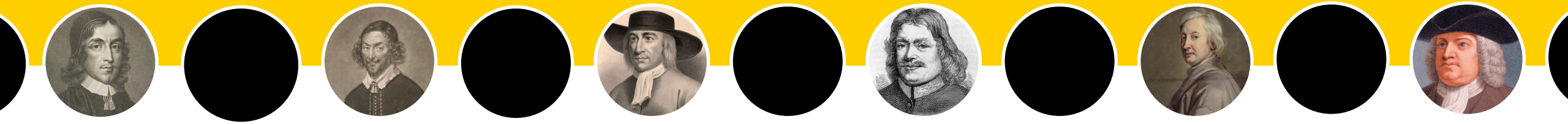
constructional change across the lifespan of 20 early modern gentlemen

Lauren Fonteyn – Leiden University

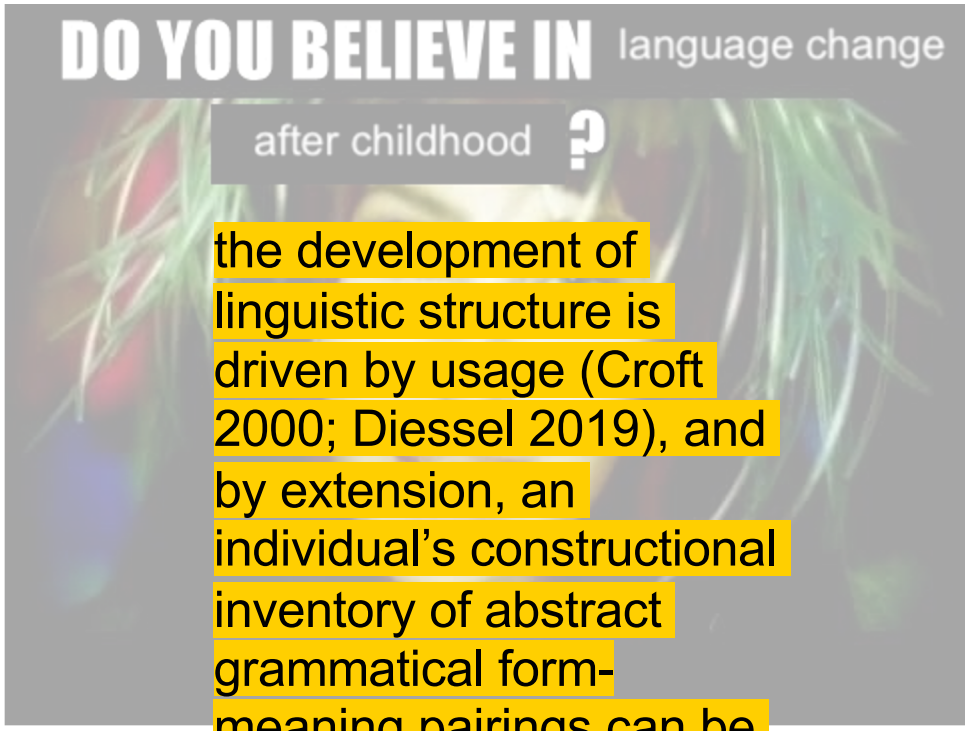


ICCG, Antwerp, August 2021

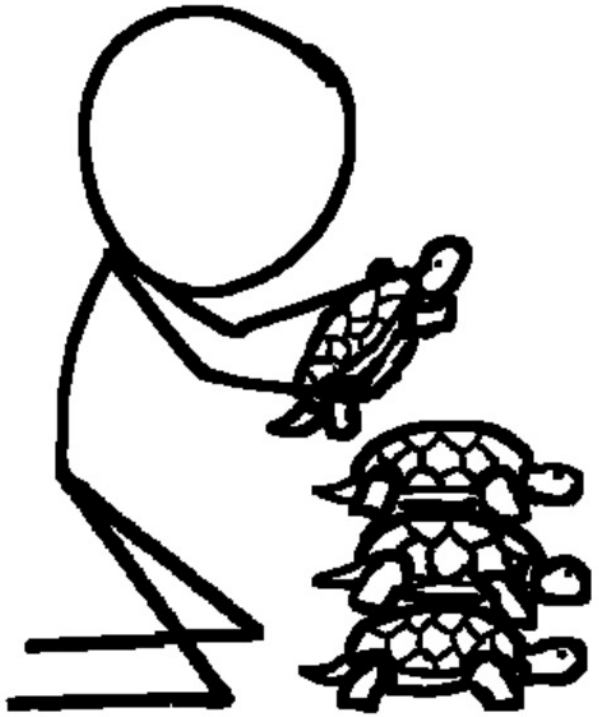

DO YOU BELIEVE IN language change
after childhood ?

