# Effects of transmission perturbation in the cultural evolution of language

Thomas Brochhagen
University of Amsterdam

Michael Franke
University of Tübingen

**Major factors in language evolution**

- Efficient information transfer
- Learnability

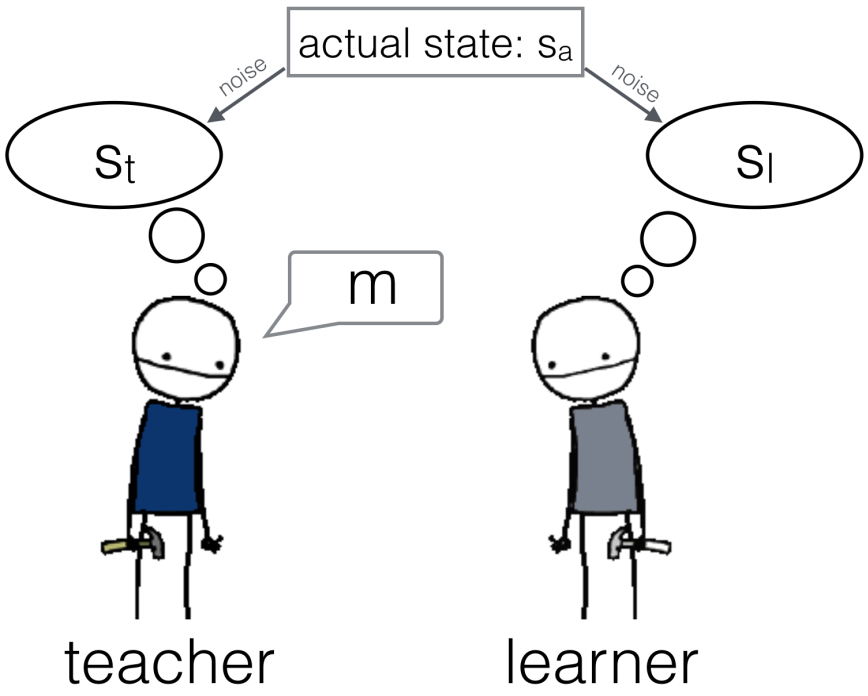
**Past research**

Cognitive learning biases effect explanatory perturbations in language transmission

**But**

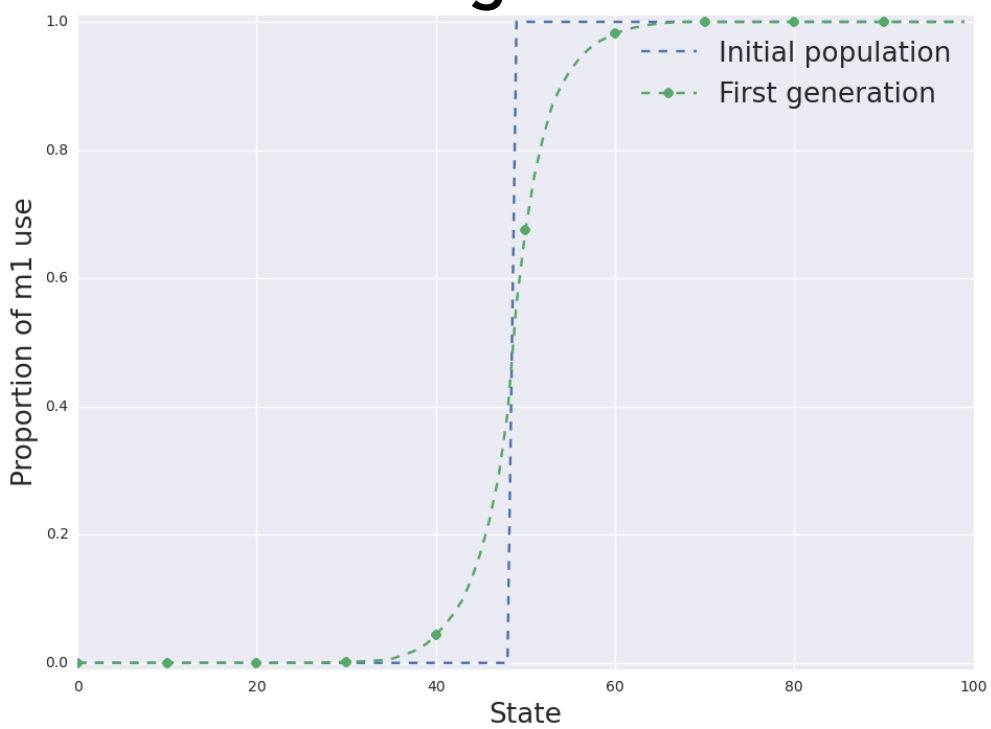
We expect class of relevant transmission perturbations to be larger

