

Project CON

Constraint-based Analysis of Restrictive Relative Clauses

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1. Three ways of analyzing relative clauses

- Modification
- Raising
- Matching

1.1 Modification Analysis

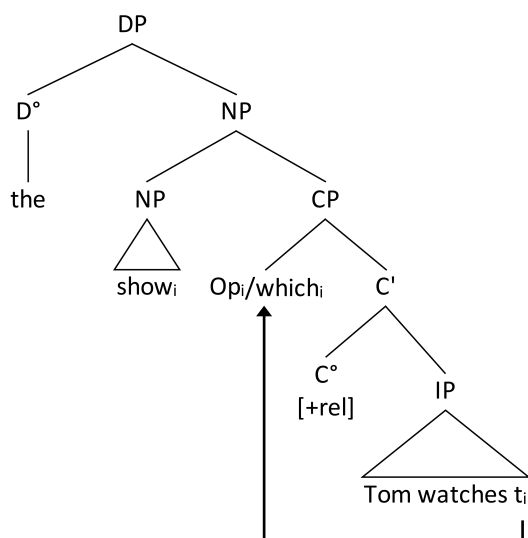
Pervasive in the literature: Implicit in Quine (1960), assumed in Montague (1970), Partee (1975), Chomsky (1977), and Heim & Kratzer (1998).

- Intuition: The head and the relative clause (RC) are predicates that combine semantically via intersective modification.
- The head originates and always remains external to the RC. Therefore, it cannot be reconstructed into an RC-internal position.
- The head and the relative operator (RO) are co-indexed, which ensures that information about the referential index is available within the RC.
- The RO can be either overt or covert; overt: relativizer (treated as a relative pronoun), covert: phonologically silent operator.

(1) Base: $[_{DP} \text{the show } [_{CP} [_{IP} \text{Tom watches Op/which}]]]]$

Step 1: $[_{DP} \text{the show } [_{CP} \text{Op}_i/\text{which}_i [_{IP} \text{Tom watches } t_i]]]$

Step 2: $[_{DP} \text{the show}_i [_{CP} \text{Op}_i/\text{which}_i [_{IP} \text{Tom watches } t_i]]]$



1.2 Raising Analysis

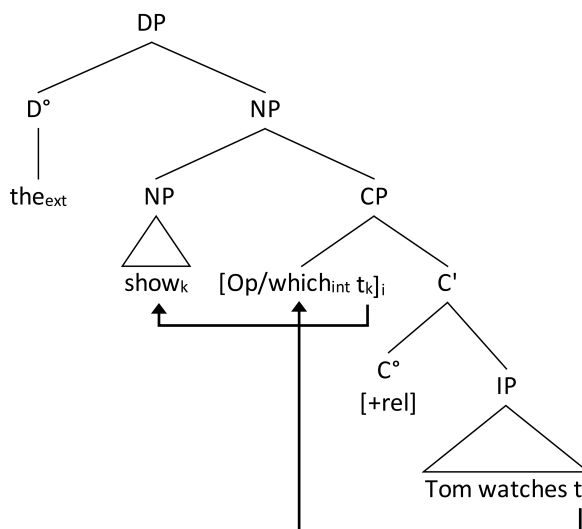
Originally proposed by Brame (1968), Schachter (1973), and Vergnaud (1974); revived by Kayne (1994), Bianchi (1999), de Vries (2002).

- Intuition: The head takes on a double role.
- The head moves from an RC-*internal* position, where it is base-generated as the complement of the *internal* determiner (Det_{int}), to an RC-*external* position, where it enters into a grammatical relation with the *external* determiner (Det_{ext}), which selects the RC and the head.
- Because of the above-described derivation history, the head can easily be reconstructed into its RC-internal position.
- In contrast to the Modification Analysis, the relativizer is treated as a relative *determiner*.

(2) Base: $[_{DP} the_{ext} e [_{CP} [_{IP} Tom watches [_{DP} Op/which_{int} show]]]]$

Step 1: $[_{DP} the_{ext} e [_{CP} [_{DP} Op/which_{int} show]_i [_{IP} Tom watches t_i]]]$

Step 2: $[_{DP} the_{ext} show_k [_{CP} [_{DP} Op/which_{int} t_k]_i [_{IP} Tom watches t_i]]]$



1.3 Matching Analysis

Originally proposed by Lees (1960, 1961), and Chomsky (1965), extended by Sauerland (1998).