“A common belief shared by many theoretical approaches is the idea that the only crucial phase for the emergence of linguistic changes is language acquisition and the critical period following it.” Raumolin-Brunberg (2005: 38)

The average person learns approximately 6,000 new lexemes during adulthood (approx. 40 years) (Brysbaert et al. 2016)

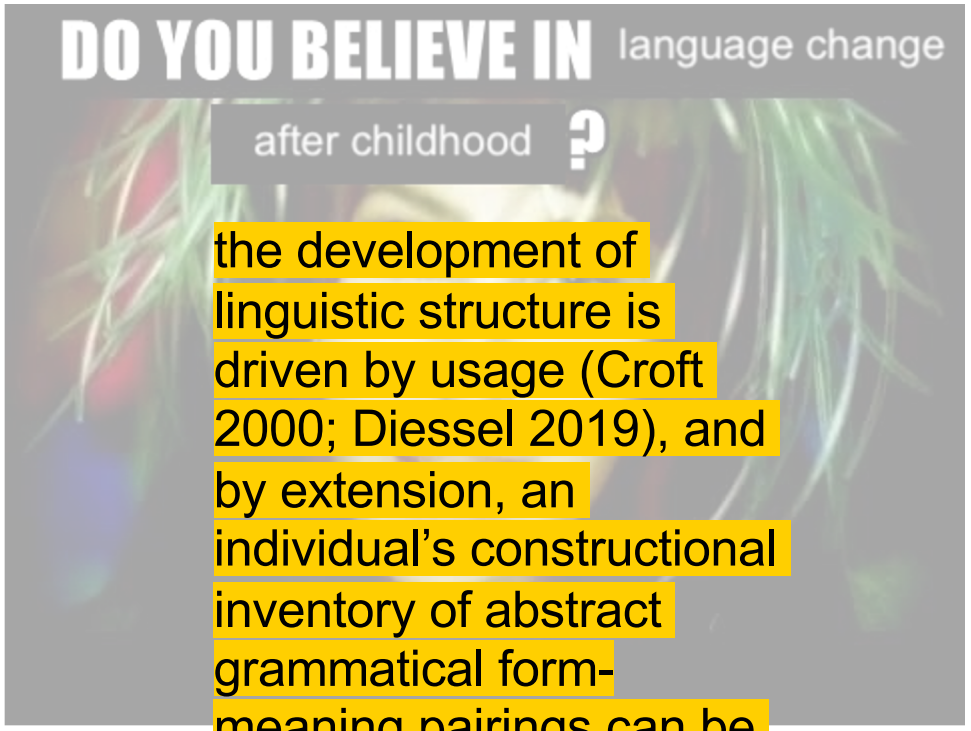


the development of linguistic structure is driven by usage (Croft 2000; Diessel 2019), and by extension, an individual’s constructional inventory of abstract grammatical form-meaning pairings can be **updated continually** (Bergs 2012: 1637).



“A common belief shared by many theoretical approaches is the idea that the only crucial phase for the emergence of linguistic changes is language acquisition and the critical period following it.” Raumolin-Brunberg (2005: 38)

The average person learns approximately 6,000 new lexemes between the ages of 20 and 60 (Brysbaert et al. 2016)



the development of linguistic structure is driven by usage (Croft 2000; Diessel 2019), and by extension, an individual’s constructional inventory of abstract grammatical form-meaning pairings can be **updated continually** (Bergs 2012: 1637).

more “systemic changes”, which affect the rule system that generates grammatical sentences, “only take place in the process of the transmission and incrementation of a change, i.e. during childhood” (Meisel et al. 2013: 37), when the grammatical system is imperfectly transmitted from parent to child (also see Anderson 2016, Lightfoot 2019).

How much innovation and change is possible across the lifespan in the domain of syntax?

(see, among many others: Nahkola & Saanilahti 2004; Raumolin-Brunberg 2005, 2009; Tagliamonte & D'Arcy 2007; Bergs 2005; Raumolin-Brunberg & Nurmi 2011; Meisel et al 2013; Buchstaller 2015, 2016; Neels 2020; Petré & Van de Velde 2018; Anthonissen & Petré 2019; Standing & Petré 2021; Buchstaller et al. 2021; …)

competing variants

the 17th century gerund alternation:

two ways of forming a gerund, diachronically unstable

conservative variant: *ing-OF*

Idolatry consists in giving **of** that worship which is due to God, to that which is not God.

(Daniel Whitby, 1674)

progressive variant: *ing-Ø*

the greatest part of Leviticus is imploy'd in giving Laws concerning Sacrifices

(Daniel Whitby, 1697)

the competitors: contexts & diffusion

BARE

(1) The soul can't dye, cannot therefore the Man dye? If not, there is no such thing, as killing **of** Men, or mortal Men. (1673, PW3)

(2) It was a cruel mercy which Tamberlane shewed to three hundred Lepers in killing them to rid them out of their misery (1662, SG2)

the

(5) how long thou hast lived to little purpose, yea, to **the** killing **of** thy soul for ever (1659, GS2)

(6) it was given out , that **the** killing an Usurper, was always esteemed a commendable Action (1679, BG3)

POSS

(3) But I perswade my selfe, it cannot well be used in the defence of **his** killing **of** the Dragon: (1631, HP1)

(4) then I must believe that **his** killing my Father was no murder, and that they died wrongfully who were Executed for having a hand in his Death (1680, LR1)

other

(7) Ninthly , Protest against **that** most terrible and odious shedding **of** the innocont blood of those 3 forementioned (1640, PW1)

(8) thou wert thereby kept from **a** further shedding the blood of thy soul. (1659, GS2)

the competitors: contexts & diffusion

The progressive variant *ing*-Ø did not emerge in all contexts simultaneously, but diffused from one context to another (Fanego 2004).

