Synchronic theory and semantic change
Matching relatives in Middle English

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We (Nik and me) are interested in the emergence of headed *wh*-relative clauses.

There appears to be a robust pathway from correlative to free relative, to nonrestrictive headed relative, to restrictive relative.

Diagnosing restrictiveness is fraught with problems in purely textual data.

In this talk, I draw on insights from formal semantics to establish distributional diagnostics for nonrestrictive relative clauses in Middle English.

This allows us to correlate the pathway with distributional evidence.

However, our findings on Middle English also inform debate over the syntax of present-day relatives.
Roadmap

1. Distributional evidence for semantic change
2. Relative clause types
3. English: 3500BC–1500AD
4. Nonrestrictiveness of *which* *N'-relatives*
5. Discussion
Section 1

Distributional evidence for semantic change
The grammaticalization literature (e.g. Traugott & Dasher 2002) is exercised with data like (1).

(1) a. I am going to London (to marry Bill).
    b. I am going to marry Bill.
    c. If interest rates are going to climb, we’ll have to change our plans.
    d. *If interest rates will climb, we’ll have to change our plans. (Hopper & Traugott 2003)

- *marry Bill* is not a place you can go to.
- *interest rates* are not the kind of things that can go.
- So we know that the meaning of *go* has changed.
What collocations are good for

- Collocational evidence is often able to diagnose **primary grammaticalization**.
  - Spatial motion $\rightarrow$ (abstract) temporal motion
- Wider set of collocates $\rightarrow$ loss of semantic selectional restrictions $\rightarrow$ bleaching.
- Not all semantic change works like this.
- **Secondary grammaticalization** may have little direct collocational evidence.
  - Demonstrative $\rightarrow$ definite article
- And yet, distributional evidence is all we have in diachronic semantics.
  - Obligatoriness of article
- The challenge is to relate distributional changes to denotational changes.
Section 2

Relative clause types
Free vs. headed relatives

- A **free relative** is a clause with the external distribution of an NP.
- A **headed relative** is a clause that modifies a noun.
- Both are syntactically subordinate.
- A headed relative can be introduced by an inflecting phrase (a relative specifier), an uninflecting particle (a relative complementizer), both or neither.

\[(2) \quad \begin{align*} 
\text{a.} & \quad \text{The food} & \quad \emptyset & \quad \text{which} & \quad \text{she ate} \\
\text{b.} & \quad \text{What she ate} & \quad \text{that} & \quad \text{which} & \quad \text{that} 
\end{align*} \]

- Indo-European relative specifiers tend to be formed from demonstratives or interrogatives.
Restrictive vs. nonrestrictive headed relatives

- A **free relative** denotes a (maximal) individual with a specified property.

  (3) Who(ever) left: $\nu x. [person'(x) \land left'(x)]$

- A **nonrestrictive** relative denotes a proposition containing a discourse anaphor.

  (4) The person, who left: $\nu x. [person'(x)] \bullet left'(y)$

- A **restrictive** relative denotes a property which modifies a nominal property.

  (5) The person who left: $\nu x. [person'(x) \land left'(x)]$
Maximization and free relatives

- English free relatives are definite descriptions (Jacobson 1995), and therefore maximizers.

(6) I ate [what he cooked].

- Two factors can obscure this, but not invalidate it:

(7) I eat [what he cooks].

  2. -ever can indicate ignorance or indifference (von Fintel 2000) regarding the referent of the free relative.

(8) I will eat [whatever he cooks].

Standard analyses of both treat the free relative as a definite description within the scope of a quantifier over situations or worlds.
Maximization and nonrestrictive relatives

- Discourse anaphors (including *wh*-phrases in nonrestrictive relatives) are maximizing (Evans 1980).
- This yields contrasts like (9) (Sells 1985: 19).

