Synchronic theory and semantic change
Maximization and Middle English *which*-relatives

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Introduction

- We 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 paper, we draw on insights from formal semantics to establish a distributional diagnostic for nonrestrictive relative clauses in Middle English.
- This allows us to correlate the pathway with distributional evidence.
- Our case study today is *which*. 
Roadmap

1. Distributional evidence for semantic change
2. Relative clause types
3. English: 3500BC–1500AD
4. Synchronic semantics to the rescue
5. Conclusions
Section 1

Distributional evidence for semantic change
Collocations and meaning

- 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 → (abstract) temporal motion
- Wider set of collocates → loss of semantic selectional restrictions → bleaching.
- Not all semantic change works like this.
- Secondary grammaticalization may have little direct collocational evidence.
  - Demonstrative → 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.

\[(2) \quad \text{a. The food} \quad \frac{\emptyset}{\text{that}} \quad \frac{\text{which}}{\text{which that}} \quad \text{she ate} \]

\[\text{b. What she ate} \]

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

- A **restrictive** relative denotes a property which modifies a nominal property.
  
  (3) The person who 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 discourse anaphor needs an accessible antecedent (Evans 1980, Sells 1985) $\rightarrow$ nonrestrictive relatives cannot modify opacity-inducing quantifiers.

  (5) *No person, who left
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

- The *wh*-phrase in English nonrestrictive relatives is a discourse anaphor (Sells 1985).
- Discourse anaphors 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. \((\rightarrow \text{state buys all the sheep})\)
   b. Each farmer owns some sheep that the State buys in the Spring. \((\rightarrow \text{state may not buy all the sheep})\)

- So free relatives and nonrestrictive relatives both involve maximization, but in different ways.
  - Free relative: maximal individual.
  - Nonrestrictive relative: proposition about maximal individual.
- We are looking at a free > nonrestrictive pathway.
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 *kw*/*kwo*.

- Original functions: probably interrogative and (restricted) indefinite (e.g. Belyaev & Haug 2014).

- Belyaev & Haug: bipartite asyndetic conditional structure + *wh*-indefinite $\leadsto$ correlative.

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

- 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)

We’re investigating a secondary grammaticalization pathway which recurs across IE but only very rarely in other languages.
On contact

- Comrie (1998): *wh*-relatives are a European, not an IE phenomenon.
  - Also attested in neighbouring unrelated languages.
- However, fine details of varieties in contact are rarely similar.
  - Middle English vs. Medieval French (Sakalauskaite 2016).
  - Early Modern Icelandic vs. ENHG (Youmerski 2016).
- Plausible contact situations aren’t always in evidence.

(11) de fout *wie* hun eigenlijk maken

  the mistake who they actually make
  ‘the mistake which they actually make’

  (Johan Cruyff, via Boef 2012)

- So contact can’t explain everything.
- (See also Poplack et al. 2012 on French P-stranding.)
Universal $\leadsto$ definite $wh$-correlatives (Belyaev & Haug 2014);

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

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

By the start of the written history of English, correlatives have morphed into left-dislocated free relatives + resumption.
(12) [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)

(13) 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

(14) Fyres  
    gecynd is þæt hit fornymð  
    [swa  
    Fire.\text{GEN} nature is that it consumes so what so  
    him  
    it.\text{DAT} near  
    ‘Fire’s nature is that it consumes whatever is near it.’
    (cocathom1,+ACHom\_l,\_22:360.152.4446, c.990)

(15) Gemyne,  
    [hwæt  
    Remember what Saint Paul said  
    ‘Remember what Saint Paul said.’
    (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.
Latent structural ambiguity

- Clause-final definite free relatives could in principle be used appositively.

\[(16) \quad \ldots \text{NP}_i \ldots \text{FR}_i\]

- This permits the following reanalysis.

\[(17) \quad \ldots \left[\text{NP} \ldots t_i\right] \ldots \text{RC}_i\]

\[(18) \quad \text{Þa \ cwæð \ ic \ to \ him, Æteowe \ me \ [þa \ byrigelles \ [hwar \ ic \ þe leigde]].}]

\(\text{‘Then said I to him show me the tomb where I you laid’.}\)

Se Hælend me þa beo þære rihthand genam and me ut lædde [hwar ic hine byrede]
\(\text{‘The Saviour then took me by the right hand and led me out to where I buried him’} \quad (\text{coniCodC,Nic_[C]:149.161–2,c.1150})\)
Early Middle English free relatives

- Various aspects of the OE free relative system disintegrated in early ME.
- *Which-FRs* almost never occur with explicit indicators of generality (*se, ever*) after 1200.
- Bare *which-FRs* can be interpreted as generalizing.

