



**University of the Basque Country**

# **Hybrid approach for Language Identification oriented to Multilingual Speech Recognition in the Basque context**

**N. Barroso, K. López de Ipiña, A. Ezeiza,  
O. Barroso, U. Susperregi**

**HAIS 2010 Donostia**



## Outline

- Introduction
- Phonetic features of the languages
- Multilingual Speech Recognition
- Language Identification subsystem
- Experimentation
- Concluding Remarks

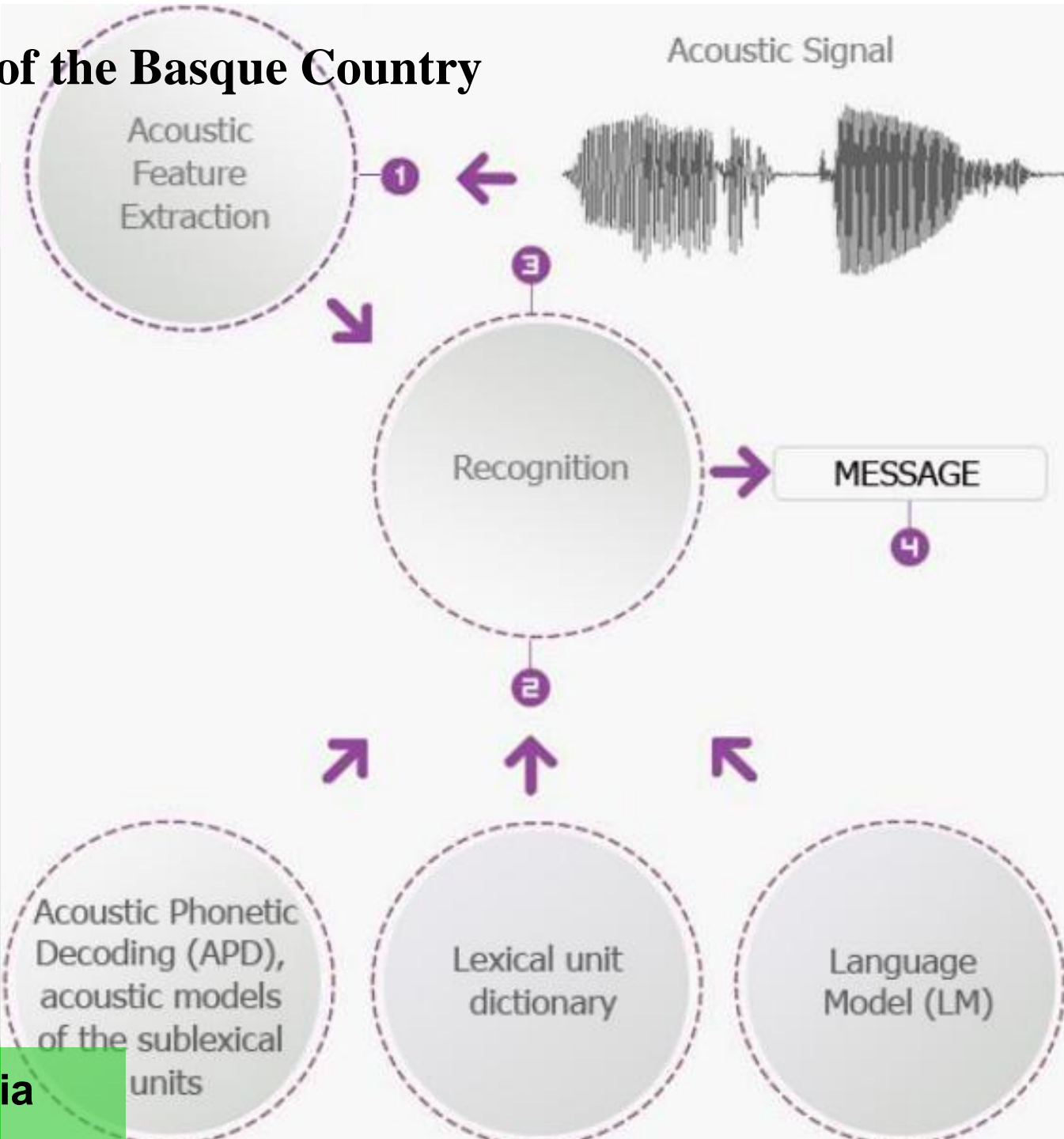


## Goals of the project

- Multilingual Speech Recognition System
- Specifically for Basque, Spanish, and French
- Language Identification as first step
- Combination of SVM, MLP, and HMM



# ASR scheme





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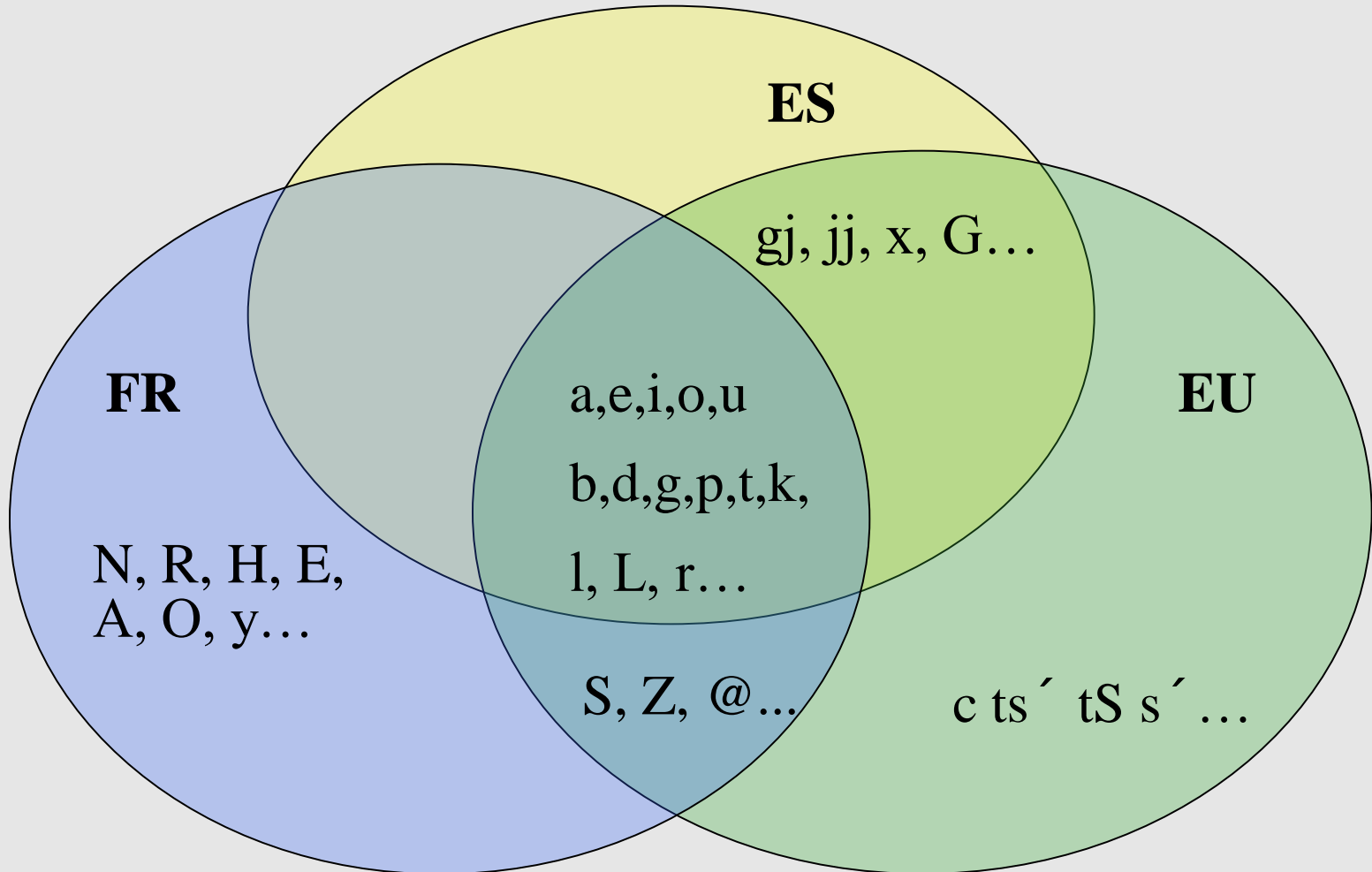
# Analysis across languages