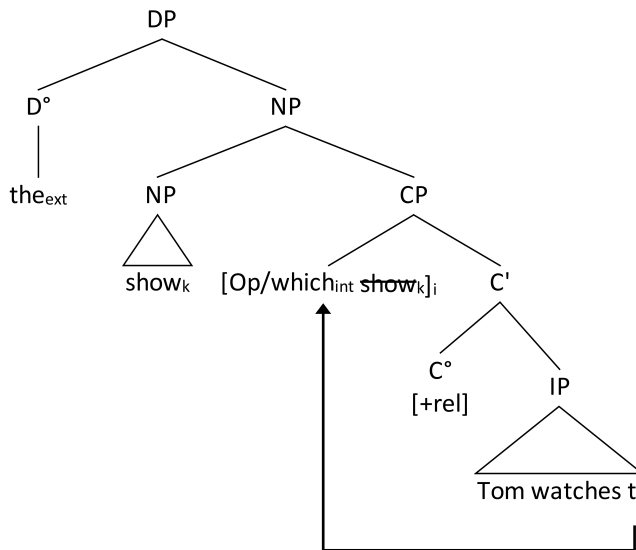
- Intuition: a hybrid between the Modification and the Raising Analysis.
- As in the Modification Analysis, the head originates and remains external to the RC during the entire derivation.
- The head has a CP-internal counterpart – the *internal* head.

- The relation between the *external* head ($head_{ext}$) and the *internal* head ($head_{int}$) is not established via a movement chain; both $head_{ext}$ and $head_{int}$ must be interpreted individually.
- $head_{int}$ is obligatorily deleted at PF under “identity” with $head_{ext}$ ($head_{int}$ may contain a pronoun co-referential to the R-expression of $head_{ext}$ rather than the R-expression itself, cf. *Vehicle Change* of Fiengo and May 1994).
- As in the Raising Analysis, the relativizer is treated as a relative *determiner*.

(3) Base: $[_{DP} the_{ext} show_k [_{CP} [_{IP} Tom\ watches [_{DP} Op/which_{int} show_k]]]]$

Step 1: $[_{DP} the_{ext} show_k [_{CP} [_{DP} Op/which_{int} show_k] [_{IP} Tom\ watches\ t_i]]]$

Step 2: $[_{DP} the_{ext} show_k [_{CP} [_{DP} Op/which_{int} show_k] [_{IP} Tom\ watches\ t_i]]]$



1.4 Modification, Raising, and Matching in direct comparison

	basic head position	connectivity	head info inside RC
Modification	RC external	co-indexation	index of the head
Raising	RC internal	movement	head itself
Matching	RC external & internal	matching under identity	copy of the head

2. Empirical motivations and problems

2.1 Two pro(blematic) arguments for Raising and Matching

2.1.1 Idiom licensing

An idiom is licensed if all of its parts form a constituent at deep structure/the point of merge.

Pro Raising but problematic for Matching:

- (4) a. We *made headway*.
b. *(The) *headway* was satisfactory.
c. The *headway*_i [_{CP} that we *made* *t*_i] was satisfactory.

(Brame 1968, Schachter 1973)

Pro Matching but problematic for Raising:

- (5) John never *pulled* the *strings*_i [_{CP} that his mother told him *t*'_i should be *pulled* *t*_i].

(Salzmann 2006:43 – example due to Henk v. Riemsdijk)

Problematic for Raising and Matching:

- (6) Parky *pulled* the *strings*_i [_{CP} that *t*_i got me the job].

(McCawley 1981:137, Alexiadou et al. 2000:12)

2.1.2 Binding-theoretic reconstruction

Principle A

Pro Raising but problematic for Matching:

- (7) The [interest in each other_i]_k [_{CP} that John and Mary_i showed *t*_k] was fleeting.

(Schachter 1973)

Pro Matching (with opportunistic deletion) but problematic for Raising:

- (8) Schicken Sie_i uns [ein Foto von sich_i], das beweist,
Send you us a photo of REFL that proves
'Send us a photograph of yourself that proves

dass Sie ein wahrer Ferrari-Anhänger sind.
that you a real Ferrari enthusiast are
that you are a real Ferrari enthusiast.'