BARE » **POSS** » ***the***

killing my father

his killing my father

the killing my father

data

EMMA corpus

(Petré et al. 2019)

90-million word corpus:

- 50 prolific English writers
- 5 generations of speakers
- born in the 17th century

16,632 *ing*-nominals

ing-OF: 4,767 ↓

ing-Ø: 11,865 ↑

- 21 authors (random)
- 3 generations: 1600, 1620, 1630
- genres: prose, letters

resulting dataset spans approx. 100 years (1626 - 1721)

stages (Labov 1994)

BARE
verbalization **virtually completed** (ing-Ø representing over 85% of all tokens).

POSS
mid-range to nearing completion (ing-Ø representing between 35% and 85% of all tokens).

THE
new and vigourous (ing-Ø representing between 15% and 35% of all tokens).

the ‘gentlemen’


Peter Heylyn (1599–1662)


William Prynne (1600–1669)


Thomas Fuller (1607–1661)


John Milton (1608–1674)


Jeremy Taylor (1613–1667)


Roger L’Estrange (1616-1704)


Roger Boyle (1621–1679)


Thomas Pierce (1622–1691)


George Fox (1624–1691)


Robert Boyle (1627–1691)


George Swinnock (1627–1673)


John Bunyan (1628–1688)


John Flavel (1630–1691)


John Tillotson (1630–1694)


John Dryden (1631–1700)


Daniel Whitby (1638-1726)


Mather Increase (1639–1723)

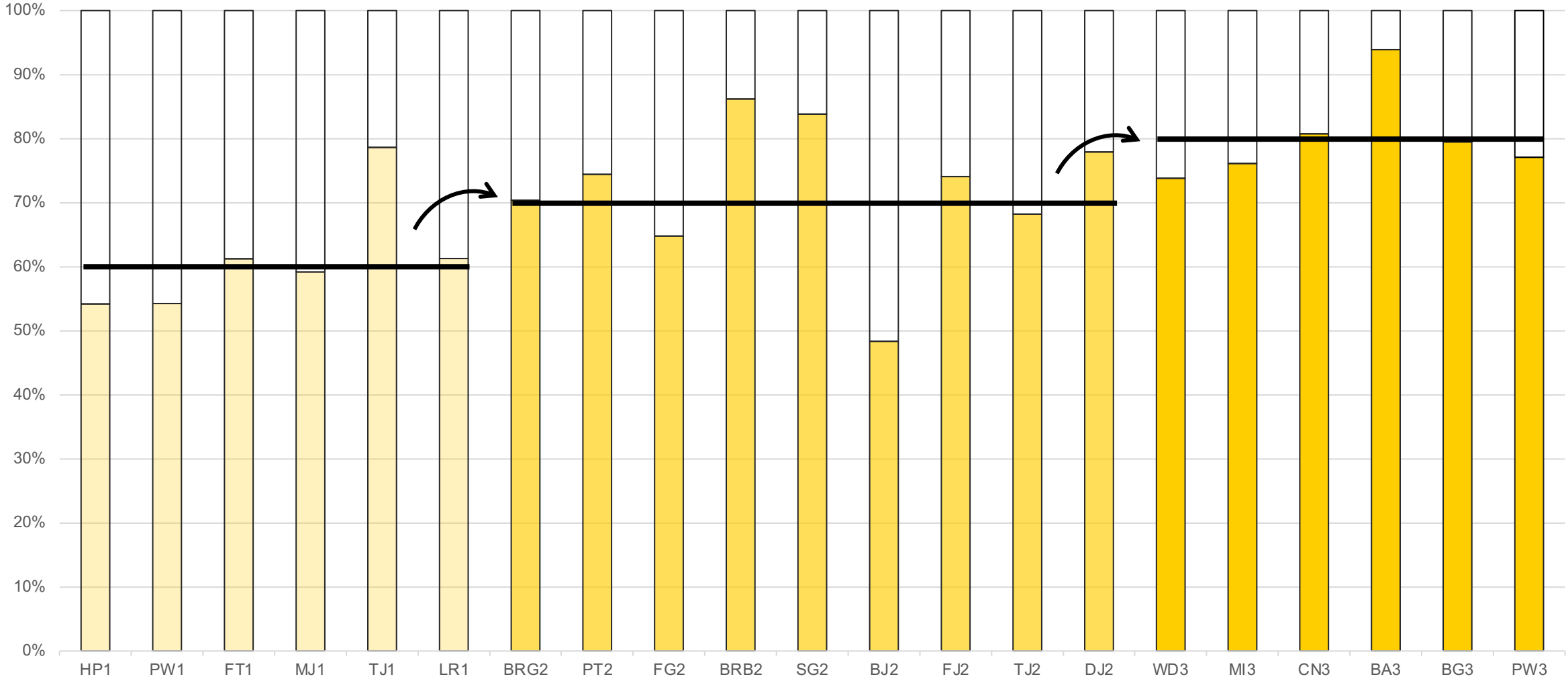

Nathaniel Crouch (1640–1725)