## Sound Inventories

Sound Type	Basque	French	Spanish
<b>Plosives</b>	p b t d k g c	p b t d k g	p b t d k g
<b>Affricates</b>	ts ts' tS		ts
<b>Fricatives</b>	g j j̃ f B T D s s' S x G Z v h	f v s z S Z	g j j̃ F B T D s x G
<b>Nasals</b>	m n J	m n J N	m n J
<b>Liquids</b>	l L r rr	l R	l L r rr
<b>Vowel glides</b>	w j	w H j	w j
<b>Vowels</b>	i e a o u @	i e E a A O o u y 2 9 @ e~ a~ o~ 9~	i e a o u



# Analysis across languages





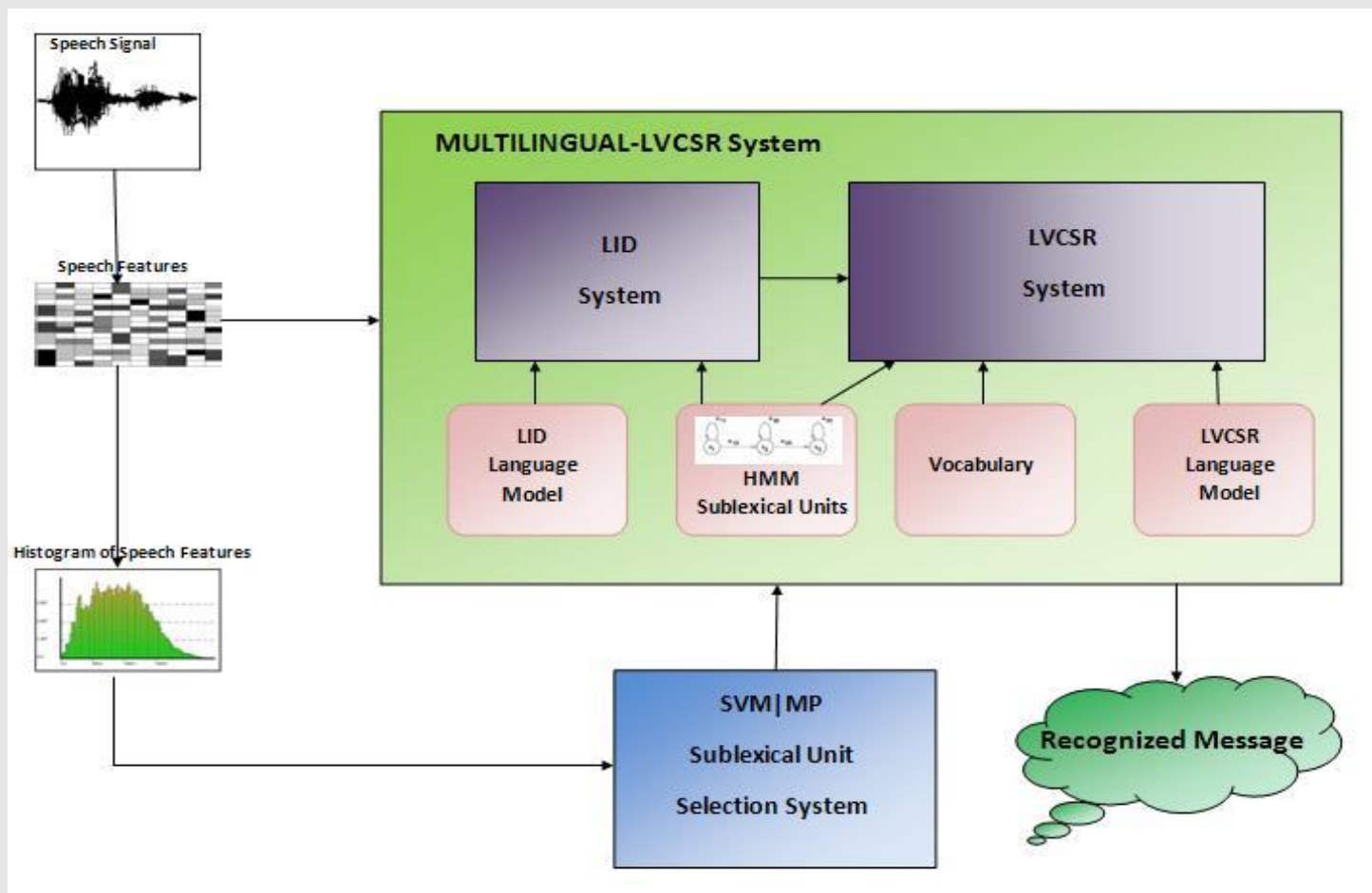
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# Multilingual LVCSR