(9)  

a. Each farmer owns some sheep, which the State buys in the Spring.  
(→ state buys all the sheep)  
b. Each farmer owns some sheep that the State buys in the Spring.  
(→ state may not buy all the sheep)

- So free relatives and nonrestrictive relatives both involve maximization, but in different ways.
  - Free relative: maximal individual.
  - Nonrestrictive relative: proposition about maximal individual.
- The free > nonrestrictive pathway followed by English can be thought of in terms of scope of the maximization operator.
Section 3

English: 3500BC–1500AD
The emergence of headed *which*-relatives is part of a wider set of changes in English:

- Old English demonstrative relative constructions abruptly disappear.
- *Wh*-forms are gradually co-opted in their place.

Free relatives provided the source for headed *wh*-relatives (Truswell & Gisborne 2015).

It is tempting to attribute the emergence of headed *wh*-relatives to the loss of demonstrative relatives.

However, *wh*-relatives have emerged in other Germanic languages without anterior loss of demonstrative relatives.

The *wh*-relative strategy emerges repeatedly across the Indo-European family.

We can understand this better by tracking the history of *wh*-forms, rather than the history of relative clauses (Gisborne & Truswell 2016).
Prehistory: Early IE correlatives

- English *wh*-forms and cognates are descended from PIE *kʷi*/ *kʷo*.
- Original functions: probably interrogative and (restricted) indefinite (e.g. Belyaev & Haug 2014).
- Belyaev & Haug: bipartite asyndetic conditional structure + *wh*-indefinite $\rightsquigarrow$ correlative.

\begin{equation}
(10) \quad [\text{kuiš}=\text{an}=\text{šan} \quad \text{EGIR}-\text{pa tarnai}] \ \text{n}=\text{an} \quad \text{WH}=\text{him}=\text{PTCL} \ \text{back} \quad \text{lets} \quad \text{PTCL}=\text{him} \\
\text{šakuwanzi} \quad \text{they.imprison} \\
\text{‘If anyone lets him back, they will imprison him.’} \ \rightsquigarrow \quad \text{‘Whoever lets him back, they will imprison him.’} \\
\quad \text{(Garrett 2008, conditional ‘back-formation’ ours)}
\end{equation}

- Early IE did not have embedded relatives (Clackson 2007); later headed *wh*-relatives descend from structures like (10).
Correlatives are rare (< 3% of languages in Dryer 2013) and overrepresented in IE (De Vries 2002).

Correlatives with interrogative forms are even rarer.

Headed *wh*-relatives are just as rare.

<table>
<thead>
<tr>
<th></th>
<th>IE</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wh-RC</td>
<td>19 (47.5%)</td>
<td>3 (2.3%)</td>
</tr>
<tr>
<td>Other</td>
<td>21 (52.5%)</td>
<td>129 (97.7%)</td>
</tr>
</tbody>
</table>

Table 1: Headed *wh*-relatives in 172 languages (based on De Vries 2002)

So *wh*-forms have followed a secondary grammaticalization pathway which recurs across IE but is very rare in other languages.
Universal $\rightsquigarrow$ definite \textit{wh}-correlatives (Belyaev & Haug 2014);

Loss of multiple correlatives (unattested in English written record);

Generalization from clause-initial $\rightsquigarrow$ clause-peripheral position.

By the start of the written history of English, correlatives have morphed into left-dislocated free relatives + resumption.
OE free *wh*-relatives
Clause-initial, generalizing, *swa* obligatory

(11) [Swa *hwylc* eower *swa næfð* nane synne on
So which you.GEN.PL so NEG.have no sin in
him], awyrpe se ærest ænne stan on hy
him, cast.out.SBJ he first one stone on her
‘He that is without sin among you, let him first cast a
stone at her.’ (coaelhom,+AHom_14:214.2117, c.990)

(12) Soðlice [swa *hwar* swa Israhela bearn *wæron*], þar
Truly so where so Israel’s children were, there
wæs leoht.
was light
‘all the children of Israel had light in their dwellings.’
(cootest,Exod:10.23.2788, c.1050)
OE free \( wh \)-relatives

Clause-final, optionally generalizing, \( swa \) optional

(13) Fyres \( gecynd \) is \( þæt \) hit fornymð \[ swa \( hwæt \) swa \]

Fire.\textit{GEN} nature is that it consumes so what so

\[ \text{him } gehende bið]. \]

\[ \text{it.DAT near } is \]

‘Fire’s nature is that it consumes whatever is near it.’

