

Managing data from a large, modern corpus: The development of American English possessive *have*.

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Outline

focus on

- ▶ data management obtained from fairly large corpus
- ▶ mixed-effects logistic regression modelling

procedure

1. preliminaries and research question
2. negative possessive *have* in LFG
3. analysis of the negation data
4. other contexts with special reference to adverbs
5. hypothesis testing

Preliminaries

Lexicon and PSRs

- (1) *houses* N (\uparrow PRED) = 'HOUSE'
(\uparrow N-TYPE) = common-count
(\uparrow NUM) = pl
(\uparrow PERS) = 3

- (2) DP \rightarrow D NP
 $\uparrow = \downarrow$ $\uparrow = \downarrow$

Common Replacement Changes

- ▶ Common replacement changes are **binary**.
Competition between exactly two variants, one conservative, one innovative.
Variants are easily identifiable by form.
- ▶ Common replacement changes are **complete**.
Perfect substitution of the conservative by the innovative variant.
Ideally, increasing proportion of innovative form observable from 0–100% of use in the textual record
- ▶ Common replacement changes are **measurable**.
Corpus available that allows tracking the implementation of the change
No evidence for prescriptive pressure
Representativeness
Large Size

Implementation of a common replacement change

Conservative period: Speakers represent only the conservative variant α

Transitional period: Speakers represent both the conservative variant α and the innovative variant β

Innovative period: Speakers represent only the innovative variant β

$$\alpha \rightarrow \{ \alpha \mid \beta \} \rightarrow \beta$$

The Constant Rate Hypothesis

(3) *The Constant Rate Hypothesis*

If:

- an innovative element enters a language and gradually replaces a conservative competitor,
- and a number of different grammatical rules can be applied to the innovative element
creating different contexts
- and each of these grammatical rules remains stable through time,
- and data is collected for the different contexts from a representative corpus in numbers sufficiently large for precise statistical estimates,

Then:

→ one will observe that the rate of change for the spread of the innovative element will be identical in all contexts.

Late Modern American English possessive *have*

- (4) *conservative possessive have*

Have we not botanical gardens? **We have**, indeed, and much good they should do ...

Sir Samuel White Baker (1855) *Eight Years' Wanderings in Ceylon*

- (5) *innovative possessive have*

"Don't you have a spare key?" **"I do."** He went into the house and returned with a large iron key ...

Frederick Ramsay (2008) *Stranger Room*

Preliminaries

Negation
Management and Analysis
Other contexts
Result

Basic linguistic units
Common Replacement Changes
Constant Rate Hypothesis
Research Question

Negation context; LFG model

Auxiliaries and Main Verbs

- (6) a. The child [*Auxiliary* will not [*Verb* sleep]]
b. * The child [*Auxiliary* ∅ not [*Verb* sleeps]]
c. The child [*Auxiliary* does not [*Verb* sleep]]

I vs. V

- (7) a. *will* I (↑ VFORM) =_c inf
(↑ TENSE) = present
(↑ MODALITY) = +
- b. *sleeps* V (↑ PRED) = 'SLEEP <(↑ SUBJ)>'
(↑ VFORM) = fin
(↑ TENSE) = present
(↑ SUBJ PERS) =_c 3
(↑ SUBJ NUM) =_c sg

- (8) I' → I VP
↑ = ↓ ↑ = ↓
(↑ CLAUSE-TYPE) =_c decl

I vs. V

XLE Demo

(The child will sleep, The child sleeps, ...)

Negation

- (9) a. $I' \rightarrow$ I $NEGP$
 $\uparrow = \downarrow$ $\uparrow = \downarrow$
(\uparrow CLAUSE-TYPE) =_c decl
- b. $NEGP \rightarrow$ NEG VP
 $\uparrow = \downarrow$ $\uparrow = \downarrow$

Negation

XLE Demo

(The child will not sleep, The child isn't sleeping, The child does not sleep, *The child not sleeps)

Negation and possessive *have*

- (10) a. *conservative variant: direct negation*

A savage who **has not the capacity to construct a hut**, may nevertheless demolish a temple.

