# Durational differences of word-final /s/ emerge from the lexicon: **Evidence from pseudowords**

#### FOR 2373 Spoken Morphology



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# Motivation

- Recent research has shown that seemingly homophonous elements, e.g. words (e.g. [1], [2]), stems (e.g. [3], [4]), prefixes (e.g. [5], [6]), and suffixes (e.g. [7]) differ in their acoustic duration
- A prominent case for this is word-final /s/ in English; studies (e.g. [8], [9], [10], [11]) show that: **non-morphemic > suffixes > clitics**
- Such findings pose a challenge for theories of speech production (e.g. [12], [13]) as it is currently unclear how morphological information would come to influence articulation
- A recent alternative theory of comprehension and production is the discriminative lexicon ([14], [15], [16])
- We follow this approach to predict the duration of word-final non-morphemic and plural /s/ in pseudowords



Figure 1. Schematic LDL network



Figure 2. LDL network toy example.

Dominic.Schmitz@uni-duesseldorf.de, Ingo.Plag@uni-duesseldorf.de, Dinah.Baer-Henney@uni-duesseldorf.de

- Linear Discriminative Learning (LDL) networks are very simple two-layer networks and are linguistically transparent and interpretable
- LDL makes use of five high-dimensional numeric matrices, each of which represents a different subsystem
- For the current implementation, the semantic and the form matrix are most important
  - The **semantic matrix S** contains semantic vectors of words • The **form matrix C** contains triphone
  - cues of words
- The LDL implementation predicts
  - meaning from forms → **comprehension**
  - form from meaning → production
- Making use of real word comprehension and its mathematical implementation, we can estimate pseudoword semantics
- A **combined implementation** for real words and pseudowords then enables us to extract a variety of measures that reflect various dimensions of associations in the lexicon
- Such measures describe, for example, phonological and semantic neighbourhood densities, phonological certainty, and semantic activation diversity
- These measures are used as predictors in linear mixed-effects regression models to analyse /s/ durations
- We took an existing data set on durations of non-morphemic and plural /s/ durations in pseudowords from a previous production study [11]

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### Dominic Schmitz, Ingo Plag & Dinah Baer-Henney Heinrich-Heine-Universität Düsseldorf

# Method



general semantic neighbourhood density

# Heinrich Heine Universität Düsseldorf





## Discussion

- LDL measures are predictive of word-final /s/ durations
  - Higher semantic activation diversity leads to **shorter** word-final /s/ durations
  - Higher phonological uncertainty leads to **longer** word-final /s/ durations
- In contrast, for traditional predictor variables such as lexical frequencies, bigram frequencies, etc., it is **unclear** why they would manifest themselves in a particular morphological effect in speech production
- In LDL such effects can emerge through the mapping of form and meaning in a **clearly** defined process of discriminative learning
- We showed that durational differences emerge from the pseudoword's resonance with the lexicon
- It remains to be shown whether the same measures are predictive for /s/ durations in real words

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