering*



(27) [*idx*] ↔ *selb-*

*idx*

This analysis predicts that *same* is licensed whenever *idx* is present. This prediction is borne out: *same* is licensed not only in cross-sentential anaphora, but also in restrictive relatives, where *idx* is also present:

- (28) Fritz wohnt jetzt **im selben** Haus, von dem er schon seit Jahren schwärmt.  
 Fritz lives now in+the same house from REL he already since years raves  
*Fritz now lives in the same house that he's been raving about for years.*

## 6. Conclusion

This paper provides an analysis of two uses of the strong form of the German definite article: the first anaphoric, the second used in relative clauses. The core of the proposal is that the strong form in restrictive relatives in German requires a syntactically transparent index. This index is hosted by a head between D and N, and gives rise to the discourse anaphoricity of DPs introduced by the strong form. In relative clauses this index is bound, just like in other instances of anaphora. In the matrix clause that selects for the relative clause, this index acts itself as a binder, binding the variable in the subordinate DP, and putting it on a par with the *outer* indices of Heim (1998). The distribution of the modifier *same* provides structural evidence for the analysis, which posits a syntactic position for *idx*.

## References

- Elbourne, Paul (2005). *Situations and Individuals*, vol. 90. MIT Press.
- Embick, David & Rolf Noyer (2001). Movement operations after syntax. *Linguistic Inquiry* 32.4, 555–595.
- Etcheberria, Urtzi & Anastasia Giannakidou (2010). Contextual domain restriction and the definite determiner. *Context-Dependence, Perspective and Relativity*, Mouton de Gruyter, Berlin, 93–126.
- Halle, Morris & Alec Marantz (1993). Distributed Morphology and the pieces of inflection. *The view from building 20* 111–176.
- Hanink, Emily (To appear). The German definite article and the ‘sameness’ of indices. *Penn Working Papers in Linguistics* 23.1.
- Hawkins, John A. (1978). *Definiteness and indefiniteness: a study in reference and grammaticality prediction*. Croom Helm.
- Heim, Irene (1982). The semantics of definite and indefinite noun phrases. Doctoral Dissertation, UMass Amherst.
- Heim, Irene (1998). Anaphora and semantic interpretation: A reinterpretation of Reinhart’s approach. Sauerland, Uli & Orin Percus (eds.), *MIT Working Papers in Linguistics*, MIT Press, Cambridge, vol. 25, 205–246.
- Kennedy, Chris (2014). Predicates and formulas: Evidence from ellipsis. *The Art and Craft of Semantics: A Festschrift for Irene Heim*, MITWPL, vol. 1, 83–136.
- Klecha, Peter & Martina Martinović (to appear). Exhaustivity, predication and the semantics of movement. *Proceedings of BLS*.
- Kobele, Greg (2010). Inverse linking via function composition. *Natural Language Semantics* 18, 183–196.
- Kobele, Greg M. (2006). Generating copies: An investigation into structural identity in language and grammar. Doctoral Dissertation, UCLA.
- Kratzer, Angelika (1996). Severing the external argument from its verb. Rooryck, Johan & Laurie Zaring (eds.), *Phrase Structure and the Lexicon*, Studies in Natural Language and Linguistic Theory, Kluwer Academic Publishers, Boston, 109–137.
- Roberts, Craig (2002). Demonstratives as Definites. *Information sharing: Reference and presupposition in language generation and interpretation* 89–196.
- Schwarz, Florian (2009). Two Types of Definites in Natural Language. *Open Access Dissertations* 122.
- Simonenko, Alexandra (2014). Grammatical Ingredients of Definiteness. Doctoral Dissertation, McGill University.
- Simonenko, Alexandra (2015). Structural triggers of the loss of scopelessness. *Proceedings of the 32nd West Coast Conference on Formal Linguistics* 191–200.
- Sternefeld, Wolfgang (1997). The semantics of reconstruction and connectivity. *Sonderforschungsbereich, Universität Tübingen* 340.
- Sternefeld, Wolfgang (2001). Semantic vs. Syntactic Reconstruction. Kamp, Hans, Antje Rossdeutcher & Christian Rohrer (eds.), *Linguistic Form and its Computation*, CSLI Publications, 145–182.
- Wiltschko, Martina (1998). On the syntax and semantics of (relative) pronouns and determiners. *Journal of Comparative Germanic Linguistics* 2.2, 143–181.
- Wiltschko, Martina (2013). Descriptive relative clauses in Austro-Bavarian German. *The Canadian Journal of Linguistics/La revue canadienne de linguistique* 58.2, 157–189.