

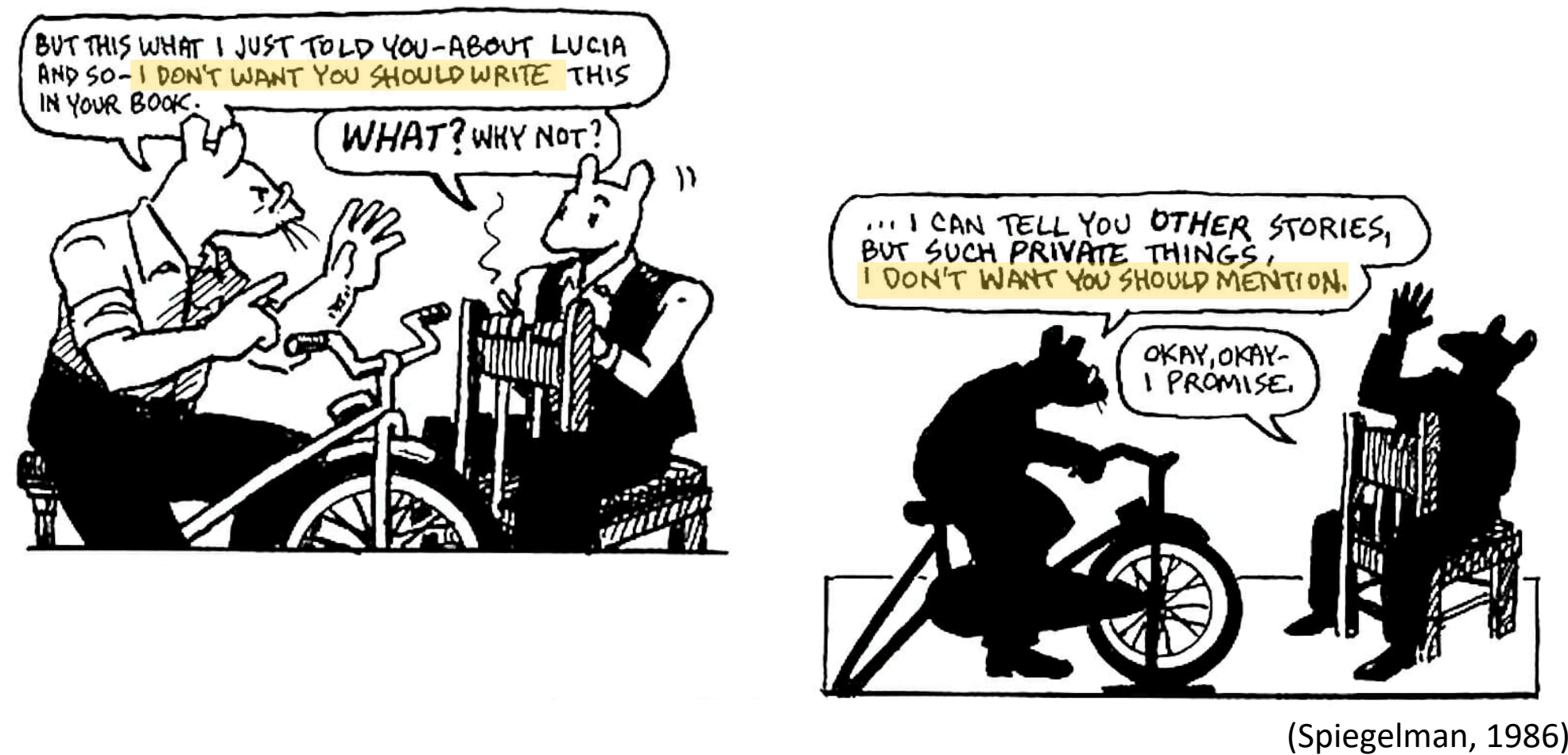
# Studying Cross-linguistic Structural Transfer in Second Language Learning

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## Introduction

Learners of a second language make characteristic errors:



(Spiegelman, 1986)

Q1: Are these errors systematic across L2s?

Q2: Are all aspects of L2 syntax affected equally?

## Background

Theories of Origins of L2 errors

- Lack of access to Universal Grammar (Clahsen and Muysken, 1986)
- Failure to reset parameters of Universal Grammar ()
- Interference in representation (Hernandez, Li, and MacWhinney, 2005)
- Interference during production (Ahn & Ferreira, 2024)

