

# Early acquired sound sequences spread...

## Does phonotactic acquisition determine phonotactic change?

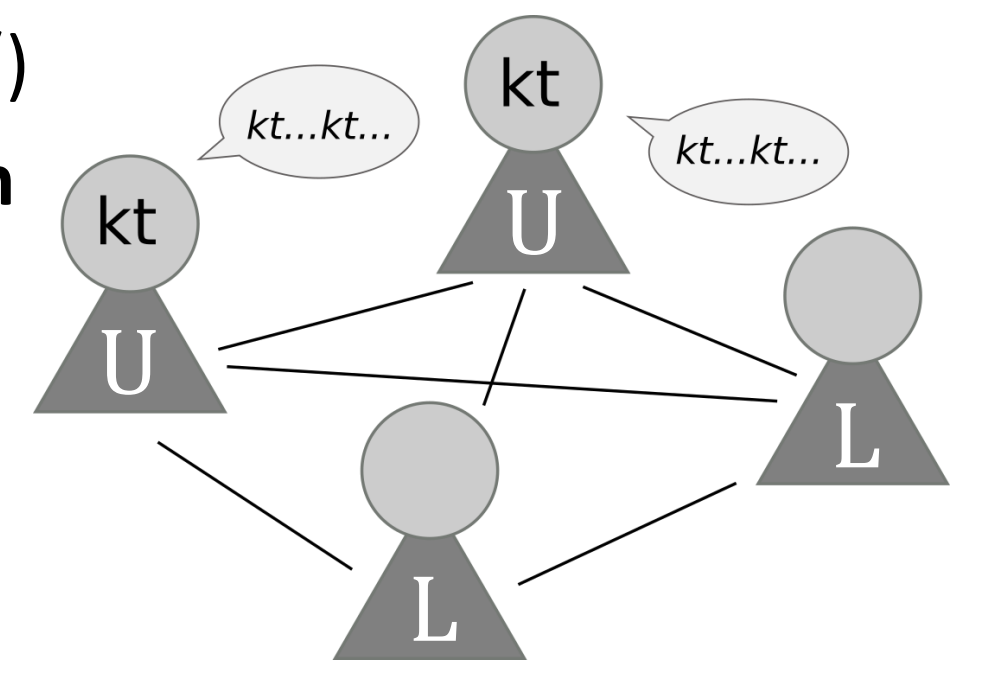
Andreas Baumann | University of Vienna | 14<sup>th</sup> International Cognitive Linguistics Conference

### Is there a link between phonotactic acquisition and change?

- × Phonological **errors** in language acquisition **do not mimic** sound **change** (Diesel 2012)
  - × Phonological **errors** are **repaired** during language acquisition
  - × **Proficient speakers** contribute more to linguistic **innovation** than children do (Bybee 2010)
- × Phonological **stability** and **AoA** ratings correlate (Monaghan 2014)
  - × Historically **old** phonotactic items occur **early** in acquisition (MacNeilage & Davis 2000)
  - × Early acquired items are more **frequent**, and frequent items are more **entrenched**