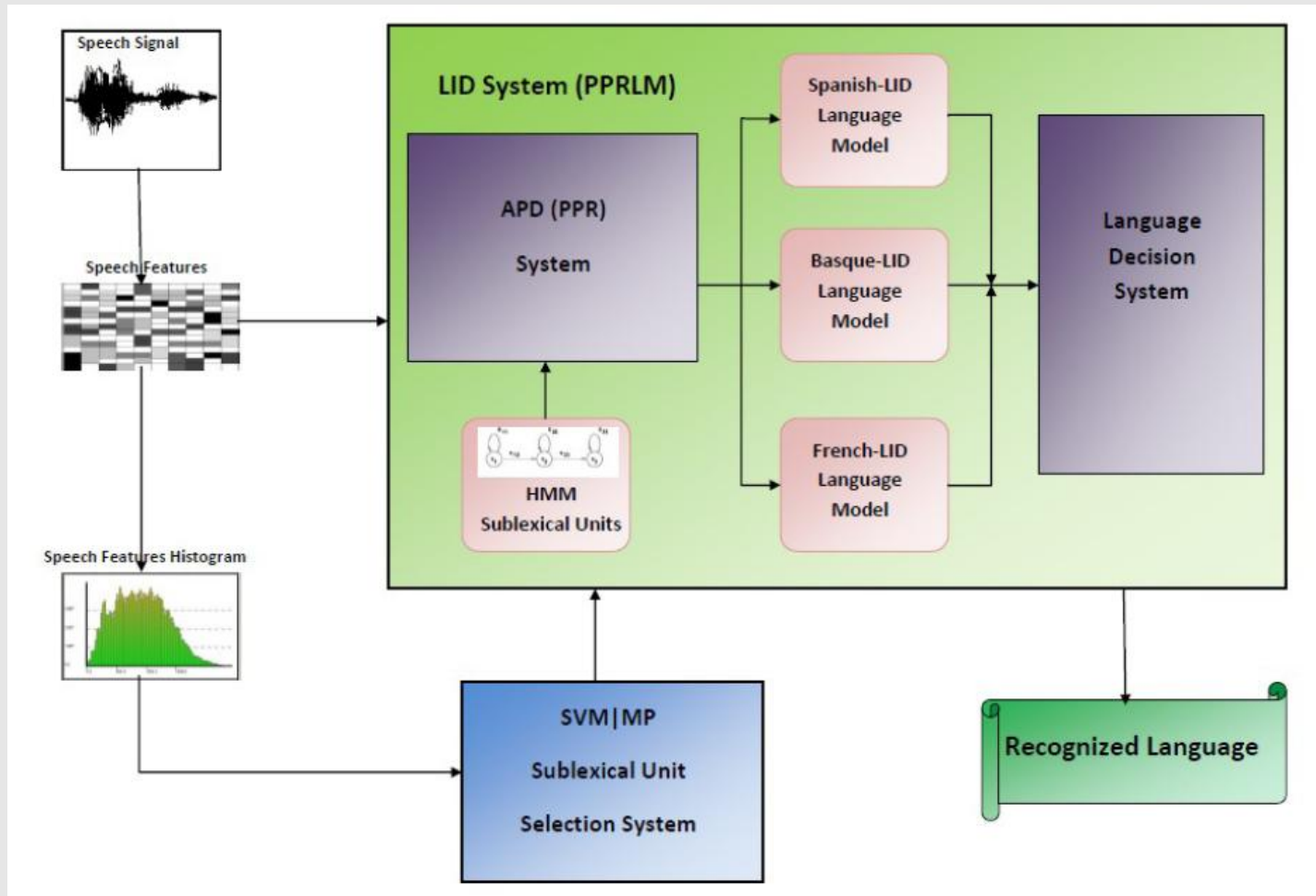


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