The History of the Loco-Foco, 1842

- b. *innovative variant: do-support*

The scientist who **does not have the inspiration of frequent contact with young and active minds of students** is likely to become self-absorbed.

Popular Science, 1908

Negation and possessive *have* - Contraction

- (11) a. *conservative variant: direct negation*
There, now, add the salt and pepper fixings, and the king himself **hasn't a slicker supper**.
A Romance of the Mohawk, 1840
- b. *innovative variant: do-support*
The farming community of 900 people **doesn't have a single fast-food restaurant**.
Weight loss x 2, 2005

Category change

Conservative period: Speakers represent only the conservative variant α

Transitional period: Speakers represent both the conservative variant α and the innovative variant β

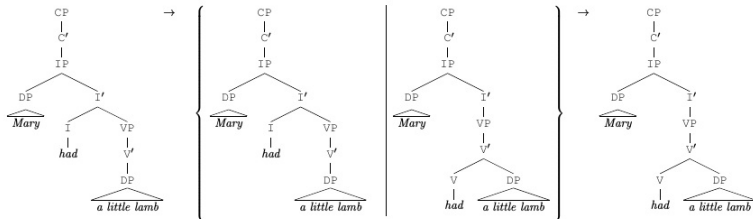
Innovative period: Speakers represent only the innovative variant β

$$\alpha \quad \rightarrow \quad \{ \quad \alpha \quad | \quad \beta \quad \} \rightarrow \quad \beta$$

Conservative period: Speakers represent possessive *have* only as category I

Transitional period: Speakers represent possessive *have* as both category I and V

Innovative period: Speakers represent possessive *have* only as category V



Negation

XLE Demo

(has - only I: Mary has a car)

(add has \forall : Mary has a car - two solutions)

(negative sentences...)

Summary

- ▶ possessive *have* changes its category from I to V
- ▶ consensus; theory-neutral: from a higher (aux) to a lower (main verb) position
- ▶ the category change manifests in differential negation marking

Focus: Data management and regression modelling

Data

Data collection

- ▶ *Corpus of Historical American English* (Davies 2010)

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- ▶ collection of declarative sentences with negation and possessive *have*
- ▶ string-based online interface

COHA search interface

CORPUS OF HISTORICAL AMERICAN ENGLISH
400 MILLION WORDS, 1810-2009

EMAIL
PASSWORD
(HELP) LOG IN (REGISTER)

SEE CONTEXT: CLICK ON WORD (ALL SECTIONS), NUMBER (ONE SECTION), OR [CONTEXT] (SELECT)
[HELP...]

COMPARE ?
SIDE BY SIDE

DISPLAY
LIST CHART KWIC COMPARE

SEARCH STRING
WORD(S)
COLLOCATES
POS LIST
RANDOM [SEARCH] RESET

SECTIONS SHOW
1 ...IGNORE-- 2000
1990
1980
1970
1960
1950
2 ...IGNORE-- 2000
1990
1980
1970
1960
1950

SORTING AND LIMITS
SORTING FREQUENCY
MINIMUM FREQUENCY 5
CLICK TO SEE OPTIONS

	CONTEXT	ALL	1810	1820	1830	1840	1850	1860	1870	1880	1890	1900	1910	1920	1930	1940	1950	1960	1970	1980	19
1	DID NOT HAVE THE	722				4	6	4	20	11	23	31	40	42	48	59	71	75	63	78	8

4.281 seconds

KEYWORD IN CONTEXT DISPLAY
Help / information / contact

SECTION: NO LIMITS

CLICK FOR MORE CONTEXT [?]

1	1863	MAG	Atlantic	A B C	he gained experiences which might have extinguished his mind, but which, as they did not have
2	1866	FIC	Outpost	A B C	Damon." Now we can watch the porpoises at play. " But they did not have that sight to interes
3	1870	FIC	RudderGrange	A B C	river road, whence I always had the earliest view of my establishment, I did not have that vie
4	1870	FIC	LostInFog	A B C	vapors, which surrounded them on all sides, it is true, but yet did not have that dampness whi
5	1880	FIC	JollyFellowship	A B C	I waded ashore. The boy who was standing by me was Rectus. He did not have that name the
6	1880	NEWS	NYT-Ed	A B C	ranks arising out of local causes merely. At all events, the Maine election did not have that inti
7	1885	MAG	NewEngYaleRev	A B C	was abundantly qualified to take the leading place in his department of study. He did not have !
8	1888	FIC	StrangeManuscript	A B C	death, of course, and poverty, too, very strongly; but I did not have that eager and energetic
9	1890	MAG	Atlantic	A B C	that end received his earnest support. Nevertheless, in the Convention of 1787 he did not have
10	1893	NEWS	NYT-Ed	A B C	" without the help of the American Minister and the United States marines. They did not have th