### $R_0$ as a measure of reproductive success in phonotactics

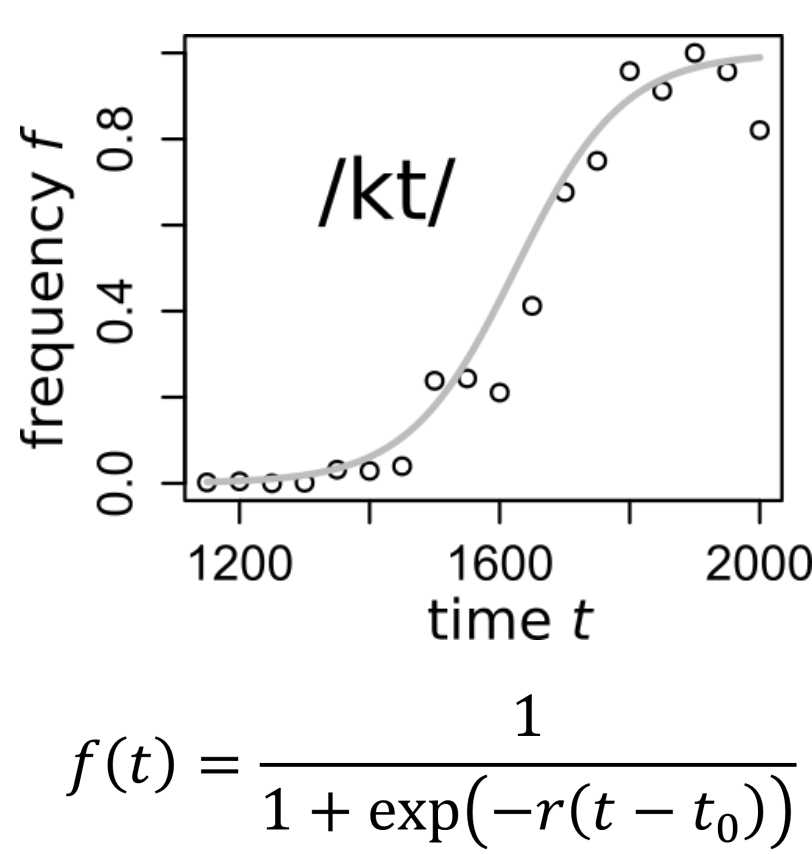
- × **Diphones** (sequences of two sounds; /kt/ in *baked*, /beikt/) are constituents of linguistic knowledge that **spread through populations**
- × Population composed of **learners L** and **users U**
- × Spread of diphones modeled by a simple **dynamical system** (Nowak 2000, Solé 2011)
- × **Basic reproductive ratio  $R_0$**  defined as the expected number of learners that learn a diphone from a single user
- ×  $R_0$  is a **standardized measure** of reproductive success ( $R_0 = \alpha/\gamma$ )