# LID system



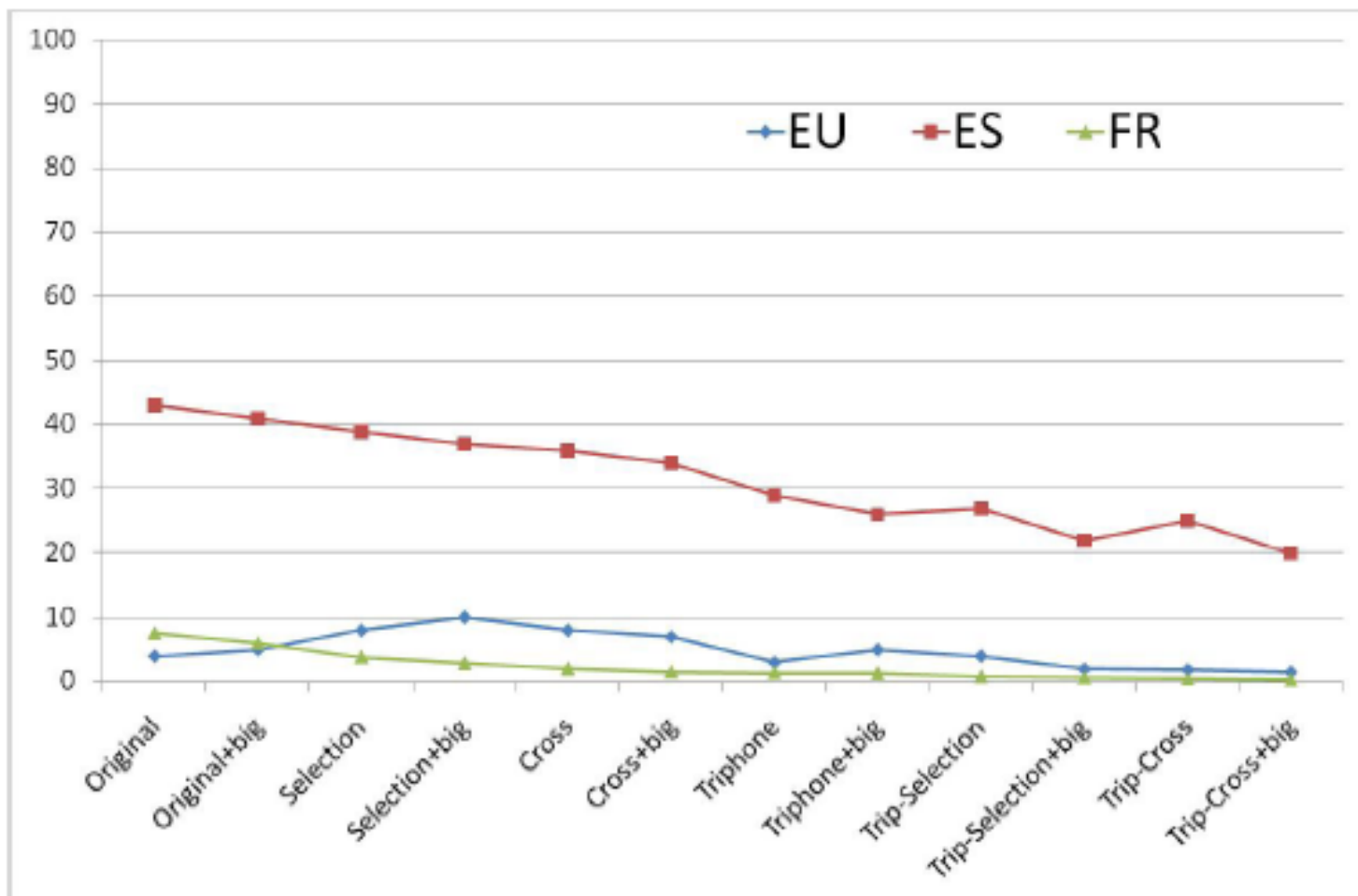