Search principles

(i) The principle of guided searches: Every search query targeted one and only one specific construction. For example, the search has not the specifically targeted negative declaratives, like *She has not the slightest idea*, but not questions, such as *Has not the citizen a right*. Results were removed if they did not match the targeted structure even if the retrieved tokens were relevant for another context.

Search principles

(ii) The principle of symmetric searches: Every pattern was given an equal chance to be found with the innovative and the conservative form. Hence, every search was conducted twice with only a minimal difference between the conservative and innovative forms. For example, I retrieved negative declarative possessive *have* structures with a search query such as `has not the for` conservative direct negation, and hence I also conducted a minimally different search such as `does not have the for` innovative *do*-supported negation.

Search principles

(iii) The principle of nearly perfect precision: Precision errors are introduced by tokens that were included in a data set but should not have been. My goal was to construct data sets with a precision that approaches 100%. In order to assure such accuracy, the result of every search query was carefully evaluated and false positives were manually deleted.

Search principles

(iv) The principle of adequate recall. Recall errors are caused by tokens that were not included in a data set but should have been. I attempted to collect very large data sets of possessive *have* structures for every context. Every context was therefore targeted by many different search queries to create large data sets of at least 1,000 examples each. It was in fact often possible to retrieve substantially more examples than that. However, it is impossible to avoid recall errors entirely with the infrastructure provided by the corpus. Instead, there is a trade-off between improving recall and the time and technology investment needed to accomplish it. Thus, I had to finalize the data collection for each context at some point based on a relatively subjective feeling of sufficiency.

Required object elements

Variant name	Targeted object	Search term
The	definite description	the
A	indefinite nominal	a
An	indefinite nominal (before vowel)	an
QuantStrong	quantified expression that cannot occur in existential construction	every each all most least both neither
QuantWeak	quantified expression that can occur in existential construction	no none few little fewer less some several various any enough more many much plenty lots
Num	cardinal number nominal	[mc*]
Dem	demonstrative nominal	this these that those
BareSg	bare singular	[*nn1*]
BarePl	bare plural	[*nn2*]
Poss	possessive adjective nominal	[app*]

Search queries

2 (dependent variable) * 2 (adverb) * 2 (negation) * 3 (inflection)
* 10 (object type) = 240 search queries.

(see excel sheet)

Principle of perfect precision - manual correction

- (12)
- a. if he has not lock'd the door
GordianKnot 1810
 - b. do think of it – had n't a been for him I should a
slipped cable
TennesseanANovel 1827
 - c. you have not much longer to bear with my humours
YankeyInEngland 1815
 - d. if Lloyd had not the next day made it the text upon
which he preached
New-EnglandTale 1822

Principle of perfect precision - manual correction

- (13) a. Has not his sire With impious step invaded all our temples?
AlexisCzarewicz 1812
- b. and he might have fallen, had not the bishop stretched out his hand
JourneyInOther 1894

Principle of perfect precision - manual correction

- (14) a. a large part of our assemblies seem to have not the
least notion
NorthAmRev 1822
- b. and I have had not a few of their mortal foes under my
roof
RachelDyerANorth 1828

Principle of perfect precision - manual correction

- (15)
- a. The tax for schools, being collected with the county tax, had not the odium attached to it of a fine
NorthAmRev 1823
 - b. Miss Atherton had not this temptation to contend with.
ThirtyYearsAgo1836
 - c. bees do not have the wings hooked together
Atlantic 1925

Final data set & reflections

N= 33,074
(see excel file)

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Final data set & reflections

