Mimicry in linguistic Evolution

A Lotka-Volterra model of the evolutionary dynamics of compositionality markers

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Ambiguity is not expected to be selected for in semiotic systems. But why does it sometimes still occur? A story about consonant clusters, morphological complexity, and mimicry.

Biological Mimicry

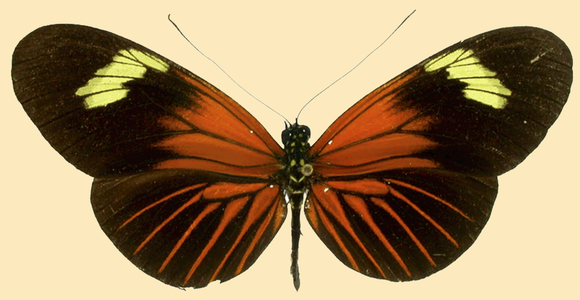
Batesian Mimicry

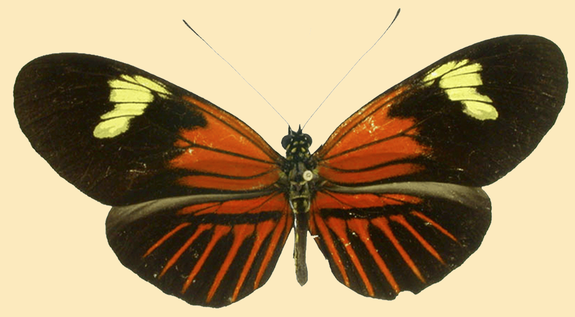
1a. The model: The colour pattern of wasps signals that they are venomous.

1b. The mimic: Hoverflies, among other species, imitate the colour pattern of wasps in order to appear poisonous as well.

Model's signalling function decreases with the number of mimicking species.

Müllerian Mimicry





2. The two types of *Heliconius* butterflies mimic each other to confuse predators.

The subspecies support each other. An equal number of mimics and models is expected to be optimal.

Linguistic Mimicry

[saɪn-d]

Complex. The cluster [nd] spans a morpheme boundary between the base *sign* and the suffix *-ed*, and consequently functions as a compositionality marker signalling morphological complexity.

[faɪnd]

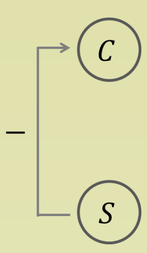
Simple. The cluster [nd] occurs within the morphologically simple form *find* and thus does not function as a compositionality marker.

Some facts about consonant clusters in English:

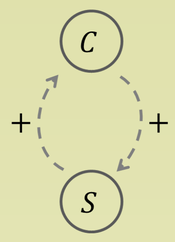
- function as compositionality markers by signalling both word and morpheme boundaries
- abundantly produced by schwa loss in the Middle English period
- typologically rare and phonotactically marked
- dispreferred articulatorily and perceptually
- frequently subject to phonological repair processes such as consonant deletion or schwa epenthesis

Linguistic compositionality markers are involved in dynamics that share features of Batesian and Müllerian Mimicry

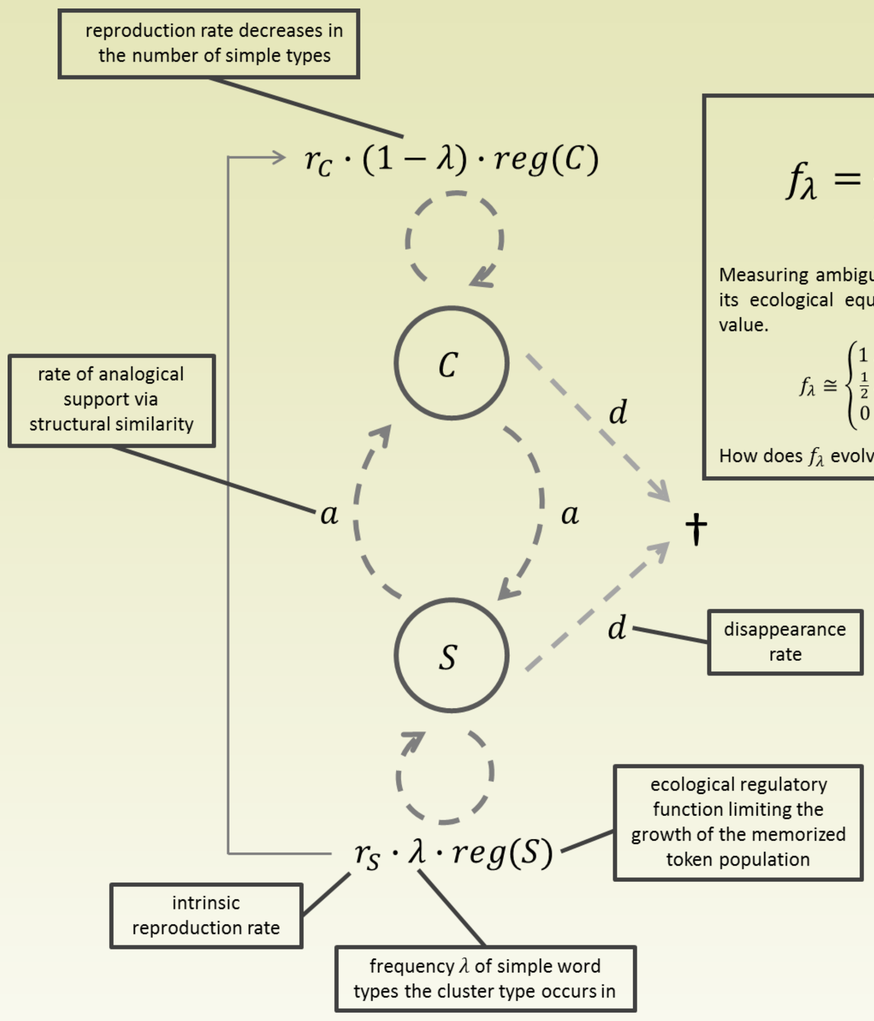
The signalling function of compositionality markers decreases with the amount of simple forms. They become more ambiguous the more often structurally similar forms appear in a simple item.