(\text{cocathom1, +ACHom}_l, _22:360.152.4446, c.990)

(14) Gemyne, \[ hwæt \] Sanctus Paulus cwæð]

Remember what Saint Paul said

‘Remember what Saint Paul said.’

(\text{cogregdC, GDPref}_and_3_[C]:15.207.28.2739, c.1075)

- Presence of \( swa \), not position, determines interpretation.
- \( Swa \approx -ever \) (Truswell & Gisborne 2015).
- OE free relatives are definite descriptions, as described above.
Free *wh-*relatives > headed *wh-*relatives

- Early Middle English: erosion of OE system.
- *swa* . . . *swa* > *se* (> *so*ever).
- *What* starts occurring with *N*′.
- *Which* *N*′ almost never occurs with *se* (2/14 tokens); *what* *N*′ almost always does (11/15 tokens).

(15) [Context: the journey from heaven to hell and back]

a. wiche strides he makede dunward. and which strides he made downwards and eft upwards afterwards upwards

   (cmtrinit-mx1,111.1511)

b. te33 . . . foll3henn ure Laferrd Crist Whatt they follow our Lord Christ what gate summ he ganngeþþ way SE he goes

   (cmorm-m1,l,285.2358)
Free *wh*-relatives > headed *wh*-relatives

- *Which* is specializing for regular, ‘definite’ interpretations, which overlap significantly with nonrestrictive headed relative interpretations (e.g. De Vries 2006)
- *What* is specializing for ‘ignorance and indifference’ interpretations, which are specifically free relative.
- The interpretive overlap makes reanalysis of *which* as headed relativizer more plausible.

(16) a. \(\ldots \text{NP}_i \ldots \text{FR}_i\)
    b. \(\ldots [\text{NP} \ldots t_i] \ldots \text{RC}_i\)

- Because of significant similarities between appositive free relatives and nonrestrictive headed relatives, no clear date for emergence of headed *which*-relatives.
Early Middle English headed relatives

- Demonstrative relatives largely disappeared with the collapse of case inflection c.1100.
- But *wh*-relatives weren’t a direct replacement (Gisborne & Truswell 2016).
  - *where* and *there* coexisted for c.200 years.
  - Argumental *se*-relatives disappeared 100 years before argumental *wh*-relatives emerged.
- The first *wh*-relatives emerged in the low-frequency, low accessibility shadows, c.1150.
- Headed relatives with *which* followed c.1350, then *whom* (c.1400), and *who* (c.1500).
- All of this coexisted with stable, high-frequency relativization with *that* and ∅.
Demonstrative and interrogative relatives over time

Proportion of relatives with filled Spec, YCOE + PCMEP + PPCME2

Red = *wh*-rels, NP gaps; Blue = *wh*-rels, PP gaps.
Section 4

Nonrestrictiveness of *which* $N'$ relatives
The problem with intuitions

- The first headed relatives are all clause-final.
- They generally seem nonrestrictive.
- Assuming nonrestrictiveness allows for a simple specification of the reanalysis, in terms of scope of the maximization operator.

(17)  

a. \( \exists x. (\text{boy}'(x) \land \text{saw}'(j, x)) \)  
b. \( \text{saw}'(j, \exists x. (\text{boy}'(x))) \)  
c. \( \lambda x. (\text{boy}'(x) \land \text{saw}'(x)) \)  

- (There is a change, contra De Vries 2002: appositive relatives denote propositions; free relatives typically denote individuals).
- But do we know that they’re all nonrestrictive?
A distributional test for restrictiveness

- A test for restrictiveness from Sells (1985):
- Discourse anaphors cannot have opaque antecedents.