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- ▶ precision, manual coorection, gold standard, intent, tediousness
- ▶ exhaustive enumeration (search queries), operationalize rather than categorize
- ▶ low tech, raw data, e.g. excel file (data)

Regression modelling

See discussion in thesis...

p. 63-75

Other contexts, especially adverbs

Inversion examples

- (16) a. *conservative variant*: 'have subject'
Have you a Bible in this office?
EighthDay 1967
- b. *innovative variant*: 'do subject have'
Do you have a doctorate in linguistics?
ColorPurple 1982

Inversion examples

- (17) a. *conservative variant*: 'have subject'
Why haven't you a bell?
Play: Greatness 1921
- b. *innovative variant*: 'do subject have'
Why don't you have a car?
WheelLove 1970

Inversion examples

- (18) *nowhere* (negative initial constituent type 11)
- a. Nowhere had that despotic leader more violent and unscrupulous partisans than there.
Century 1886
 - b. NOWHERE did the Industrial Revolution have greater | effect than in the United States of America
AnOutlineHistory 1968

Inversion searches

2,326 search queries

N = 10,359 examples

Ellipsis examples - matrix declarative

- (19) a. *conservative variant*: 'have Δ '
WASHINGTON: If we only **had** Lee's seven thousand!
But **we haven't** Δ . You may order the retreat at once,
Colonel.
WashingtonCrossing 1932
- b. *innovative variant*: 'do Δ '
"Not everyone **has** a garage. **We don't** Δ ." "We have
no car." "Exactly."
FieldStream 2006

Ellipsis examples - embedded clauses

- (20) a. I **have** no military reputation, for if I **had** Δ , it would doubtless be forever ruined
YaleRev 1913
- b. I wish I **had** a skateboard. If I **did** Δ , I'd join them.
Esquire 1999

Ellipsis examples - tag questions

- (21) a. Listen, the Biswangers **have** a pool, **haven't they** Δ ?
Mov:Swimmer 1968
- b. They **have** submarines in Germany, **don't they** Δ ?
MotorBoysOnPacific 1909

Inversion searches

96 search queries with very intense manual correction process
N = 2,332 examples

Prediction: Relative order between *have* and adverbs

- (22) *adverbs intervene between auxiliaries and full lexical verbs*
The children [_{Auxiliary} will never/certainly [_{Verb} sleep]]

Prediction: Relative order between *have* and adverbs

(22) *adverbs intervene between auxiliaries and full lexical verbs*

The children [_{Auxiliary} will never/certainly [_{Verb} sleep]]

(23) *change in possessive 'have' should be reflected with adverbs*

a. [_{conservative—have} have never/certainly [...]]

b. [never/certainly [_{innovative—have} have ...]]

Pre-and-Post-Aux position - temporal adverb

- (24) a. *conservative variant: 'have'-adverb*
The preacher **had** **always** **a belief in witchcraft**
RachelDyerANorth, 1828
- b. *innovative variant: adverb-'have'*
My father **always** **had** **a serene philosophy**
Atlantic, 1946

Pre-and-Post-Aux position - epistemic adverb

- (25) a. *conservative variant: 'have'-adverb*

A period of war, moreover, **has necessarily** a tendency to strengthen the governmental action.

USDemRev, 1838

- b. *innovative variant: adverb-'have'*

The government, in any argument over facts, **necessarily has** the last word, since it can claim to have more facts.

Nation, 1965

Adverb data collection

- ▶ dependent variable: *'have'*-adverb vs. adverb-*'have'*

Adverb data collection

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- ▶ with an object element (e.g., *the*, *a*, *every*, *some*, *two*, *this* etc.)