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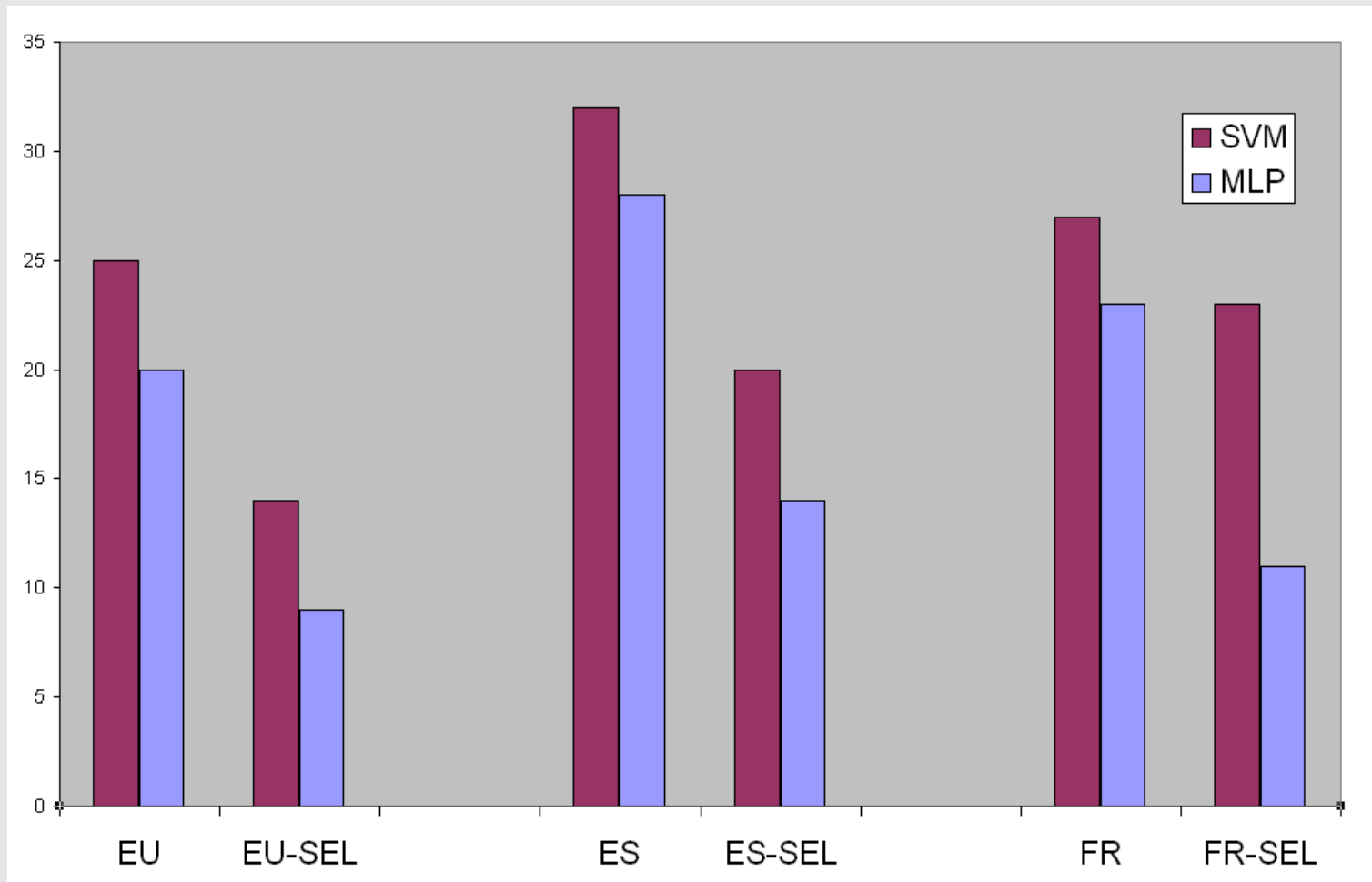