## Iterated learning with state-noise

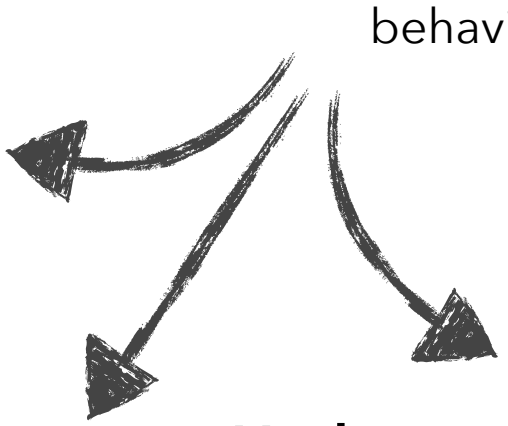



$$P_N(\tau_j \to \tau_i) \propto \sum_{d \in D_k} \underbrace{P_N(d_l \mid \tau_j)}_{\prod_{\langle s_l, m\rangle \in d_l} \sum_{s_t} P_N(s_t \mid s_l)\, P(m \mid s_t, \tau)} \underbrace{F(\tau_i \mid d)}_{\propto P(\tau_i \mid d)^{\gamma}}$$

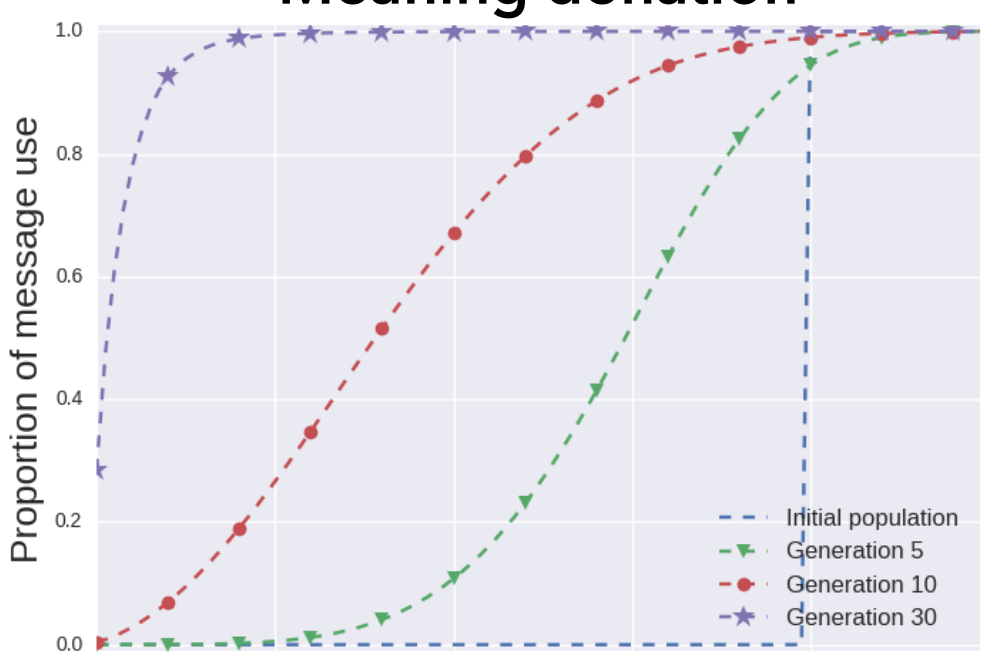
## Vagueness




This can lead to inferring the "wrong" teacher type if noise makes some types err in a way that resembles the noiseless behavior of other types



## Meaning deflation




## Underspecified lexical meaning

state-noise can mimic effects previously reported under the assumption of semantic simplicity bias

EBERHARD KARLS
UNIVERSITÄT
TÜBINGEN