A constant rate effect without stable functions

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Micro-changes and macro-changes

- What counts as a change in a grammar?
- Small individual-level differences cumulatively engender large-scale syntactic reorganizations.
- That's because the small individual-level differences are not completely random.
- Kroch (1989): a class of changes can be construed as replacement of a form with a competing variant that does the same job.
- The gradual replacement takes place at the same rate across contexts.
- This is the Constant Rate Effect.
- Q1: what are the prerequisites for a CRE to emerge?
- Q2: what kind of tool is the CRE?

Uniformitarianism

- Uniformitarian hypothesis: 'the view that the linguistic behavior of human beings in the past is broadly comparable with that used by our contemporaries'.
- Non-uniformitarian alternative (e.g. Heine & Kuteva 2007): 'modern language was not always as complex as it is now'
- Major non-uniformitarian mechanism: grammaticalization.
  - Lexical $\rightarrow$ functional
  - Bleaching
- This works differently to Kroch's classical CREs:

	Old	New
Kroch	function	form
Gramm.	form	function

- Claim: regardless, the underlying mechanism of competition is the same.

Roadmap

1. Background on grammar competition and the CRE.
2. Data: A Constant Rate Effect in the development of Middle English relative clauses.
3. Discussion: What does this tell us?

Section 1

Grammar competition and the Constant Rate Effect

S-curves are everywhere
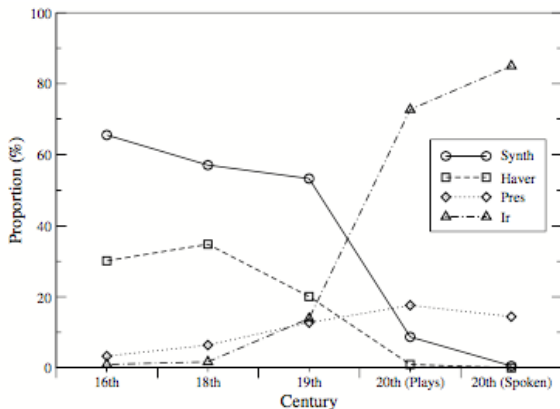
- ▶ Grammar change very often looks like this:

Figure 1 : Future markers in Brazilian Portuguese, from Poplack & Malvar (2007) via Blythe & Croft (2012)

S-curves are everywhere

- ▶ We've known this for a long time.

  > The process of change in the community would most probably be represented by an S-curve. The rate of change would probably be slow at first, appearing in the speech of innovators, or more likely young children; become relatively rapid as these young people become the agents of differential reinforcement; and taper off as fewer and fewer older and more marginal individuals remain to continue the old forms. (Osgood & Sebeok 1954: 155)

- ▶ See also Weinreich et al. (1968), Bailey (1973), Kroch (1989), Yang (2002), Niyogi (2006), Blythe & Croft (2012), . . .

Deriving an S-curve

- ▶ The common understanding of the derivation of S-curves is already implicit in Osgood & Sebeok (1954). You need:
  - ▶ One (diachronically stable) function, F,
  - ▶ Two competing Lexical Items realizing that function, LI_{Old} and LI_{New}.
- ▶ As more people use LI_{New} to do F, evidence that you should use LI_{New} to do F increases and evidence that you should use LI_{Old} to do F recedes.
- ▶ A simple equation can describe this shape:

$$\ln \frac{p}{1-p} = k + st \tag{1}$$

  (where p is the frequency of one of the the two variants).
- ▶ Equivalently:

$$p = \frac{e^{k+st}}{1 + e^{k+st}} \tag{2}$$

- ▶ Two parameters:
  1. s describes the rate of change (higher = faster);
  2. k describes the intercept.

Varying *s* and *k*

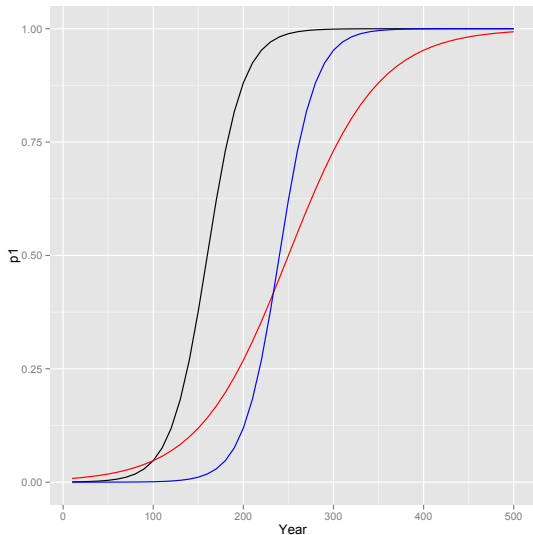
Figure 2 : Logistic functions with different slopes and intercepts

Kroch and Yang (and Borer) on interpreting S-curves

- S-curves reflect competition between pieces of grammars (Kroch 1989, 1994).
- Grammars are just bundles of lexical items and some invariant ways of combining them (Borer 1983, Kroch 1994).
- So S-curves reflect competition between lexical items.
- Speakers have a weighted distribution of such lexical items. The weights reflect correspondences between observed linguistic data and the generative capacity of different grammars (Yang 2002).
- s reflects the extent to which evidence favours the incoming grammar (Yang).
- k reflects the effect of contextual factors (as in classical sociolinguistic variable rule analysis).
- Constant Rate Effects arise if contextual factors are purely additive like this.