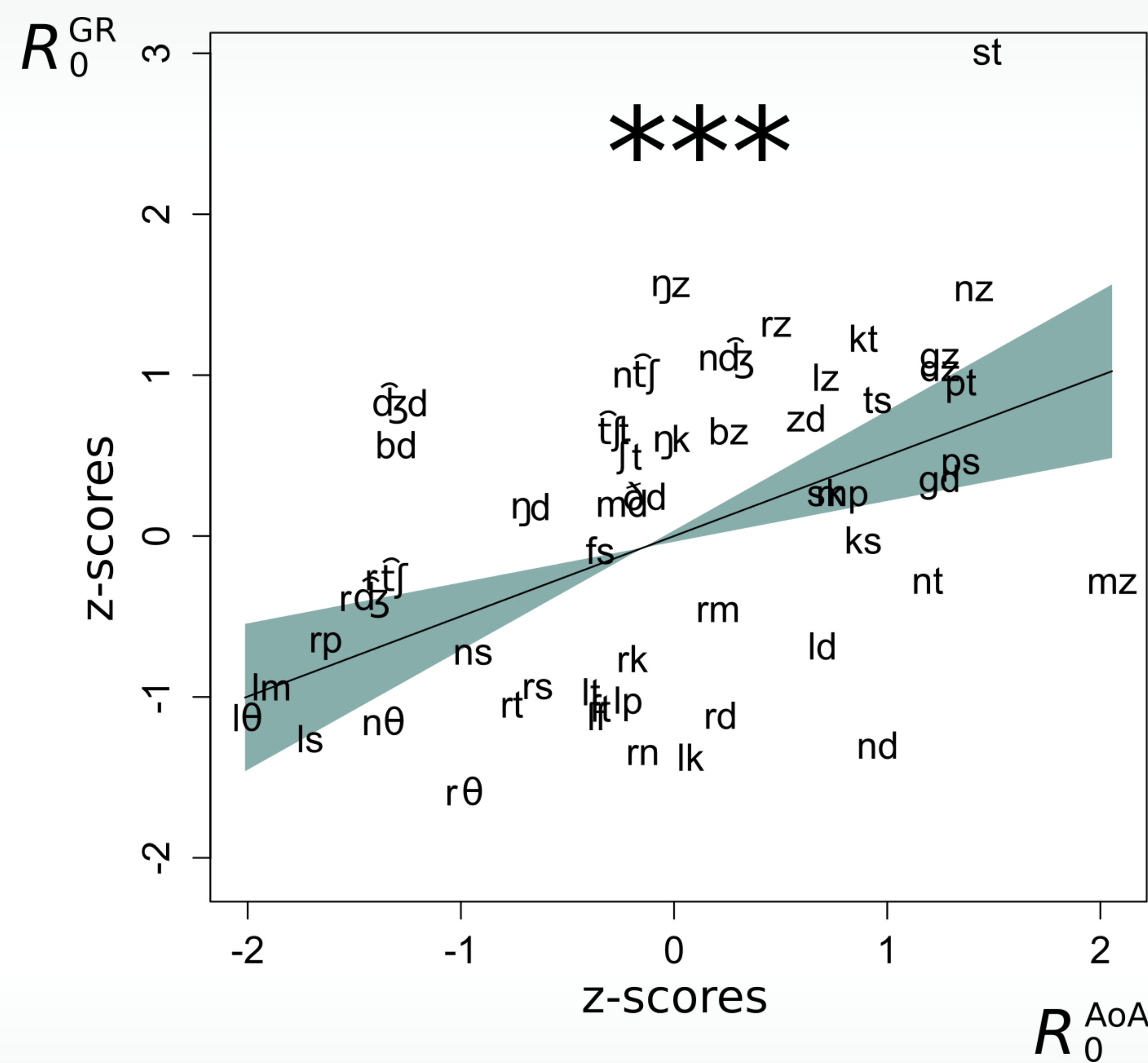
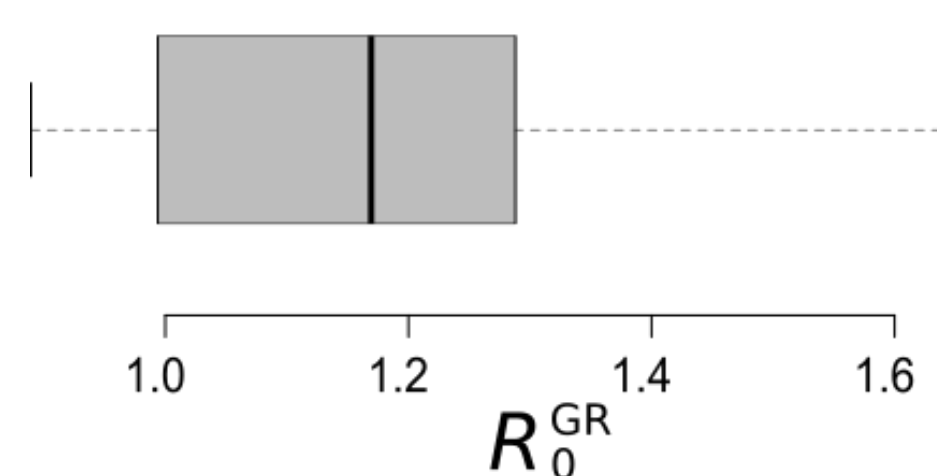
$$\begin{aligned} \dot{L} &= -\alpha LU + \gamma U \\ \dot{U} &= \alpha LU - \gamma U \end{aligned}$$

### Estimating $R_0$ in diachrony

- × **Historical trajectory** for every word-final consonant cluster in English
- × **Data:** PPCME2, PPCEME, PPCMBE, COHA, COCA
- × **Transcription:** ECCE, CMU
- ×  **$R_0$ -GR** (growth rate) estimate based on rate  $r$  from model of logistic growth (Hethcote 1989;  $R_0 = 1+rG$ )