Clusters in simple forms and complex items benefit from one another because of their structural similarity (through structural priming and analogy).



Can formal modelling shed light on how compositionality marker ambiguity evolves?

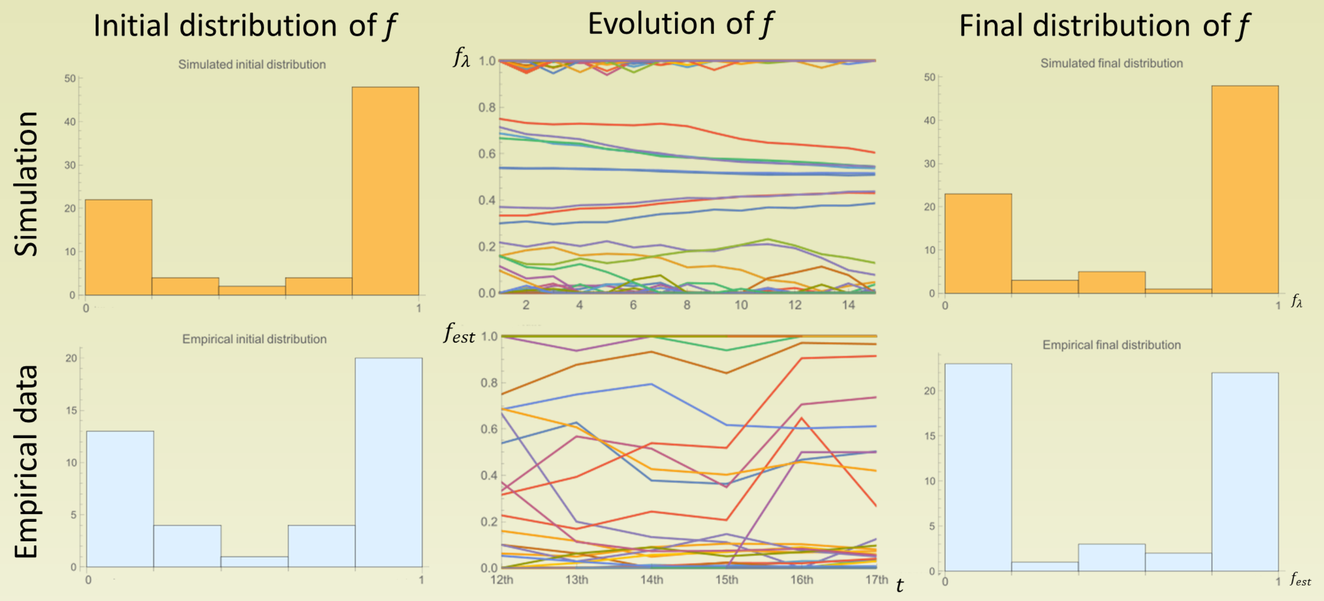


$$f_\lambda = \frac{\hat{S}_\lambda}{\hat{S}_\lambda + \hat{C}_\lambda}$$

Measuring ambiguity of a cluster type at its ecological equilibrium for a given λ value.

$$f_\lambda \cong \begin{cases} 1 \ldots \text{simple} \\ \frac{1}{2} \ldots \text{ambiguous} \\ 0 \ldots \text{complex} \end{cases}$$

How does f_λ evolve?



Empirical evidence: The interaction of supporting and inhibiting effects leads to stable disambiguated as well as ambiguous configurations.

Outline of a cooperative two-dimensional Lotka-Volterra system: Equilibrium densities depend on the evolving parameter λ, which changes if cluster-repair processes are at work in lexical items (see consonant-cluster fact box).

More information on our project:

Full article

Website

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for a list of references follow the QR codes

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