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 → functional
  - Bleaching
- This works differently to Kroch’s classical CREs:

<table>
<thead>
<tr>
<th>Old</th>
<th>New</th>
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<tbody>
<tr>
<td>Kroch function form</td>
<td>Gramm. form function</td>
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- 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:

$$\ln \frac{p}{1-p} = k + st \quad (1)$$

(where $p$ is the frequency of one of the two variants).

Equivalently:

$$p = \frac{e^{k+st}}{1 + e^{k+st}} \quad (2)$$

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

The graph shows the percentage of affirmative and negative sentences in various morphosyntactic contexts over time. The x-axis represents the time period from 1400 to 1700, while the y-axis indicates the percentage of sentences. The graph includes lines for different categories such as affirmative transitive, affirmative intransitive, affirmative object, negative question, and negative declarative sentences, each showing distinct patterns of change over time.
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 \[ \frac{\emptyset}{\text{that}} \] \[ \frac{\text{which}}{\text{that}} \] she ate  
b. What she ate
**Wh-relatives: background**

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

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

- 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 (*kʷi-*, *kʷo-*)
- 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 [burh   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 be 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.
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 $\not\Rightarrow$ not necessarily any reflex in individual grammars (though this is possible).
- Gradual transmission $\not\Rightarrow$ 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 than the functions they have been associated with.
- This second type of competition gives us a mechanism for moving beyond uniformitarianism.
References