(Salzmann 2006:117)

Variable binding effects

(9) The [relative of his]_{i,k} [_{CP} that everybody_i likes t_k] lives far away.

(Sauerland 2003)

Principle C

Pro coexistence of Raising (a-examples) and Matching (b-examples):

- (10) a. *the [picture of Bill]_{i,m} [_{CP} [that t_m]_k he_i likes t_k] (principle C violation)
b. the [picture of Bill]_{i,k} [_{CP} [that ~~one~~_{k,m} he_i likes t_m] (no principle C violation)
- (11) a. *the [picture of Bill]_{i,m} [_{CP} [that t_m]_k he_i took t_k] (principle C violation)
b. *the [picture of Bill]_{i,k} [_{CP} [that ~~one~~_{k,m} he_i took t_m] (idiom not licensed)

(Carlson 1977, Munn 1994, Sauerland 2003)

2.2 Morpho-lexical challenges to Raising and Matching

1. The morphological paradigm of the German d-relativizer has the same structure as that of personal pronouns instead of determiners. [Raising, Matching]
2. Wh-relativizers systematically are surface-homophonous with interrogative pronouns (even though the raising-matching theories predict the former to all be syntactically complex and the latter to all be simplex). [Raising, Matching]
3. Relativizers behave like personal pronouns and unlike determiners in that their morphological paradigms are characterized by animacy distinctions. [Raising, Matching]
4. A DP that heads an A-bar chain carries the morphological case assigned to the foot of the chain. [Raising]
5. Determiners govern the declension class of nouns and adjectives they are in construction with. [Raising]

NB: Most of the arguments in this and the next section stem from Borsley (1997, 2001) and Heck (2005).

2.2.1 Paradigms lost

The German d-relativizer patterns with personal pronouns, not with determiners:

- (12) Determiner:
Ich vertraue *den*_{det}/**denen*_{pron} Freunden.
I trust the friends
'I trust the friends.'

(13) Pronoun:
 Ich vertraue **den*_{det}/*denen*_{pron}.
 I trust them
 'I trust them.'

(14) Relativizer:
 die Freunde, **den*_{det}/*denen*_{pron} ich vertraue.
 the friends who I trust
 'the friends who I trust'

(Heck 2005)

W(h)-relativizers are surface-homonymous with interrogative pronouns:

(15) German: *wer, wie, was, wieso, weshalb, warum, wo, ...*

(16) English: *who(m), why, where, ...*

(17) der Ort_i, [_{RC} [wo t_i] du geboren bist]
 the place where you born were
 'the place where you were born'

(18) ich fragte, [_Q [wo] du geboren bist]
 I asked where you born were
 'I asked where you were born'

Modification: w(h)-relativizers = pronouns
 vs.

Raising & Matching: w(h)-relativizers = syntactically *complex*
 interrogative pronouns = syntactically *simple*

This enforces a number of stipulations in Raising and Matching, e.g.:

- Kayne's (1994: 154, fn. 12) suggestion that „*who* could be taken to be a form of *which* that appears under spec-head agreement with a [+ human] NP.“
- the obligatory deletion of the complement in Matching (cf. comparative deletion in Sauerland 2003, section 4.1).

Relativizers and personal pronouns show animacy distinctions, determiners do not:

	animate	inanimate
Personal pronouns	<i>he, she</i>	<i>it</i>
Relativizers	<i>who</i>	<i>which</i>
Determiners	<i>a, the</i>	

2.2.2 Case clash in Raising

The head of the RC is base-generated inside the RC as the complement of the “internal” determiner. In the course of the derivation, the head is raised into a position where it enters into a grammatical function with the “external” determiner. However, a DP heading an A-bar chain carries the morphological case assigned to the foot of the chain.

(19) Der^{nom} Junge_i^{nom}, [_{CP} [_{DP} den^{acc} t^{acc}_i]_k du t_k^{acc} kennst], kommt auch mit.
the boy who you know comes also with
'The boy who you know will also come along.'

(20) *Der^{nom} Jungen_i^{acc}, [_{CP} [_{DP} den^{acc} t^{acc}_i]_k du t_k^{acc} kennst], kommt auch mit.
the boy who you know comes also with
'The boy who you know will also come along.'