The emergence of *do*-support

(1) Madame, sithyn ye know in sertayne, wherefore **do ye aske** hit me?
'Madam, since you now for certain, why do you ask me?'
(cmmalory,636.3829, c.1469)

(2) How **gate ye** this swerd?
'How did you get this sword?' (cmmalory,9.242)

(3) And so, he that vsed to teache, **did not** commonlie **vse** to beate
'And so, he that used to teach did not commonlie use to beat.'
(asch-e1-p2,12R.32, 1563–8)

(4) bodelie labors, wrought by compulsion, **hurt not** the bodie
'Bodily labours, wrought by compulsion, do not hurt the body.'
(asch-e1-p1,9V.171)

Kroch's *do*-support CRE
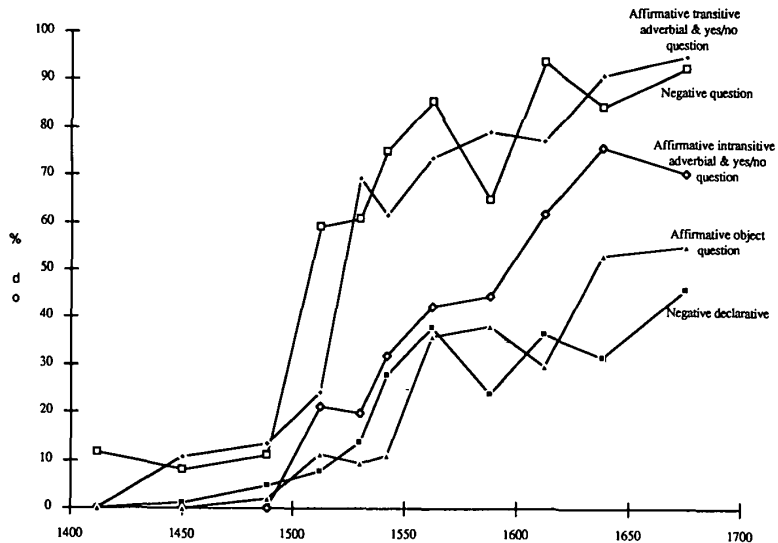
Kroch's *do*-support CRE
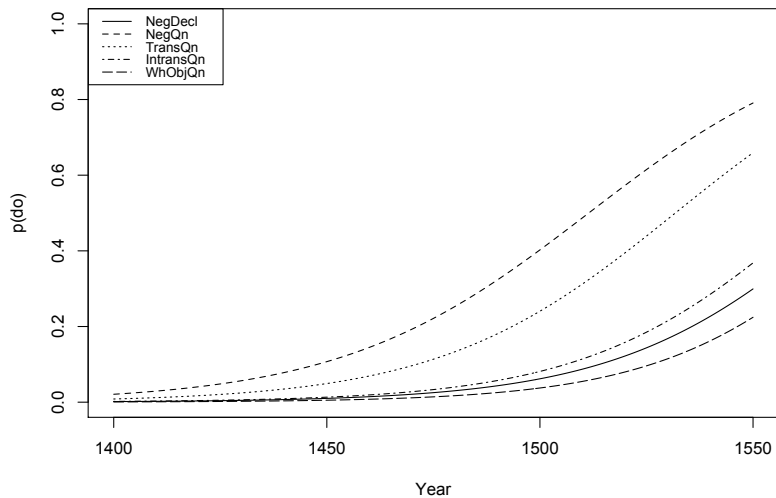
Recap: Kroch's CREs

- A fixed function.
- Multiple competing lexical items realizing that function.
- Some factor globally favouring one of the competing realizations.
- Other factors locally favouring one of the competing realizations in particular contexts.
- No interactions between the two classes of factor.

Section 2

English *wh*-relatives

A partial typology of relative clauses

- 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 and typically interpreted within the scope of the matrix clause.

- A headed relative can be introduced by an inflecting phrase (a relative specifier), an uninflecting particle (a relative complementizer), both or neither.

(5)   a.   The food $\dfrac{\emptyset \mid \text{which}}{\text{that} \mid \text{which that}}$ she ate

       b.   What she ate

Wh-relatives: background

- Headed *wh*-relatives are largely confined to Indo-European.

	IE	Other
Wh-RC	19 (47.5%)	3 (2.3%)
Other	21 (52.5%)	129 (97.7%)

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

- They appear to be absent from PIE and very early IE.
- So this is a recurring change across IE.
  - Visible in the written record of Romance, Germanic (several times over), Slavic, . . .
- The change involved new uses of PIE lexical stock (*$k^w i$-, $k^w o$-).
- The *wh*-forms occupied a grammatical function that could also be populated by demonstratives.
- English saw a loss of demonstrative relative specifiers (c.1150) followed by an emergence of *wh*-relatives.

