# A Unifying Theory for Experimental Symbolomics

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## Overview

Sample poster with a more flexible/complex/interesting variant of the basic layout.

## Introduction

- automatic sign language recognition system
- necessary for communication between deaf and hearing people
- continuous sign language recognition, several speakers, vision-based approach, no special hardware
- large vocabulary speech recognition (LVSR) system to obtain a textual representation of the signed sentences
- evaluation of speech recognition techniques on publicly available sign language corpus

## Automatic Sign Language Recognition (ASLR)

- similar to speech recognition: temporal sequences of images
- important features
  - hand-shapes, facial expressions, lip-patterns
  - orientation and movement of the hands, arms or body
- HMMs are used to compensate time and amplitude variations of the signers
- goal: find the model which best expresses the observation sequence

## Experimental Setup

### Database

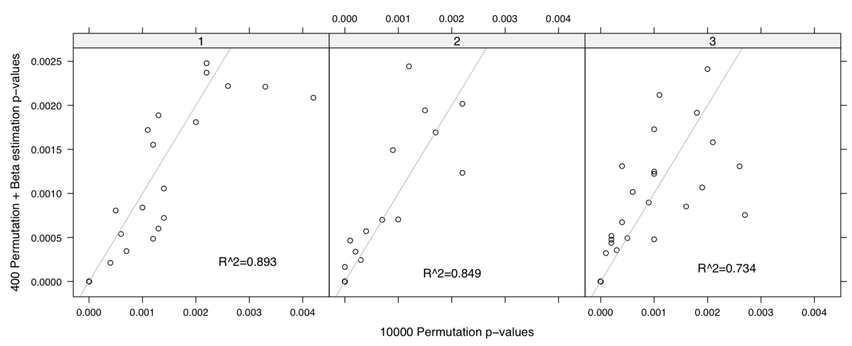
- system evaluation on the RWTH-BOSTON-104 database
  - 201 sentences (161 training and 40 test sequences)
  - vocabulary size of 104 words
  - 3 speakers (2 female, 1 male)
  - corpus is annotated in glosses

### Problems

- 26% of the training data are singletons
- simple sentence structure
- one out-of-vocabulary (OOV) words with whole-word models

### Differences in Comparison to ASR

- simultaneousness
- signing space
- environment
- speakers and dialects
- coarticulation and movement epenthesis
- silence
- whole-word models and sub-word units




## System Overview

### Visual Modeling (VM)

- related to the acoustic model in ASR
- HMM based, with separate GMMs, globally pooled diag. covariance matrix
- monophone whole-word models
- pronunciation handling

### Language Modeling (LM)

- according to ASR: LM should have a greater weight than the VM
- trigram LM using the SRILM toolkit, with modified Kneser-Ney discounting with interpolation

## Feature Selection and Model Combination

### Feature Selection

- concatenation of appearance-based and manual features
- sliding window for context modeling
- dimensionality reduction by PCA and/or LDA

## Model Combination

- log-linear combination of independently trained models
- profit from independent alignments (e.g. performing well for long and short words)
- profit from different feature extraction approaches

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