Gilbert Burnett (1643–1715)


William Penn (1644–1718)


Aphra Behn (1640–1689)

Rate of incoming variant per individual (ordered by birth date)



method

estimating the likelihood of the dependent variable under different grammatical conditions per individual writer as they age

multifactorial model

Bayesian Logistic Regression (brms)

- **dependent variable:** gerund
- **independent variables:**

main effects: determiner (det), standardized age (age_sd)

random effect: author

```
brm(gerund ~ det*age_sd
          +(det:age_sd|author),
          data=df, family = bernoulli(),
          chains = 2, iter = 2000, warmup  =
          1000, cores = 2, prior =
          c(set_prior
          ("normal(0, 1)", "b"),
          set_prior("lkj(2)", "cor"),
          set_prior("normal(0, 5)",
          "Intercept"),
          set_prior("cauchy(0, 2)", "sd")))
```

why bayesian mixed effect models?

- generalized linear and logistic (mixed-effect) models are common in historical (socio-) linguistic analyses (e.g., Tagliamonte & Baayen 2012; Fonteyn & van de Pol 2016; De Smet & Van de Velde 2020).
- 'frequentist' implementation

- some 'principled' reasons to go bayesian:
  - what even are p-values?
  - frequentist **confidence intervals** are less intuitive than bayesian **credible intervals**
  - setting priors sort of makes sense?

- a practical reason to go bayesian:
  - with **logistic** mixed-effect models, there is a fairly high chance of data separation, which occurs when "one predictor completely or almost completely separates the binary response in the observed data" (Kimball et al. 2019: 231)

why bayesian mixed effect models?

Problem for frequentist models (e.g. `glmer`): “empty cells, (…) or perfect separation of response classes in particular combinations of predictors may render regression modelling (…) impossible” (Tagliamonte & Baayen 2012: 24)

	JOHN DRYDEN	
	ing-OF	ing-Ø
BARE	11 (96.3%)	284 (3.7%)
POSSESSIVE	0 (0%)	10 (100%)
THE	73 (86.9%)	11 (13.1%)
OTHER	3 (60%)	2 (40%)

- a practical reason to go bayesian:
  - with **logistic** mixed-effect models, there is a fairly high chance of data separation, which occurs when “one predictor completely or almost completely separates the binary response in the observed data” (Kimball et al. 2019: 231)

hypotheses

three hypotheses, each linked to a model comparison

- **HYPOTHESIS 1**

The rate by which individuals use functionally equivalent (or 'competing') constructions across their lifespan can change (Nahkola & Saanilahti 2004; Raumolin-Brunberg 2005; 2009; Sharma, Bresnan & Deo 2008; Raumolin-Brunberg & Nurmi 2011; Buchstaller 2015, 2016; Neels 2020; and **many** more).

> adding 'age' as independent variable improves fit

```
M0 <- ingform ~ 1 +(1|author)
M1 <- ingform ~ age_sd +(1|author)
```

Model fit is assessed by examining the Widely Applicable Information Criterion or 'WAIC' (Watanabe 2010) and WAIC weights (McElreath 2018: 226).

hypotheses

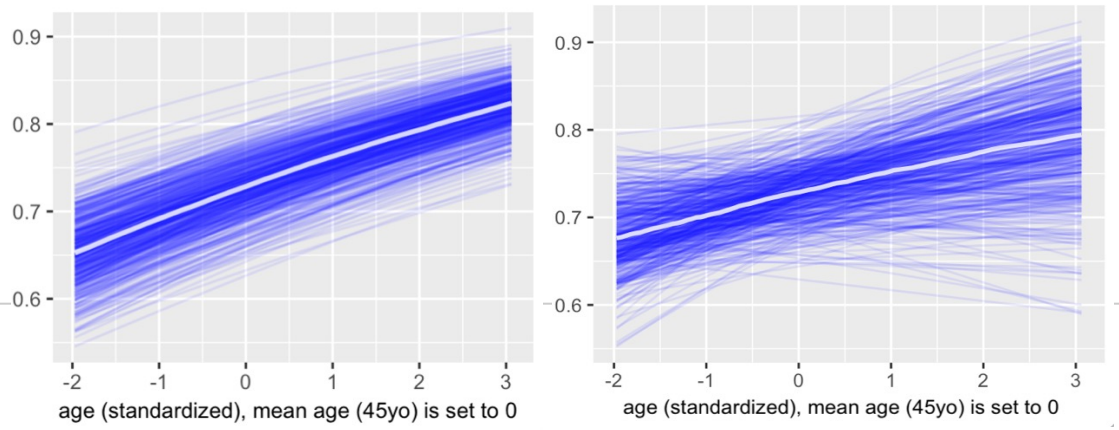
three hypotheses, each linked to a model comparison

- **HYPOTHESIS 2**

The extent to which (Baxter & Croft 2016) and direction in which (e.g. Raumolin-Brunberg 2009; Buchstaller 2015; Sankoff & Wagner 2011; Sankoff 2019; Anthonissen 2020: 325) these usage-rates change across the lifespan varies between different individuals.