(21) Sie fragte, [_Q [_{DP} welchen^{acc} Jungen^{acc}]_k du t_k^{acc} kennst]
she asked which boy you know
'She asked which boy you know'

(22) a. * Sie fragte, [_Q [_{DP} welcher^{nom} Jungen^{acc}] du t^{acc} kennst].
b. * Sie fragte, [_Q [_{DP} welcher^{nom} Junge^{nom}] du t^{acc} kennst].
c. * Sie fragte, [_Q [_{DP} welchen^{acc} Junge^{nom}] du t^{acc} kennst].

(23) The student^{nom} [who(m)^{acc} you know t^{acc}] will come as well.

Kayne (1994): no account.

de Vries (2002:115): the account in Bianchi (1999) violates cyclicity.

Salzmann (2006), section 1.2.3, concludes that the accounts in Bhatt (2002) and de Vries (2002) are based on ad hoc assumptions and thus lack explanatory force. In 1.2.3.3, he concludes: **“The case problem [...] certainly remains one of the strongest arguments against the HRA.”**

2.2.3 Declension

German determiners govern the declension of adjectives and nouns they are in construction with.

Mixed declension after indefinite article:

(24) ein^{nom} junger^{nom} Angestellter^{nom}
a young employee
'a young employee'

Weak declension after definite article:

(25) der^{nom} junge^{nom} Angestellte^{nom}
the young employee
'the young employee'

Relative clauses:

(26) ein [junger Angestellter]_i, [der t_i] befördert wurde
a young employee who promoted was
'a young employee who was promoted'

(27) *ein [junge Angestellte]_i, [der t_i] befördert wurde
a young employee who promoted was
'a young employee who was promoted'

2.3 Raising and Matching miss syntactic generalizations

1. In English, external arguments are extraction islands. [Raising]
2. In German, no part of a genitive specifier of DP can be extracted. [Raising]
3. In German, no part of a dative specifier of DP can be extracted. [Raising]
4. Non-pronominal specifiers of NPs are marked with 's in English. [Raising, Matching]
5. In German, the DP-complement of an adjunct-PP is an extraction island. [Raising]
6. In German, adpositions of the *mit*-class are obligatorily prepositional if they combine with an inanimate phrasal complement and obligatorily postpositional if they combine with an inanimate pronominal complement. [Raising, Matching]
7. In German, restrictive and non-restrictive relative clauses typically are identical in form. However, the Raising/Matching derivation has been limited to restrictive RCs. [Raising, Matching]

2.3.1 In English, external arguments are extraction islands.

Subject Condition:

- (28) a. *Who_i did [_{SUBJ} pictures of t_i] give Mary a headache?
b. the person_i [_{SUBJ} who t_i] gave Mary a headache

2.3.2 In German, no part of a genitive specifier of DP can be extracted.

Left Branch Condition 1:

(29) *Wessen_i hat [t_i Tochter] das Pulver erfunden?
whose has daughter the gunpowder invented
'Whose daughter invented gunpowder?'

(30) der Mann_i [dessen^{gen} t_i Tochter] das Pulver erfand
the man whose daughter the gunpowder invented
'the man whose daughter invented gunpowder'

2.3.3 In German, no part of a dative specifier of DP can be extracted.

Left Branch Condition 2:

- (31) *Wem_i hat [t_i seine Tochter] das Pulver erfunden?
whose has his daughter the gunpowder invented
'Whose daughter invented gunpowder?'
- (32) der Mann_i [dem^{dat} t_i seine Tochter] das Pulver erfand
the man whose his daughter the gunpowder invented
'the man whose daughter invented gunpowder'

2.3.4 Non-pronominal specifiers of DP are marked with 's in English. (argument due to Alex Grosu)

- (33) a. [_{DP} [_{DP} the woman's] car] was stolen
b. the woman whose car was stolen
c. *the woman [_{DP} [_{DP} whose _'s] car] was stolen
d. *the woman's [_{DP} [_{DP} whose _] car] was stolen

2.3.5 In German, the DP-complement of an adjunct-PP is an extraction island.

Condition on Extraction effects:

- (34) *[Welchem Tag]_i hatte Petra [_{PP} an t_i] Urlaub?
which day had Petra on vacation
'Which day did Petra take off?'
- (35) der Tag_i, [_{PP} an dem t_i]_k Petra t_k Urlaub hatte
the day on which Petra vacation had
'the day that Petra took off'

If Huang (1982)'s Condition on Extraction Domains (CED) is valid, then the structural type of adverbial relative clause should be universally impossible. But:

- (36) a. the place_i [_{CP} [_{AdvP} where t_i] I would like to be buried one day]
b. the reason_i [_{CP} [_{AdvP} why t_i] I can't come]
- (37) der Ort_i [_{CP} [_{AdvP} wo t_i] ich mal begraben werden möchte]
the place where I sometime buried be want
'the place where I want to be buried one day'
- (38) der Grund_i [_{CP} [_{AdvP} warum t_i] ich nicht kommen kann]
the reason why I not come can
'the reason why I will not be able to come'

2.3.6 German *mit*-class adpositions

In German, adpositions of the *mit*-class are obligatorily prepositional if they combine with an inanimate phrasal complement and obligatorily postpositional if they combine with an inanimate pronominal complement

- (39) Wir hatten [_{PP} mit dem Anruf (*mit)] gerechnet.
we had with the call with expected
'We had expected the phone call'
- (40) Wir hatten [_{PP} (*mit) da mit] gerechnet.
we had with it with expected
'We had expected the phone call'

Interrogative clauses respect this generalization:

- (41) [_{PP} (*Mit) wo mit] hattet ihr nicht gerechnet.
with what with had you not expected
'What did you not expect?'

Under raising and matching, relative clauses violate the empirical generalization:

- (42) etwas Schreckliches_i, [_{PP} (*mit) [wo t_i] mit] wir nicht gerechnet hatten
something terrible with what with we not expected had
'something terrible that we had not expected to happen'

2.3.7 In German, restrictive and non-restrictive relative clauses are identical in form. However, the Raising/Matching derivation has been limited to restrictive RCs.

- (43) das Bild, das im Wohnzimmer hängt
the picture which in the living room hangs
'the picture(,) which is hanging in the living room'

2.4 Hydras and split antecedents

- (44) the man and the woman [who t] were arrested ...
(45) John saw a man and Mary saw a woman [who t] were wanted by the police.

(Alexiadou et al. 2000:13f)

Alexiadou et al. (2000:14): "It seems rather far-fetched to suppose that the antecedents in [(45)] could have originated inside the relative clause ... and then be split and distributed across two clausal conjuncts after raising ..."

- (46) The boy and the girl who met in secret were discovered by her parents.

2.5 Conclusion

In the balance, the adoption of the Raising and Matching Analyses leads to a serious loss of empirical generalizations in syntax and morphology. The only advantage of these theories comes from their handling of reconstruction effects:

	Morpho-lexical Generalizations	Syntactic Generalizations	Reconstruction Effects	Hydras and Split Antecedents
Raising	X	X	(√)	X
Matching	X	(X)	(√)	X
Modification	√	√	X	X

3. Our research agenda

Our goal

Extend the modification analysis of restrictive relative clauses in such a way that it can:

- capture reconstruction effects without literal syntactic reconstruction and
- give a satisfying account of hydras and split antecedents.

3.1 Idiom reconstruction

Idioms show variable degrees of flexibility.

3.1.1 Idiom types

Syntactically frozen idioms:

(47) *kick the bucket*

Active: John kicked the bucket.

Passive: *The bucket was kicked by John.

Relative: *This is the bucket that John kicked.

Syntactically invariable idiomatic expressions are analyzed in terms of phrasal lexical entries.

(Wasow et al. 1980, Nunberg et al. 1994, Jackendoff 1995)

Syntactically semi-flexible idioms:

(48) *spill the beans*

Active: John spilled the beans.

Passive: The beans were spilled by John.

Relative: *These are the beans that John spilled.

Syntactically flexible idioms:

(49) *pull strings*

Active: John pulled some strings to get the job.

Passive: Strings seem to be pulled every time he applies for a promotion.
(Horn:2003:261)

Relative: The strings that Pat pulled helped Chris get the job. (Wasow et al. 1980:93)

	in situ	A-chain θ -marked by V	head's index θ -marked by V
<i>kick the bucket</i>	✓	*	*
<i>spill the beans</i>	✓	✓	*
<i>pull strings</i>	✓	✓	✓

(Webelhuth 2011)

NB: Relative pronouns inherit the LID-value of the noun.

Residual problem: idiom licensing and Principle C in combination:

(50) a. *[The [headway on Mary_i's project] [she_i had made]] pleased the boss.

b. [The [headway on her_i project] [Mary_i had made]] pleased the boss.