# LID system (Error Rate)



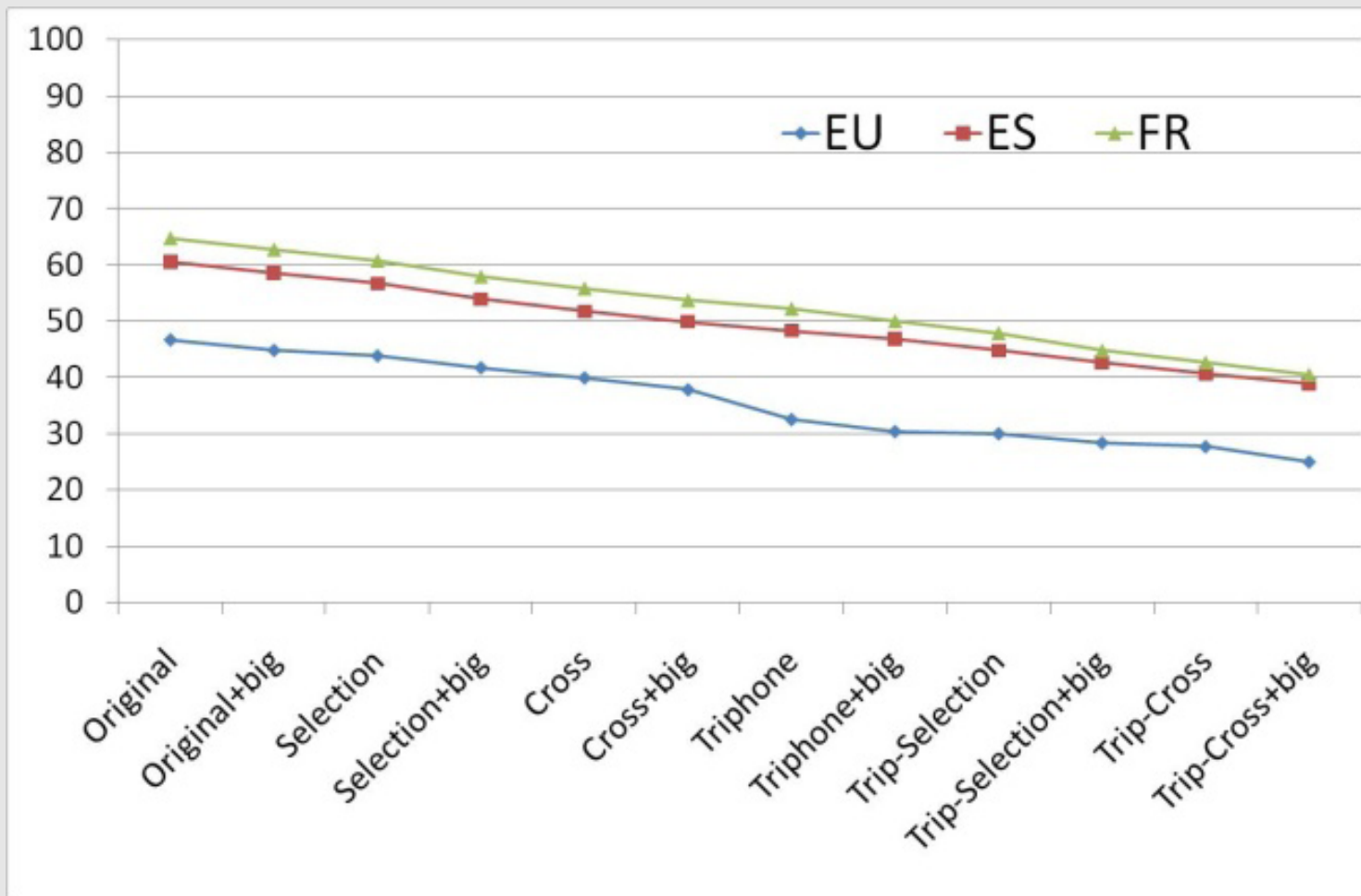


# Phoneme Error Rate (classifiers)





# Phoneme Error Rate (Sublexical Units)





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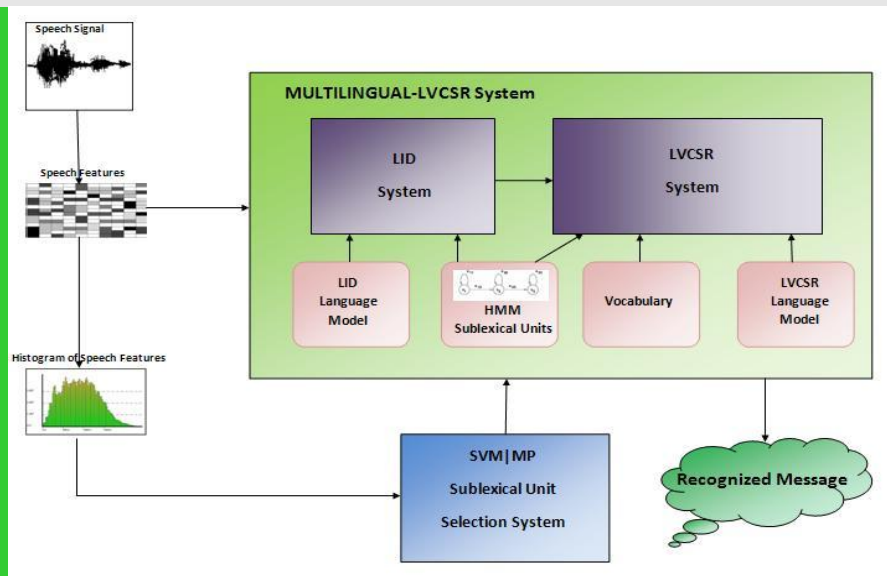
## Concluding Remarks

- Differences between languages
- Optimization of the selection process of the units
- Improvements on Language Models
- Combinations of different statistical models



## Ongoing work

- New Feature Extraction methods
- Phonetic transcription fixes and improvements
- Matrix estimation for few data
- Cross-Lingual Adaptation experiments



**N. Barroso, O. Barroso,  
U. Susperregi**  
**Irunweb Enterprise**  
**nora@irunweb.com**

**K. López de Ipiña,  
A. Ezeiza**

**Systems Engineering  
and Automation dept.  
Univ. Basque Country**  
**karmele.ipina@ehu.es**