Part-of-Speech Tagging a Spanish Learner Oral Corpus

Criteria, Procedure, and a Sample Analysis

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LIMSI & UAM

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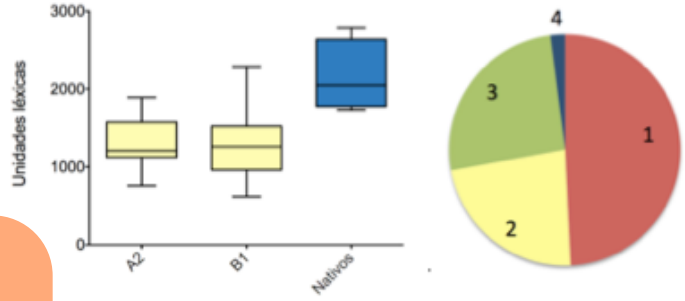
Introduction

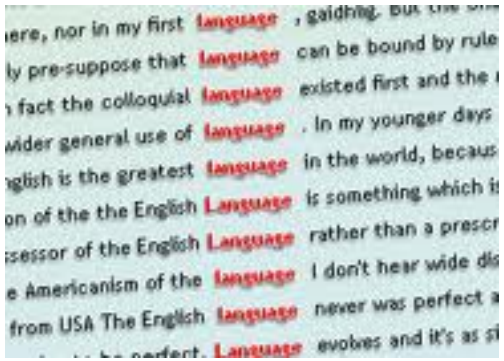


Second language acquisition research

Interlanguage analysis

Corpus linguistics

Computer tool



Background of Spanish learner corpus research

- Spanish learner text corpora available:
  - **CEDEL2** (Lozano and Mendikoetxea, 2013)
  - **CAES** (http://galvan.usc.es/caes)
  - **The Aprescrilov corpus** (Buyse et al. 2012)
- Few research projects on spoken learner corpus:

<table>
<tr><th>ENGLISH</th><th>FRENCH</th><th>SPANISH</th></tr>
<tr><td>LINDSEI
(Louvain International Database of Spoken English; Gilquin et al., 2010)</td><td rowspan="2">FLLOC
(French Learner Language Oral Corpus; Myles, 2005)</td><td>The Díaz Corpus
(Díaz Rodríguez, 2007)</td></tr>
<tr><td>NICT JLE
(NICT Japanese Learner Corpus; Izumi et al., 2004)</td><td>SPLLOC
(Spanish Learner Language Oral Corpora; Mitchell et al., 2008)</td></tr>
</table>

- Phonetic corpora: **FonoELE** (Blanco 2012, 2014)
- **Multimodal** corpora: www.laits.utexas.edu/spt/

Literature review

- **Annotation of Interlanguage/Learner corpora**:
  - Computer-aided Error Analysis (CEA, Dagneaux et al. 1998)
    -  Search and consult errors in context
    -  Error tagging is time-consuming
    -  Learners avoid structures (Schachter 1974)
  - Contrastive Interlanguage Analysis (CIA, Granger 1996)
    -  Compare L1-L2 (most common), or different L2s
    -  Comparative fallacy (Bley-Vroman 1983)
    - ➡ **Native speakers as a benchmark?**
    - ➡ Complementary approaches

*Also: Automatic tagging to describe errors (Diaz-Negrillo et al . 2010)

Part-of-Speech tagging learner corpora

- **Annotation of Interlanguage/Learner corpora**:
  - Initiatives to PoS tag learner data:
    - Mostly English texts: e.g. Tono (2002), Díaz-Negrillo et al. (2010)
    - Other languages: Italian (Rastelli 2006), Norwegian (Tenfjord et al. 2006), Czech (Rosen et al. 2014)
    - Oral data: FLLOC (Myles 2005), SPLLOC (Mitchell et al. 2008)
  - Parsed data (e.g. Rosén & De Smedt 2010; Dickinson & Raheb 2011)
    - ➡ syntactic properties

See an overview of NLP for learner data in Meurers (2015)

Part-of-Speech tagging learner corpora

- **Annotation of Interlanguage/Learner corpora**:
  - Performance of taggers on learner data **decreases**
  - How do native PoS categories fit with **non-native** data?
  - ➡ attempts to refine tagsets (Gaillat 2013; Gaillat et al. 2014)
  - CIA analyses have proliferated:
    - Modals
    - Vocabulary and collocations
    - Connectors
    - Sequences of grammatical categories (e.g. Tono 2000)
    - Clitics and word order...

See panorama in Granger 2004

Goals

- Have an insight into learners' production of L2 categories
  - ➡ a sample study on learners' production of articles

- Fulfil the lack of **computerised, annotated corpora** for Learner Corpus Research.

- ➡ an online interface to perform exploratory analysis of learner corpus data.

Studies on L2 articles

- Most research on L2 English.

See an overview in Díez-Bedmar & Papp 2008; Díez-Bedmar & Pérez Paredes 2012

- Summary of results:
  - Learners whose L1 lacks articles use this category less accurately.