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- ▶ only positive polarity

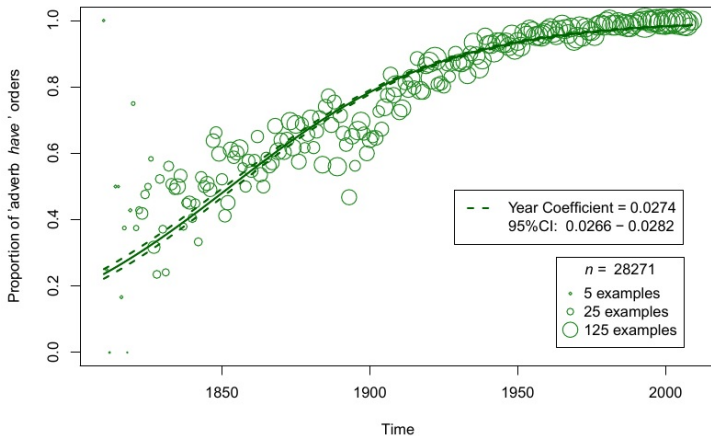
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- ▶ manual correction of precision errors

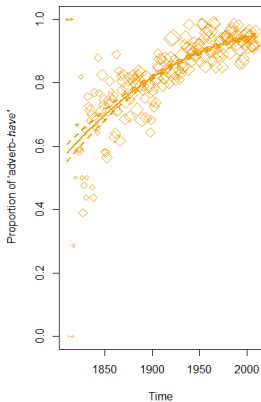
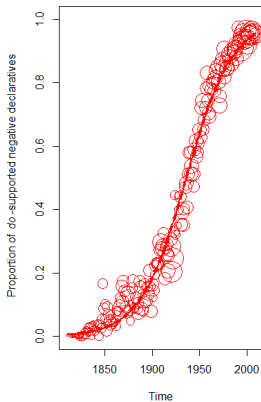
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- ▶ 25 sentence adverbs; choice theoretically motivated
- ▶ only positive polarity
- ▶ manual correction of precision errors
- ▶ total of 28,271 examples

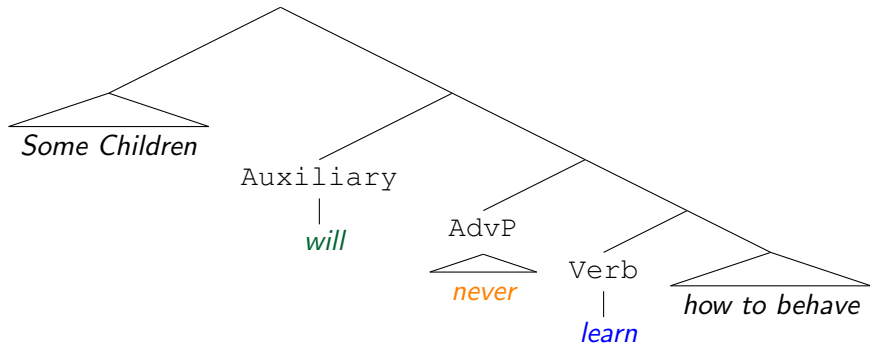
The development of adverbs and possessive *have*



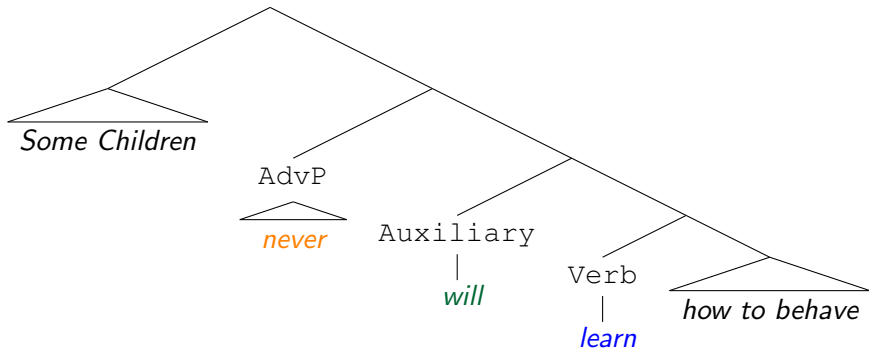
Comparison between negation and adverb data



Why is the rate of change different?



Why is the rate of change different?