> modelling inter-individual variation as varying slope rather than varying intercept improves fit

```
M1 <- ingform ~ age_sd +(1|author)
M2 <- ingform ~ age_sd +(age_sd|author)
```



results

Hypothesis 1 and Hypothesis 2

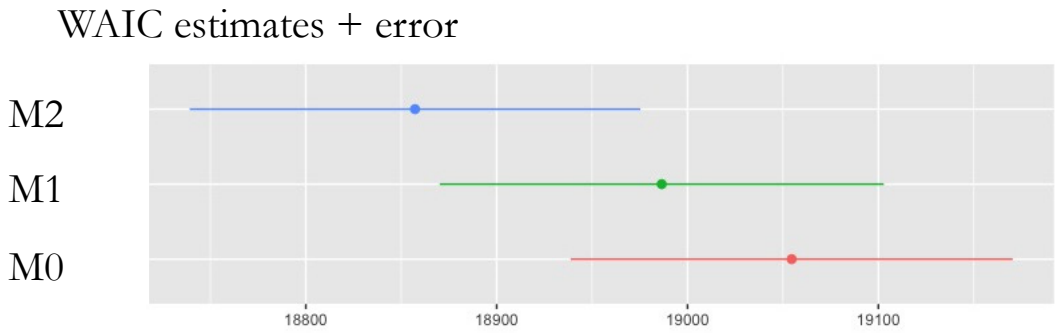
- **HYPOTHESIS 1**

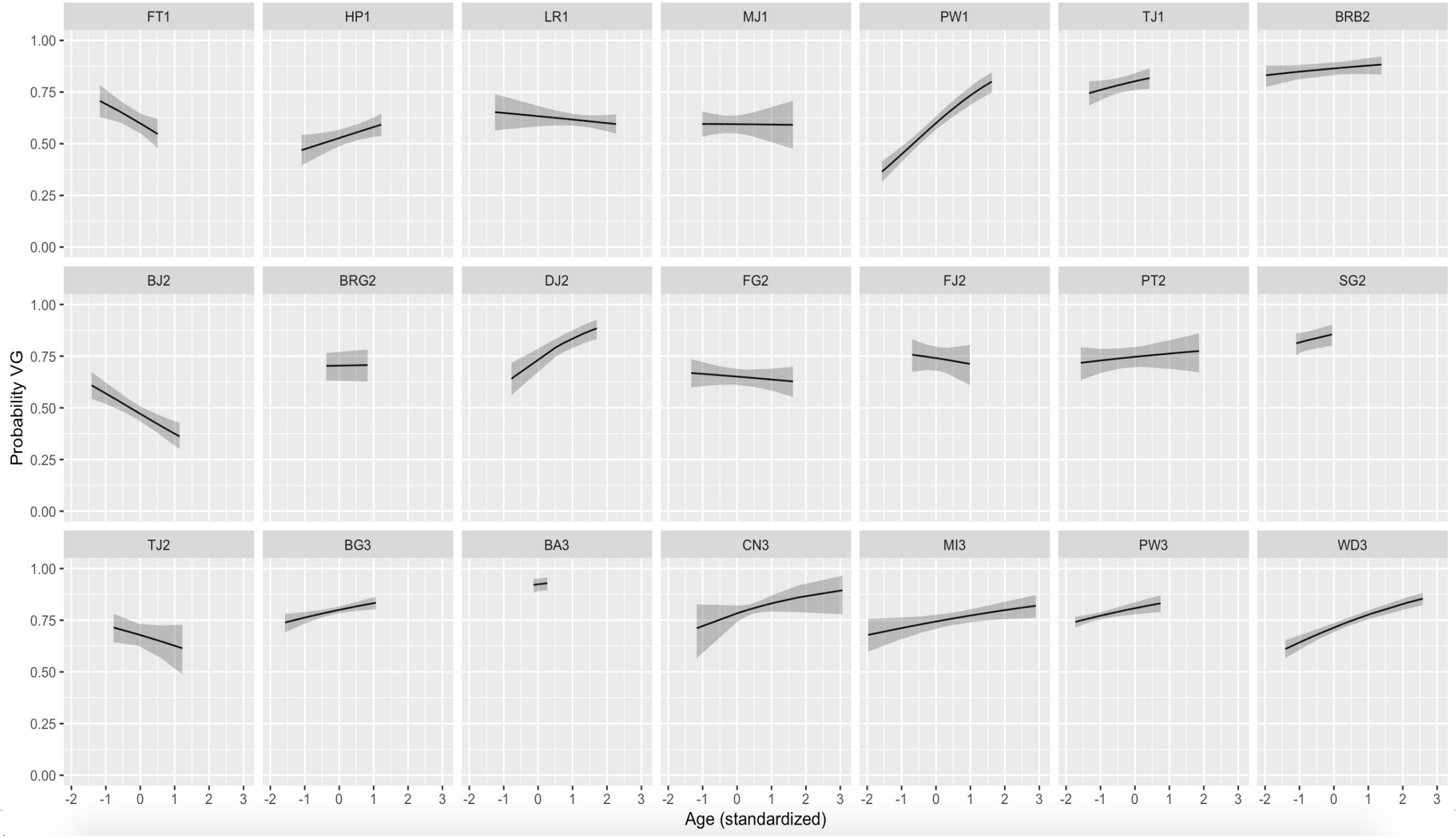
The rate by which individuals use i*ng*-OF and *ing*-Ø constructions changes across their lifespan. ✓