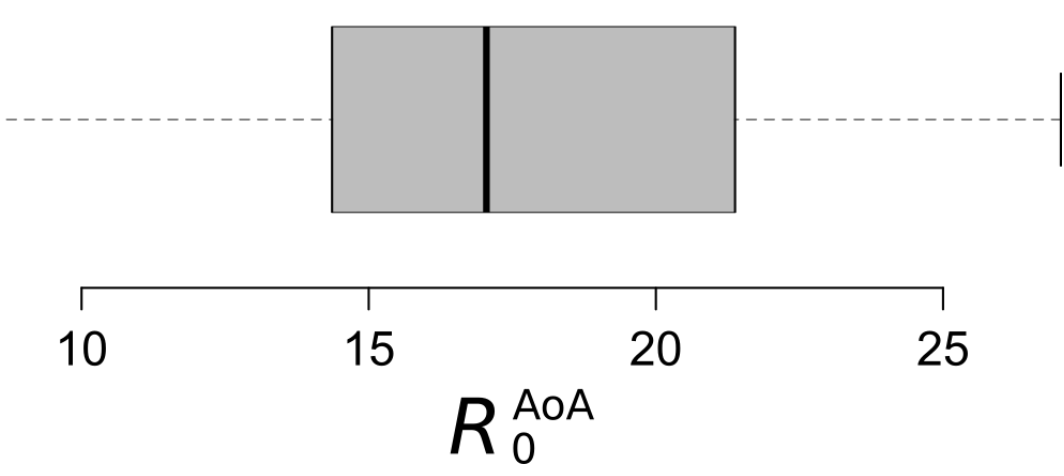
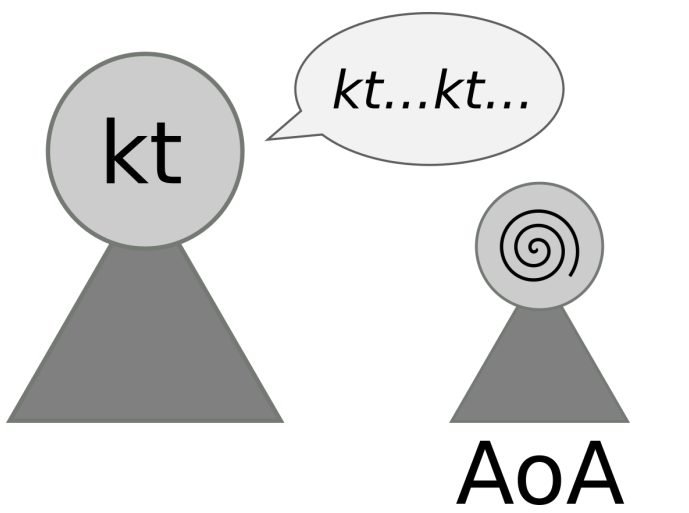