Example of high-adjoined adverbs

- (26) a. Apparently a shock that has been experienced
often will lose effectiveness as a reinforcer.
BNC, APH W_ac_soc_science
- b. I found that the story they tell
sometimes has changed dramatically
BNC, F71 S_speech_unscripted
- c. if he was not prepared to take a risk with his money, he
most certainly was not prepared to take a risk which
might lose him the one person he valued most.
BNC, FPK W_fict_prose

I vs. V

XLE Demo

(Mary often will sleep, Mary will often sleep)

Evidence for high adjunction with possessive *have*

- (27) *post-verbal negation forces conservative have + high adverb*
- a. We **certainly have not** the solidarity and endurance of the Jews
... [I' certainly [I' have [NEGP not ...]]]
Atlantic 1927
 - b. They **probably haven't** a cutting-torch at all.
... [I' probably [I' haven't ...]]
Aliens 1965

Evidence for high adjunction with possessive *have*

- (28) *post-verbal adverb or floating quantifier forces conservative have + high adverb*
- The poor Indians **now have often** reason to rejoice
... [I' now [I' have [VP often [VP...]]]]
NaturalistInNicaragua 1847
 - Sir Henry comes forward to indicate a policy which will have the united support of the party, and **apparently has already** the approval of the country.
... [I' apparently [I' has [VP already [VP...]]]]
Nation 1905
 - they **still had each** a strong following
... [I' still [I' had [VP each [VP...]]]]
Atlantic 1893

Evidence for high adjunction with possessive *have*

- (29) *direct verb phrase ellipsis forces conservative have + high adverb*
- a. You have a flair, Townsend. You **really have** Δ .
... [I' really [I' have]]
Play:Veronique 1962
 - b. but if anybody had a reason , he **certainly had** Δ
... [I' certainly [I' had]]
Play:StreetScene 1928

Evidence for high adjunction with possessive *have*

- (30) *parallel adverb+auxiliary cluster suggests conservative have + high adverb:*
- a. But, he **never was** respected; much less, revered; and, **never had** any permanent influence;
... [_{I'} never [_{I'} was ...]] ... and [_{I'} never [_{I'} had [_{VP}...]]]
RandolphANovel 1823
 - b. a woman **never can** obtain rank by merit, therefore **never has** reason to be proud of it.
... [_{I'} never [_{I'} can ...]] ... therefore [_{I'} never [_{I'} has [_{VP}...]]]
LoversVows 1814

I vs. V

XLE Demo

(Mary often has problems, Mary has often problems)

Correlation between *have* and other auxiliaries

- ▶ Hypothesis: If a substantial number of adverb-*have* sentences involve the conservative variant of possessive *have*, then, the frequency of adverbs positioned before possessive *have* should correlate with their propensity to be adjoined to I'.

How to determine probability of high adjunction?

- ▶ idea: instantiate I-position by another auxiliary
- ▶ compare pre-auxiliary and post-auxiliary position

Example of High Adjunction measurement - *never*

aux	[pp*] [nn*]	[pp*] [nn*]	% before aux
	never aux	aux never	
<i>may</i>	42	1,414	2.9
<i>might</i>	9	1,044	0.9
<i>can</i>	1,480	5,617	20.9
<i>could</i>	2,687	6,809	28.3
<i>shall</i>	614	4,155	12.9
<i>should</i>	580	3,387	14.6
<i>will</i>	1,322	8,151	14.0
<i>would</i>	2,008	11,643	14.7
<i>must</i>	12	945	1.3
<i>is</i>	139	2,923	4.5
<i>are</i>	94	1,674	5.3
<i>was</i>	1,824	7,921	18.7
<i>were</i>	324	2,459	11.6
TOTAL	11,135	58,142	16.1

Low Frequency Adverbs

- ▶ point estimates of rate of change for low-frequency items are very imprecise
- ▶ only use adverbs with more than 500 examples