(18) Nobody; turned up. #He; was angry

- Because nonrestrictive relativizers are discourse anaphors, only restrictive relatives can modify opacity-inducing quantifiers (no, few, little, every, but cf. all).

(19) a. No person who left
    b. *No person, who left
Properties of early headed which relatives

According to this diagnostic, restrictive which-relatives are initially rare, but not nonexistent.

(20) a. he is emperour of him-zelue. þet is of his bodye: and of he is emperor of himself that is of his body and of his herte. [huiche he demþ and halt ine guode payse] his heart which he deems and holds in good weight huerof he deþ his wyl. whereof he does his will

(cmayenbi-M2,85.1658, 1340)

b. and for no richesse ye shullen do no thyng [which may in and for no riches you shall do no thing which may in any manere displese God]

any manner displease God

(cmctmeli-m3,234.C1.665)
Which \( N' \) relatives are nonrestrictive

- However, there are no examples of a \( Which N' \)-relative modifying an opacity-inducing quantifier (not even \textit{all}).
- How surprising is this?
  - 4,691 NPs with opacity-inducing quantifiers + RCs, of which 588 have \textit{which} (12.5%).
  - 19,250 \textit{which}-relatives, of which 1,672 have \textit{which} \( N' \) (8.7%).
  - If the two properties were independent, you might expect roughly \( 588 \times 0.087 = 51 \) hits.
- A slightly fancier version of the same estimates the frequency year-by-year, calculates an expected value for each text, and sums them. Expected: 50 hits. \( p = 0.05 \) threshold value: 21 hits.
- So 0 hits is very surprising.
Expected which N' with opacity-inducing antecedent
Nonrestrictiveness is independent of choice of N′

- The N′ inside the relative could be identical to the antecedent (overtly matching relatives).

  (21) the before knowing of God, which before knowing of God 
  bhiouoldith so without fayling thingis to comynge
  ‘the foresight of God, which foresight of God beholds so 
  infallibly things to come’ (cmpurvey-m3,l,55.2216)

- Or it could be different, standing in a variety of discourse 
  relations to the antecedent (nonmatching relatives).

  (22) Asa, kyng of Juda, . . . had sore feet, whech passioun our 
  bokys sey it was podegra
  ‘Asa, king of Judea, had sore feet, which suffering our books say 
  was gout’ (cmcapchr-m4,33.43)

- Initially, almost all which N′ relatives were overtly matching 
  relatives.

- But both kinds are still categorically nonrestrictive.
The grammar of *which* changes; the N’ restriction doesn’t

- *Which N’* declines over time, frequency of *which* with opaque antecedents increases in lockstep.
- Among *which N’* relatives, overtly matching relatives decline while nonmatching relatives become the norm.
- We even see a significant by-text correlation between frequency of overtly matching *which N’*-relatives and frequency of *which* modifying opaque antecedents.
- No significant correlation with frequency of nonmatching *which N’*-relatives.
- All of this suggests significant changes c.1350–1800 in the grammar of *which*.
- But no matter what a speaker’s grammatical representation of *which* was, that grammar didn’t permit restrictive *which N’*-relatives.
Nonrestrictiveness and *which N’*

Frequency of *which* in negative opaque contexts (blue), Frequency of *N* with *which* (red)
Diachrony of overtly matching relatives

[Graph showing the percentage of internal heads as a percentage of all 'Which N' over a period from 1400 to 1800, with a downward trend indicated by a line and shaded area.]
Matching and restrictiveness

Overtly matching

Nonmatching

Year

Which

Frequency of overtly matching relatives/Which
Frequency of nonmatching relatives/Which

Year

Which

Frequency of overtly matching relatives/Which
Frequency of nonmatching relatives/Which

Nonmatching

Overtly matching
Section 5

Discussion
Nonrestrictiveness makes sense

- Maximizing relatives: amount relatives, free relatives, some internally-headed relatives, correlatives.
- Grosu & Landman’s generalization: a head noun in maximizing relatives is interpreted internal to the relative.