$$f(t) = \frac{1}{1 + \exp(-r(t - t_0))}$$



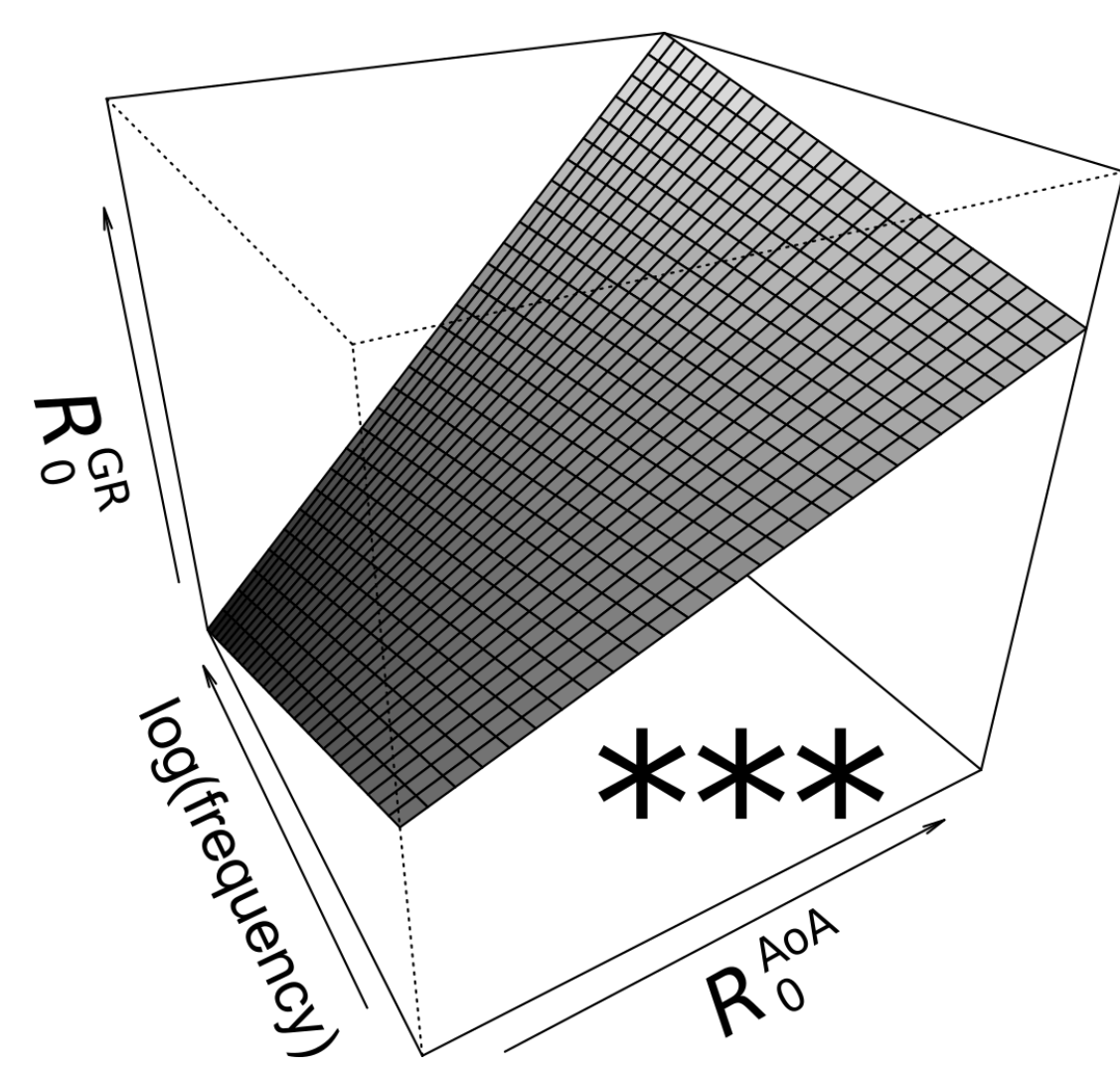
### Estimating $R_0$ in acquisition

- × **Age-of-acquisition rating** for every word-final consonant cluster in English
- × **Data:** AoA-rating dataset (Kuperman et al. 2014)
- × **Transcription:** CMU
- ×  **$R_0$ -AoA** estimate based on AoA rating of the first word ending in that cluster (Dietz 1993,  $R_0 = LE/AoA$ )



### What is the role of utterance frequency?

- × **Utterance frequency** promotes change but can also have conserving effects (Bybee 2007)
- × What is the effect of frequency on the relationship between  $R_0$ -GR and  $R_0$ -AoA?
- × The relationship is a bit tighter in frequent diphones
- × **Highly frequent** diphones are acquired **earlier**
- × Frequency and diachronic stability correlate only slightly



### So, how do acquisition and change hang together?

- ! **Early acquired** diphones are diachronically **more successful**
- !  $R_0$ -AoA estimates are much higher than  $R_0$ -GR estimates
- ! **Adult speakers**, by implication, **decrease** reproductive **success**
- ! **Language learners**, in contrast, have a **stabilizing** function in phonotactic evolution
- ! Early acquired diphones are more **entrenched** and therefore **resistant** against phonological change at later ages

Language acquisition contributes to diachronic stability of diphones.

...late ones don't.