Low Frequency Adverbs

adverb	lower	higher	range	<i>n</i>
<i>possibly</i>	-0.005	0.037	0.043	26
<i>necessarily</i>	0.011	0.057	0.046	39
<i>definitely</i>	0.023	0.142	0.119	53
<i>nevertheless</i>	0.014	0.036	0.022	107
<i>frequently</i>	0.012	0.038	0.026	108
<i>of course</i>	-0.006	0.009	0.015	109
<i>surely</i>	0.011	0.033	0.022	112
<i>suddenly</i>	0.036	0.098	0.061	138
<i>rarely</i>	0.011	0.034	0.023	146
<i>indeed</i>	0.012	0.026	0.015	162
<i>obviously</i>	0.025	0.051	0.025	181
<i>seldom</i>	0.027	0.057	0.031	196
<i>apparently</i>	0.034	0.058	0.024	284
<i>actually</i>	0.022	0.043	0.021	311
<i>sometimes</i>	0.014	0.028	0.014	318
<i>then</i>	0.021	0.030	0.010	549
<i>usually</i>	0.029	0.045	0.017	576
<i>often</i>	0.023	0.034	0.011	691
<i>probably</i>	0.019	0.028	0.010	752
<i>certainly</i>	0.018	0.029	0.011	773
<i>really</i>	0.020	0.029	0.009	876
<i>no longer</i>	0.037	0.047	0.010	1087
<i>already</i>	0.035	0.043	0.009	1732
<i>always</i>	0.019	0.024	0.005	2399
<i>now</i>	0.035	0.040	0.005	3381
<i>never</i>	0.016	0.024	0.008	3596

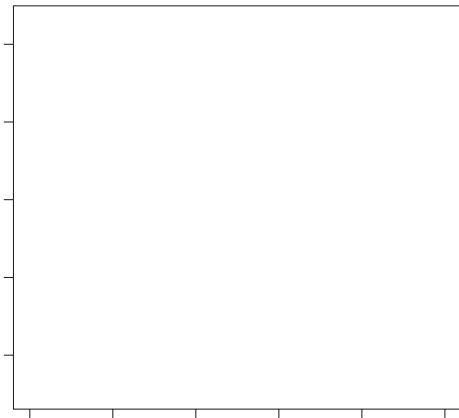
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<i>certainly</i>	0.018	0.029	0.011	773
<i>really</i>	0.020	0.029	0.009	876
<i>no longer</i>	0.037	0.047	0.010	1087
<i>already</i>	0.035	0.043	0.009	1732
<i>always</i>	0.019	0.024	0.005	2399
<i>now</i>	0.035	0.040	0.005	3381
<i>never</i>	0.016	0.024	0.008	3596

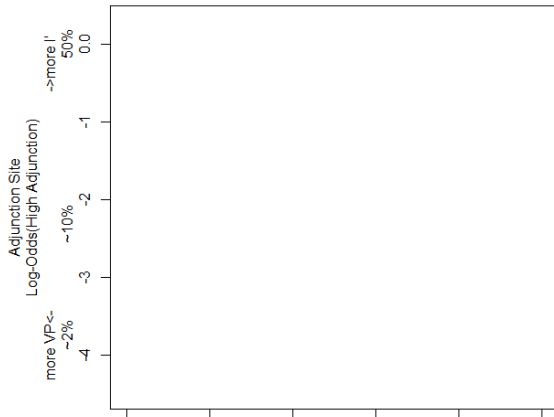
Low Frequency Adverbs

- ▶ point estimates of rate of change for low-frequency items are very imprecise
- ▶ only use adverbs with more than 500 examples
- ▶ 11/25 adverbs
- ▶ ~ 90% of overall data

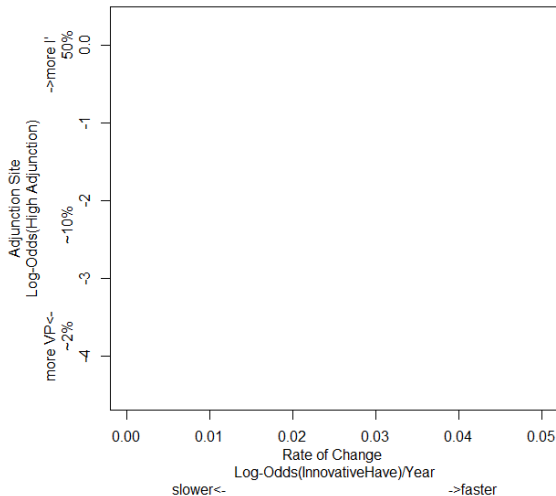
Correlation high adjunction \sim rate of change