- **HYPOTHESIS 2**

The extent to which and direction in which these usage rates change across the lifespan varies between different individuals. ✓

	WAIC	weight
M0	19054	0.0
M1	18986	0.0
M2	18857	1.0




FT1
HP1
LR1
MJ1
PW1
TJ1
BRB2
BJ2
BRG2
DJ2
FG2
FJ2
PT2
SG2
TJ2
BG3
BA3
CN3
MI3
PW3
WD3
Probability VG
1.00
0.75
0.50
0.25
0.00
-2
-1
0
1
2
3
Age (standardized)

hypotheses

three hypotheses, because three is a party

- **HYPOTHESIS 3**

adults may ‘participate’ in the diffusion of the new variant to new grammatical contexts, and reach a more advanced stage of the development occurring at the community level (Tagliamonte & D’Arcy 2007: 213; De Smet 2016; Mackenzie 2019; Anthonissen & Petré 2019; Buchstaller, Krause-Lerche & Mechler 2021).

> adding ‘determiner type’ as independent variable improves fit

```
M2  <- ingform ~ age_sd +(age_sd|author)
M3  <- ingform ~ det +(det|author)
```

> the combined effect of age and grammatical context yields a better fit than the effect of grammatical context in isolation

```
M3+ <- ingform ~ det*age_sd +(det*age_sd|author)
```