(19) a. beo he hwuch-se eauer beo
    be.SBJ he which-so ever be.SBJ
    ‘whichever he may be’ (cmhali-m1,152.352)
    b. Bo wuch ho bo (OwlNight,116.1378.751)

- *What-FRs* behave much as in OE through Middle and Early Modern English: generalizing with *se* or *ever*; often definite without.
- In other words, *which* largely leaves the FR system before entering the HR system. *What* apparently specializes as free relativizer in its absence.
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.
Early *which/whom/who*-relatives

(20) 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 dep his wyl. whereof he does his will

(cmayenbi-M2,85.1658, 1340)

(21) But he [whom God hath sent], spekith the wordis of God but he whom God hath sent speaks the words of God

(cmntest-M3,3,20J.234, c.1395)

(22) This declaryth the Mayster of the storyes [who so lyste this declares the master of the stories who so wants to see it].

to see it

(cmfitzja-M4,A5R.71, 1495)
The first headed relatives are all clause-final.
They all *seem* nonrestrictive.
This allows for a minimal specification of the reanalysis, in terms of scope of the maximization operator. Restrictive relatives would be further from the source construction, in that they do not involve maximization.

\[(23)\]
\[
a. \ i\!x. (boy'(x) \land saw'(j, x)) \\
b. \ \lambda P. [P(i\!x. (boy'(x)))](\lambda y. saw'(j, y)) \\
c. \ \lambda x. (boy'(x) \land saw'(x))
\]

(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?
Sparse high-quality data

- A robust indicator of restrictiveness: only restrictive relatives can occur under opacity-inducing quantifiers.
- There are no such examples with *which*-relatives prior to c.1450.

(24) and anone he saw he was in a wylde mounteyne whych was closed with the se nyghe all aboute, that he myght se no londe aboute hym [whych myghte releve hym], but wylde bestes.

(cmmalory-M4,664.4760, 1470)

- But such examples are rare anyway — insufficient data to distinguish real from accidental gaps.
Plentiful low-quality data

▶ Textbook examples of restrictiveness often work like this:

(25)  a. A car which I bought last year . . .
    b. The car, which I bought last year, . . .

▶ This might suggest that indefinite antecedents correlate in some way with restrictiveness.
▶ They don’t, and given the Kamp/Heim treatment of indefinites, we shouldn’t expect them to.
▶ And intuitions about restrictiveness break down in the face of corpus examples.

(26)  Þa cwæð ic to him, æteowe me [þa byrigeles
Then said I to him show me the tomb
[hwar ic þe leigde]].
where I you laid
‘Then I said to him, “Show me the tomb where I laid
you”.’
We need more good data

- There is plentiful evidence for the endpoints of the change:
  - OE $wh$-relatives are all free;
  - Early Modern English restrictive $wh$-relatives are well-attested.
- There is a natural series of reanalyses:
  - Free $\rightarrow$ nonrestrictive (clause-final, maximizing);
  - Nonrestrictive $\rightarrow$ restrictive (take nominal antecedents, distinction often unclear).
- But direct evidence for the nonrestrictive-only stage is limited to intuitions and the few examples with opacity-inducing quantifiers.
- We shouldn’t be convinced by the natural story unless it’s supported by more robustly attested data.
Section 4

Synchronic semantics to the rescue
A new generalization

Head nouns in nonrestrictive relatives only

- A relative clause of the form \textit{which N IP} is nonrestrictive.
- The proportion of nonrestrictive \textit{which}-relatives correlates with the frequency of \textit{which N}-relatives.

We will not derive this from first principles, but the following considerations make the generalization natural.

1. \textit{Wh}-phrases in nonrestrictive relatives are maximizing by virtue of being interpreted as discourse anaphors (Evans 1980, Sells 1985).
2. Any ‘head noun’ is interpreted internal to a maximizing relative, and often also pronounced RC-internally (Grosu & Landman 1998).
Internal interpretation of head nouns

- 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.

(27) 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 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.)
Nonrestrictive relatives involve MAX in a different way, but still use a nominal restrictor in the scope of MAX (as with other discourse anaphors; Evans 1980, Elbourne 2001).

(28) If a man owns a donkey, he always beats it.
[[always_{s_1} if a man(s_1) owns(s_1) a donkey(s_1)]_{s_2} he man(s_1) beats(s_2) it donkey(s_1)] (Elbourne 2001: 250)

(29) I read the books, which were on the table.
I read the books \wedge they books were on the table.
Restrictive relatives and head nouns

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

\[(30) \text{ I read the books that were on the table.} \]
\[\text{‘I read the } x : \text{book}'(x) \land \text{on}'(x, t)’\]

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

\[(31) \text{ ‘I read the } x : \text{book}'(x) \land \text{book}'(x) \land \text{on}'(x, t)’\]

- In sum:
  - Head nouns are interpreted inside maximizing relatives (Grosu & Landman 1998).
  - Although nonrestrictive relatives use \(\text{MAX}\) differently, we still expect head nouns to be interpreted inside them (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*.

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

(cembrut3-M3,85.2588, c.1400)

- 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.
Rise of restrictive *which*-relatives

Frequency of *which* in negative opaque contexts (blue), Frequency of N with *which* (red)
Correlation *which N* vs. opacity-inducing quantifiers
Section 5

Conclusions
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.
References