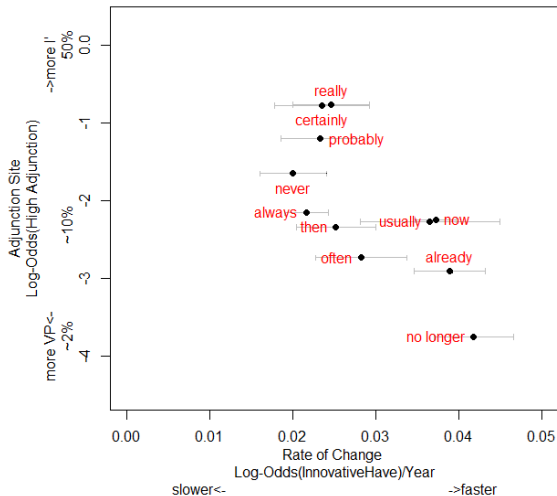
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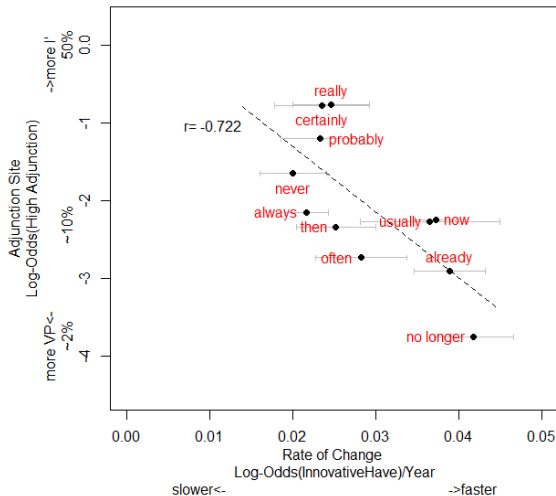
Correlation high adjunction \sim rate of change



Correlation high adjunction \sim rate of change



Correlation high adjunction \sim rate of change



Summary of High Adjunction

- ▶ There is in fact a strong correlation between the (apparent) rate of change in adverb placement with possessive *have* and the propensity of an adverb to adjoin high.
- ▶ Hence, the actual rate of the loss of V-to-I movement is likely to be higher than the initial measurement suggested

Origin of negation-adverb difference

- ▶ The surplus of expected *adverb-'have'* orders is caused by frequent high adjunction of adverbs.

Adjuncts with a High Probability to Adjoin Low

diagnostic	<i>n</i>	High Adj. index	rate of change	95%-CI
<i>no longer</i>	1,080	2.3%	0.0422	[0.0376 – 0.0472]
<i>already</i>	1,727	5.2%	0.0396	[0.0353 – 0.0441]
<i>still</i>	4,913	5.4%	0.0376	[0.0349 – 0.0403]
floating quantifiers	594	-	0.0399	[0.0336 – 0.0469]
TOTAL	8,314			

VP Adjuncts, examples

- (31) a. *conservative variant: 'have adverb'*
France **has no longer** any regard for the rights of
Prussia or the Confederation
NYT-Reg 1860
- b. *innovative variant: 'adverb have'*
Great Britain **no longer has** the strongest fleet
Atlantic 1921

VP Adjuncts, examples

- (32) a. *conservative variant*: 'have floating quantifier'
the red limit and the violet limit **have both** the same
luminous intensity
TreatiseOnForces 1845
- b. *innovative variant*: 'floating quantifier have'
Arcturus and Capella **both have** the same magnitude
ExploringDistant 1956

Is there are Constant Rate Effect in the possessive *have* data?

thesis, p. 106-111

Summary and outlook

- ▶ Possessive *have* develops *do*-support with negation in 19th - 21st century American English. This can be analyzed as a change in the category of *have* (from I to V).

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Summary and outlook

- ▶ Possessive *have* develops *do*-support with negation in 19th - 21st century American English. This can be analyzed as a change in the category of *have* (from I to V).
- ▶ Data collection from COHA and mixed-effects model as tools to analyse rate of change
- ▶ Other contexts should be affected by the change as well: inversion, adverbs ellipsis
- ▶ These four contexts do indeed develop at the same rate of change!

Thank you for your attention!

Possession can be hard...