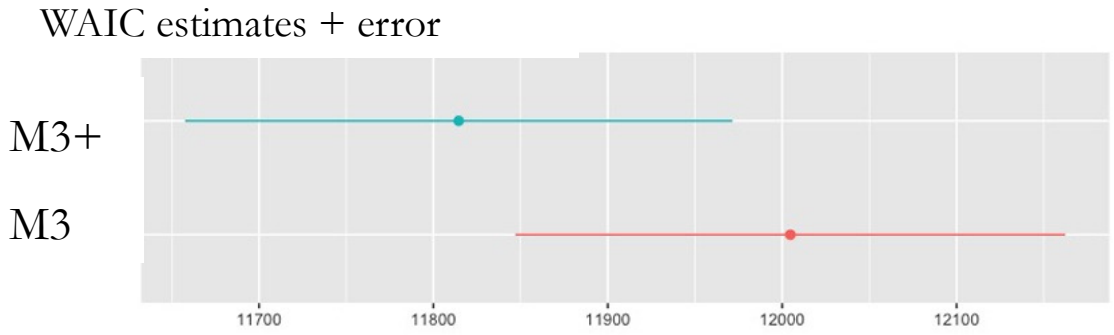
results

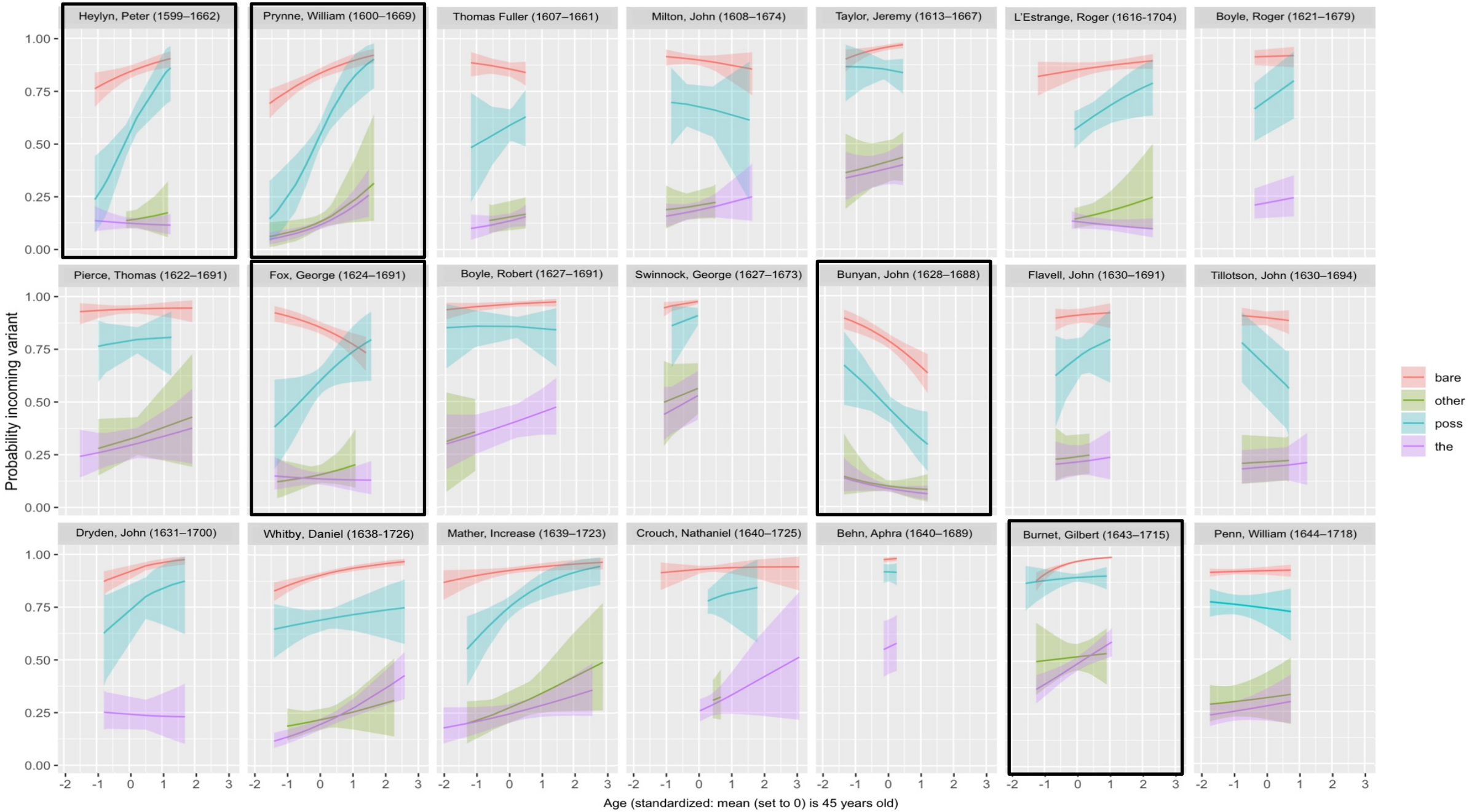
Hypothesis 3

- **HYPOTHESIS 3**

adults may ‘participate’ in the diffusion of the new variant to new grammatical contexts, and reach a more advanced stage of the development occurring at the community level ✓

	WAIC	weight
M2	18857	0.0
M3	12004	0.0
M3+	11815	1.0



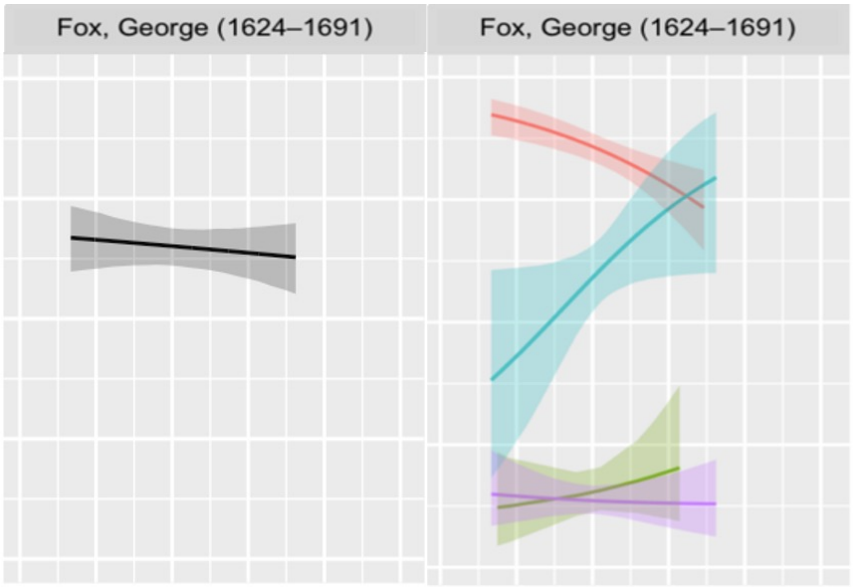

Heylyn, Peter (1599–1662)
Prynne, William (1600–1669)
Thomas Fuller (1607–1661)
Milton, John (1608–1674)
Taylor, Jeremy (1613–1667)
L'Estrange, Roger (1616-1704)
Boyle, Roger (1621–1679)
Pierce, Thomas (1622–1691)
Fox, George (1624–1691)
Boyle, Robert (1627–1691)
Swinnock, George (1627–1673)
Bunyan, John (1628–1688)
Flavell, John (1630–1691)
Tillotson, John (1630–1694)
Dryden, John (1631–1700)
Whitby, Daniel (1638-1726)
Mather, Increase (1639–1723)
Crouch, Nathaniel (1640–1725)
Behn, Aphra (1640–1689)
Burnet, Gilbert (1643–1715)
Penn, William (1644–1718)
Probability incoming variant
0.00
0.25
0.50
0.75
1.00
-2
-1
0
1
2
3
Age (standardized: mean (set to 0) is 45 years old)
bare
other
poss
the