Emergence of *wh*-relatives in Middle English

- First examples (c.1150) mainly have PP gaps.
- NP gaps emerged c.200 years later.
- Subject and object gaps appear at the same time.
- Once a *wh*-form becomes associated with relativization, it can be used across its full range of application.
- Initially an alternative PP relativization strategy (P-stranding) that largely died c.1200.
- Stable high-frequency alternative NP relativization strategy (*that*) throughout the period.

Early Middle English relatives

(6) Ðis is sunfulla monna leddre [**þurh   hwam** ure drihtan teh
     This is sinful   man's ladder through which our Lord   draws
     to him al moncun].
     to him all mankind
     "This is the sinful man's ladder, through which our Lord draws all
     mankind to him."   (cmlambx1-mx1,129.1279, c.1200)

(7) Ðes wrecche **þe** he **of** spec wes ure feder adam
     This wretch that he of spoke was our father Adam
     "This wretch that he spoke of was our father Adam"
                                            (cmlambx1-mx1,129.1287)

(8) A yong man called Melibeus, myghty and riche, bigat upon his
     wyf, **that** called was Prudence, a doghter **which that** called was
     Sophie.
     "A young man called Melibeus, mighty and rich, begat by his
     wife, who was called Prudence, a daughter who was called
     Sophie."   (cmctmeli-m3,217.C1b.5, c.1390)

Specifying the change

- Largely old forms
- Not all old functions:
    - NP-relativization: old function (*that*-relatives);
    - PP-relativization: new (or renewed) function.
- New associations (of *which* with relativization):
    - *Which*-NP relativization: competes with *that*-relativization.
    - *Which*-PP relativization: doesn't directly compete with anything after c.1200.
- The two types of relative emerge at the same rate (no interaction of relative type with year, $p = 0.95$), despite the fact that only one is competing with *that*.
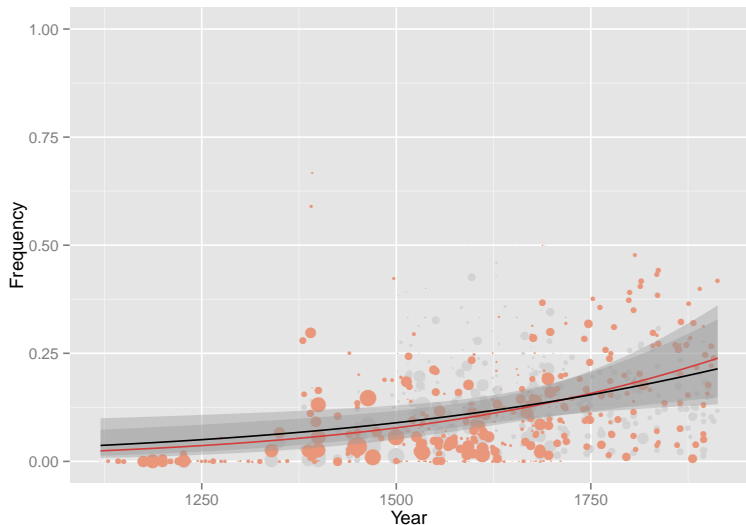
A CRE among relative types

Figure 3 : The rise of headed *which*-RCs with argumental NP (black) and PP (red) gaps

Section 3

Discussion

Q1: what are the prerequisites for a CRE to emerge?

- Kroch's *do*-support CRE reflects the fact that English has always had ways to form negative declaratives, object *wh*-questions, etc., within a stable sentence grammar architecture.
- What changes is how you form those constructions.
- We don't have this functional stability: no way to form PP-gap relatives c.1200.
- But we do have stability of forms.
- This can create competition among potential uses of those forms:
    - What can you do with *which*? With *that*?
- So the major prerequisite is stability.
- But stability and competition can come in different guises.

Functional variability and Constant Rate Effects

- We speculate that competition with stable forms and unstable functions will not always generate CREs.
- As a form acquires new uses, its frequency of use will change.
- This may mean that we don't see the stability we need to see for a CRE to emerge.
- So why did we see one? Hypothesis: because the only other use of these forms in early ME (as interrogatives) was very low frequency.
- People who use *whereby* from c.1250 on almost always use it in headed relatives.

Q2: what kind of tool is the CRE?

- The CRE diagnoses gradual population-level transmission.
- Population-level transmission ⤳ not necessarily any reflex in individual grammars (though this is possible).
- Gradual transmission ⤳ some kind of competition at the population level.
  - Kroch: competition among forms realizing a given function.
  - Middle English: competition among functional specifications of a given form.
- In the history of IE, the $k^w i$-/$k^w o$-**forms** are more stable that the functions they have been associated with.
- This second type of competition gives us a mechanism for moving beyond uniformitarianism.

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