(Sauerland 2003)

Webelhuth (2011)'s lexico-syntactic approach can cope with the idiom reconstruction in (50) but does not tie idiom reconstruction to binding-theoretic reconstruction.

Yet idiom reconstruction and binding-theoretic reconstruction may not always go together anyway:

Heycock (2011) denies condition C effects in English for idiom reconstruction:

(51) This represents the only headway on Lucy's problem that she thinks they have made so far.

Heck (2005) and Salzmann (2006) claim that the grammaticality contrast between (10) and (11), repeated here as (52a.) and (52b.)

(52) a. the picture of Bill that he likes

b. *the picture of Bill that he took

does not arise in German:

(53) die Reden von Fritz_i, die er_i gerne schwingt

Webelhuth (personal communication):

(54) Nur die Bilder der Bundeskanzlerin_i, die [?]sie_i/diese_i/sie_i selbst_i/sie_i persönlich_i gemacht hat, dürfen auf die Homepage des Bundeskanzleramtes gestellt werden.

The data problem

“[T]he data seems to be murky” (Bhatt 2002:85).

“There seems to be some interesting speaker variation concerning variable binding in relative clauses” (Sauerland 2003:fn.2).

“The preceding subsections have shown that the Condition C facts are extremely delicate, often leading to conflicting judgments. Pending further descriptive work, any evaluation of these approaches will have to assume a particular empirical basis which might not do justice to all of them” (Salzmann 2006:73).

3.1.2 External cooperations

Cooperation with the DFG-Project *Syntax/Semantik-Konfigurationen in Relativsätzen mit externen und internen Köpfen* (led by Manfred Krifka, Berlin) in order to compare three methods to resolve reconstruction effects:

1. Berlin: LF movement
2. Berlin: type raising
3. Frankfurt: underspecified semantics (Minimal Recursion Semantics (MRS), Lexical Resource Semantics (LRS)) + Barker’s continuations or Sternefeld’s telescoping

Cooperation with Berlin and the Courant Research Center “Text Structures” in Göttingen (CRC) in order to design and conduct experiments to clarify the data concerning reconstruction effects.

3.2 Binding-theoretic Reconstruction Effects

Principle A

(55) The [interest in each other_i]_k [_{CP} that John and Mary_i showed t_k] was fleeting.

(Schachter 1973)

Variable binding effects

(56) The [relative of his_i]_k [_{CP} that everybody_i likes t_k] lives far away.

(Sauerland 2003)

Sternefeld's worst case scenario for raising:

(57) The picture of his_i mother that every soldier_i kept t wrapped in a sock was not much use to him_i.

(Safir 1999:613)

Sternefeld (2011) observes two core problems:

- *every soldier* must have scope over the entire subject phrase
- *every soldier* must be able to bind *him* in the matrix clause

and concludes: "In any case syntactic reconstruction is insufficient to handle these examples."

Hulsey and Sauerland (2006)'s proposal: QR out of RC.

Barker's continuations: "'semantic reconstruction': no movement or copy-movement; reconstruction interpreted as delayed evaluation" (Barker 2011). Barker will be coming to Frankfurt and we will attempt to emulate a continuation-based semantics within constraint-based grammar.

3.3 Attachment problem

(58) the man and the woman [who t] were arrested ...

The sentence in (58) cannot be analyzed à la Partee by attaching the RC below the determiner.

(59) John saw a man and Mary saw a woman [who t] were wanted by the police.

(60) A man walked into the room and then a woman did. THEY fell in love.

Split antecedent with a plural pronoun in the following sentence might be adaptable to the treatment of relative clauses.

Kiss (2005)'s theory of generalized modification postulates an anaphoric relation between the relative pronoun and the restrictor of the head noun.

3.4 Overview over our specific objectives

- adopt the Modification Analysis and try to capture reconstruction effects semantically (or, as an alternative, syntactically, if recourse to literal raising or matching can be avoided)
- design and conduct experiments to validate the data to be analyzed
- make headway on Webelhuth (2011)'s idiom theory by incorporating a mechanism capable of analyzing Safire-style sentences
- use Barker's continuation semantics to derive variable binding effects
- employ a combination of Generalized Modification and an underspecified semantics to account for hydras and split antecedents
- check the compatibility of the above-mentioned theories and, if possible, implement them in a constraint-based syntactic framework

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