Author	Frequency change?		Constraint change?
Heylyn, Peter (1599–1662)	yes (poss)	com trend	maybe (poss; partial)
Prynne, William (1600–1669)	yes (bare, poss & the)	com trend	maybe (poss; full)
Fuller, Thomas (1607–1661)	no	stable	no
Milton, John (1608–1674)	no	stable	no
Taylor, Jeremy (1613–1667)	yes (bare)	com trend	no
L'Estrange, Roger (1616-1704)	no	stable	no
Boyle, Roger (1621–1679)	no	stable	no
Pierce, Thomas (1622–1691)	no	stable	no
Fox, George (1624–1691)	yes (bare)	retrograde*	no
Boyle, Robert (1627–1691)	yes (bare)	com trend	maybe (bare; partial)
Bunyan, John (1628–1688)	yes (bare & poss)	retrograde	no
Flavell, John (1630–1691)	no	stable	no
Tillotson, John (1630–1694)	no	stable	no
Dryden, John (1631–1700)	yes (bare)	com trend	no
Whitby, Daniel (1638-1726)	yes (bare & the)	com trend	maybe (bare; partial)
Mather, Increase (1639–1723)	yes (poss)	com trend	maybe (bare & poss; partial)
Crouch, Nathaniel (1640–1725)	no	stable	no
Burnet, Gilbert (1643–1715)	yes (bare & the)	com trend	yes (bare; partial)
Penn, William (1644–1718)	no	stable	no

discussion - 1

quantitative developments across the lifespan

- **the curious case of George Fox**



- retrograde in determinerless contexts with respect to the *ing*-variable;
- but his choices in possessive contexts likely concur with the community trend.
- individuals need not consistently develop towards or away from the community trend in every respect (also see Bergs 2005: 255-256; Buchstaller et al. 2021).

discussion - 2

quantitative developments across the lifespan

STABILITY

- supposing ‘instability’ means that increases or decreases should exceed a threshold of 0.2:
- for about half of the individuals, there seem to be no (substantial) quantitative changes during their lifespan.

RETROGRADE CHANGE (e.g., Sankoff & Wagner 2006)

- the vast majority of developments are progressive, as lifespan change usually progresses “in the direction of the community change” (Baxter & Croft 2016);
- the only cases of retrograde change are attested with John Bunyan (and George Fox);
- why them?

discussion - 3

qualitative developments across the lifespan

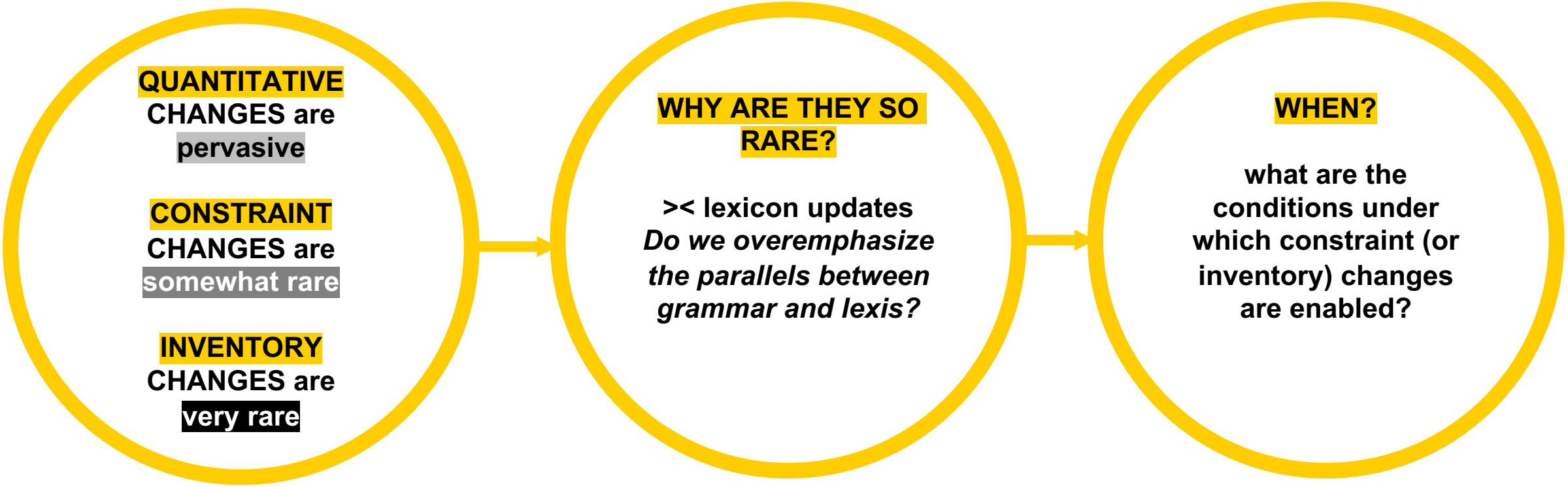
OUT WITH THE OLD, IN WITH THE NEW?

- None of the individuals in the sample made a complete switch from solely using ing-OF to solely using ing-Ø;
- “evidence of inventory change is rare and difficult to come by”, and “speakers are less likely to change the constraints that govern the use of a variable than they are to change proportional use of a variant” (Buchstaller et al. 2021: 32-33; also see MacKenzie 2019).

CONSTRAINT CHANGES?

- some possible (or rather: very likely) cases of (mostly partial) constraint changes
- still quite rare (5% - 32% of individuals in sample)

conclusions & open questions



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