(23) I read the books that there were on the table:
‘I read the unique individual composed of \(d\)-many books s.t. \(d\) is the maximal amount s.t. there are \(d\)-many books on the table.’

- *Books* does dual duty: I read books (RC-external), but also the predicate *books* is one of the restrictors that determine the restrictor of \textsc{max} (RC-internal).
- (Grosu & Landman have machinery in place to ensure that *books* need only be interpreted in one position, even if it does two jobs.)
Nonrestrictiveness makes sense

- Sells (1985): nonrestrictive relatives are discourse anaphors
  - Explains prohibition against antecedents in opaque environments.

(24)  
a. John has a wife. She is sitting next to him.
   b. John is married. ??She is sitting next to him.  
   (Heim 1990: 166)

(25)  
\[
X \text{ S } Y \text{ NP}_i \ Z \Rightarrow 1 \ 2 \ 3 \ 4 + 2 \ 5 \ 
\text{conditions: 4 is a pronoun}
\text{2 is of the form } [s \ \text{NP}_i \ S] 
\]

- Elbourne (2001) recasts NP-copying as NP/N'-deletion.
- Overtly matching relatives show what happens without deletion.
Restrictiveness makes less sense

- Standard accounts of restrictive relative semantics (e.g. Heim & Kratzer 1998) involve conjunction of predicates.

(26) I read the books that were on the table.
    ‘I read the $x: \text{book'}(x) \land \text{on'}(x, t)$’

- Although nothing goes wrong truth-conditionally if N is also interpreted within the restrictive relative, this is redundant.

(27) ‘I read the $x: \text{book'}(x) \land \text{book'}(x) \land \text{on'}(x, t)$’

- In sum:
  - Head nouns are interpreted inside maximizing relatives (Grosu & Landman 1998).
  - This applies equally to nonrestrictive relatives, although possibly for different reasons (Sells 1985, Elbourne 2001).
  - Head nouns inside restrictive relatives are redundant, and so probably not there.
Plentiful high-quality data

Internal realization of head nouns

- Early headed *which*-relatives frequently have a full *which*-NP, not just pronominal *which*.

(28) How Kyng Arthure ȝaf bataile to þe Emperour, [in þe how King Arthur gave battle to the Emperor in the whiche bataile þe Emperoure was slayn].

This reflects the likely source of headed *which*-relatives in free relatives (almost always of the form *which N*).

- If the head noun is pronounced RC-internally, it must be interpreted there.
  - E.g. no QR-like mechanism to get N out of the RC.
- Therefore pronunciation of N within RC implies interpretation of N within RC.
  - ... which implies nonrestrictive interpretation.
- RCs without overt head nouns could be restrictive or nonrestrictive.
Diagnosing nonrestrictiveness is easy now

- *Which N’* → nonrestrictive.
- But *which N’* is visible, unlike restrictiveness.
- And the classification of examples according to whether the *which*-phrase contains a noun is crisp, unlike classifications according to restrictiveness.
The entire pathway is visible

- We now have distributional evidence for each step in a complex series of semantic changes.
  - Erosion of *swa* . . . *swa*;
  - Loss of *which* *N’*;
  - Co-occurrence with *no* *N*, etc.
Synchronic formal semantics can generate new distributional hypotheses

- There is no common-sense reason to associate presence of N with nonrestrictiveness.
- It is only because of the work of Evans, Sells, Heim, Kadmon, etc. that we can propose this distributional diagnostic.
Many current analyses (e.g. Hulsey & Sauerland 2006) use copies to account for reconstruction phenomena involving relatives.

(29)  a. The pictures of each other that the twins took.
     b. The headway that we made.

Overtly matching relatives look a lot like pronounced copies. But the interpretation isn’t what copy-theory would like.
  ▶ Overtly matching relatives are nonrestrictive.
  ▶ Reconstruction effects are largely in restrictive relatives.

So maybe this historical structure can inform debate on the analysis of reconstruction.