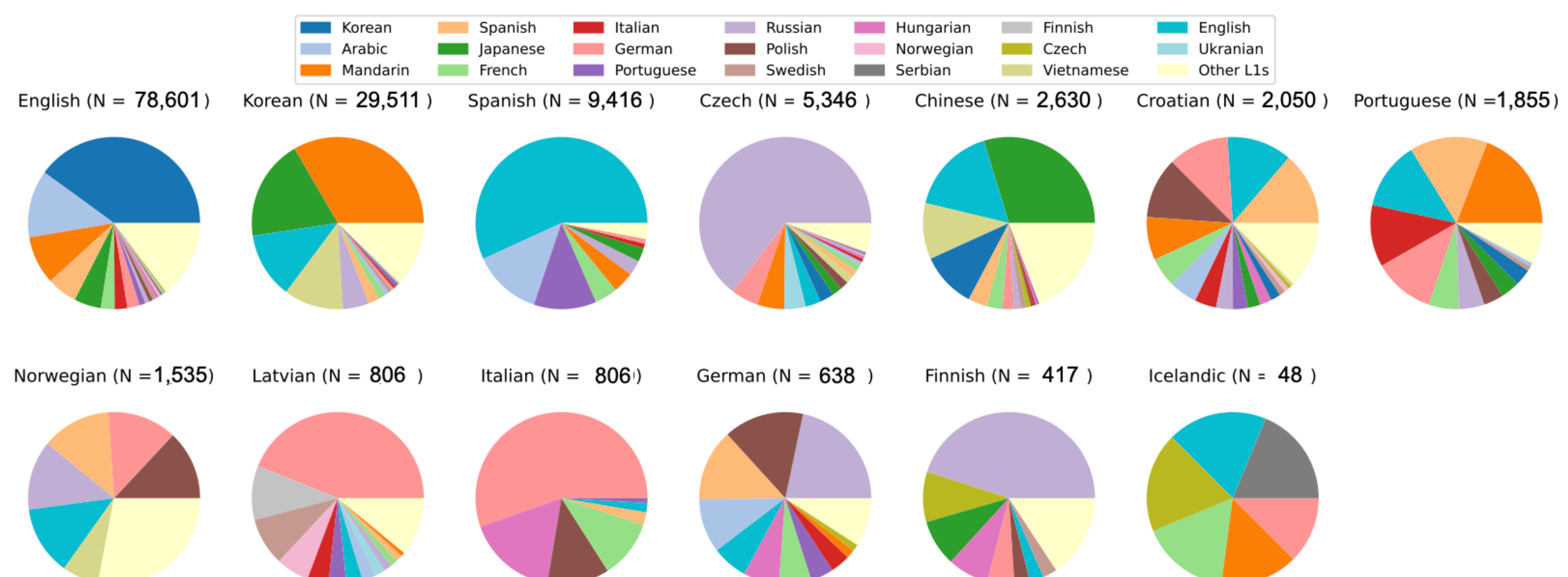
But... very limited data:

- Typical study considers 1-2 L1s or L2s and 1 narrowly-defined phenomenon.
- Overall picture is unclear

## Present Study

Approach:

- Train classifier to identify L1 of authors of L2 essay.
- Features classifier finds useful represent L1->L2 transfer (positive or negative).
- Combine 29 learner corpora
  - 133,659 essays
  - 273 L1-L2 pairs
  - Automatic dependency parsing & feature extraction



## Experiment 1

Q1: Are errors systematic across L2s?

- Train ridge regression classifier to identify L1 based on
  - POS trigrams (PRON+VERB+NOUN)
  - Dependency trigrams (nsubj+root+obj)

L2	Baselines			Model
	Majority	Random	Stratified	
English	0.23	0.03	0.19	<b>0.48</b>
German	0.08	0.07	0.13	<b>0.24</b>
Norwegian	0.02	0.11	0.11	<b>0.25</b>
Icelandic	0.02	0.14	0.17	<b>0.57</b>
Spanish	0.41	0.11	0.36	<b>0.65</b>
Portuguese	0.06	0.08	0.11	<b>0.30</b>
Italian	0.39	0.19	0.37	<b>0.62</b>
Czech	0.50	0.04	0.42	<b>0.53</b>
Croatian	0.03	0.04	0.09	<b>0.23</b>
Latvian	0.27	0.08	0.22	<b>0.34</b>
Finnish	0.28	0.09	0.23	<b>0.38</b>
Chinese	0.14	0.06	0.16	<b>0.31</b>
Korean	0.17	0.04	0.18	<b>0.35</b>
all	0.09	0.02	0.11	<b>0.42</b>

A1: Yes!

compare

harder!  
(more L1s)

## Experiment 2

Q2: Are all aspects of L2 syntax affected equally?

- Train ridge regression classifier on interpretable features
  - Text features: numbers of sentences and words, average sentence length, number of unique POS & dependency relations, etc.
  - Morphological features: entropy, standard deviation, & production ratio of morphological features (tense, mood, number, adjective degree, etc.).
  - Syntactic features: entropy of dependency relations, main clause word orders; dependency tree depth; etc.

L2	Exp. 2 (Features)
	Model
English	0.30
German	0.21
Norwegian	0.21
Icelandic	0.45
Spanish	0.53
Portuguese	0.20
Italian	0.54
Czech	0.51
Croatian	0.16
Latvian	0.31
Finnish	0.34
Chinese	0.21
Korean	0.25
all	0.26

most & least predictive features  
(permutation importance)

**Predictive features**

the aspect of verbs  
the form of verb (e.g., finite, infinite)  
the person of auxiliary  
the proportion of verb usage

**Non-predictive features**

the main constituent order  
the number of auxiliary  
the head directionality of subordinate clause

## Discussion

Summary:

- Consistent L1 “grammatical accent” across L2s
- Only some features highly predictive

Limitations & Questions:

- Multi-collinearity, lots of
- Many features, complicates interpretation
- What predicts which features matter & how to test

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