Studies on articles in L2 Spanish

- Error analyses

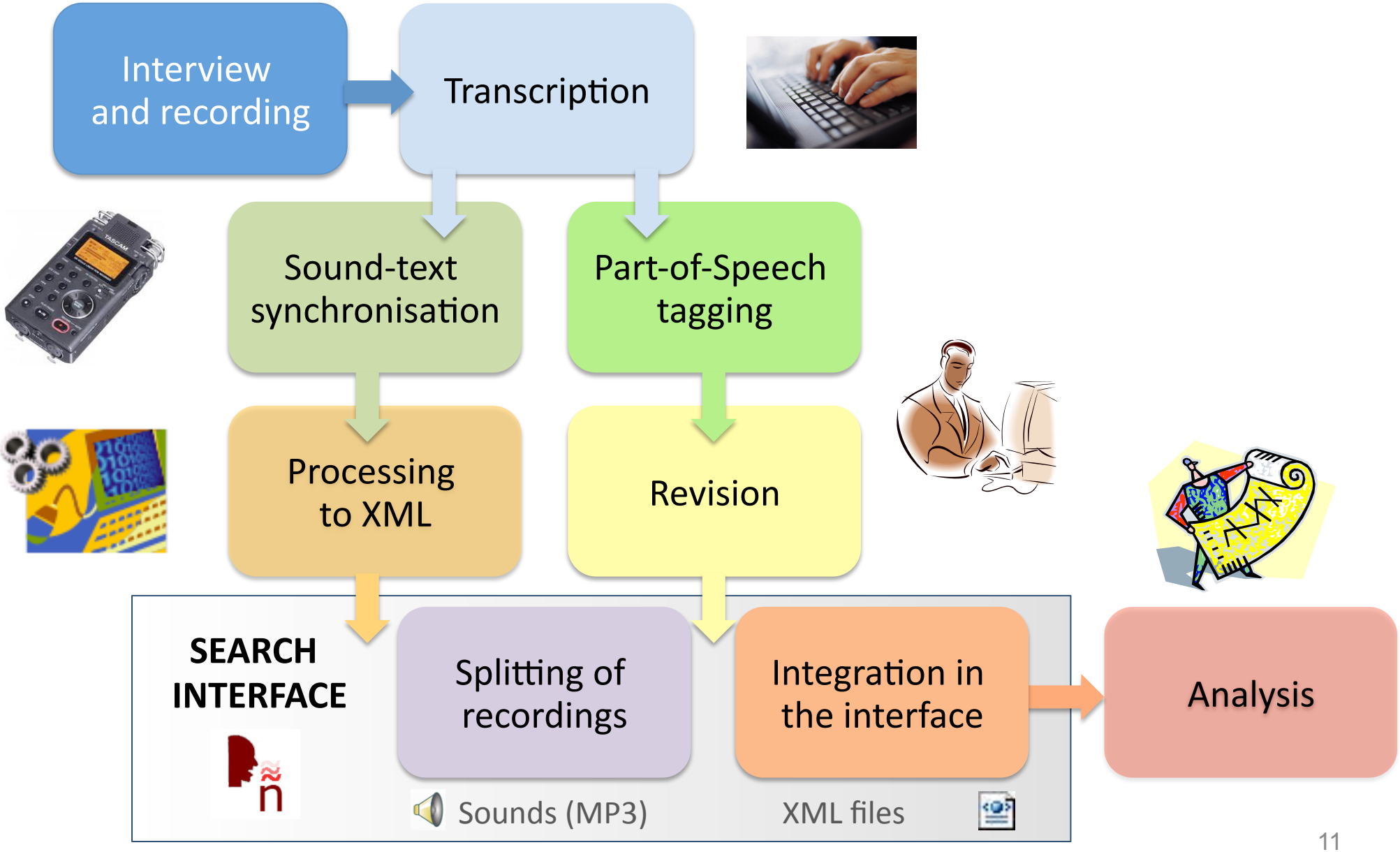
  e.g. Fernández 1990; Santos 1991; Vázquez 1991

- Focused studies on the acquisition of definite articles, or definite and indefinite articles

  e.g. Ramírez-Mayberry (1998), Said-Mohand (2007), Goitia (2007), Lin (2005), Tarrés (2007), Lu & Hsueh (2012) Valverde & Ohtani (2014)

- Summary of results:
  - Learners use more definite than indefinite articles
  - Both are underused
  - Interlanguage phenomena (e.g. Polish, Chinese and Japanese learners)

Methodology



Corpus design

- Participants: students of Spanish/FL (20-26 year old).
- **Low-intermediate level** (A2 and B1, *CEFR*).
- **N = 40**:
  - 9 groups of 4 students with the same L1:

Italian	English	Japanese
French	German	Chinese
Portuguese	Dutch	Polish

  - 1 heterogeneous group of 4 students with other L1s:

Korean	Finish
Turkish	Hungarian

- Control group of native speakers (N=4): 2 men and 2 women.

Corpus design

	File	L1	Length (mm:ss)	Length L1 group
Romance languages	PORMA2	Portuguese	25:10	1:26:52
	PORWA2_1	Portuguese	20:09	
	PORWA2_2	Portuguese (Brazilian)	19:51	
	PORWB1	Portuguese (Brazilian)	21:42	
	ITAMA2	Italian	20:45	1:13:25
	ITAWA2	Italian	13:09	
	ITAMB1	Italian	23:16	
	ITAWB1	Italian	16:15	
	FREMA2	French	24:08	1:23:17
	FREWA2	French	20:31	
	FREMB1	French	21:56	
	FREWB1	French	16:46	
Sino-Tibetan languages	CHIWA2_1	Chinese	18:48	1:17:27
	CHIWA2_2	Chinese	18:45	
	CHIMB1	Chinese	18:56	
	CHIWB1	Chinese	20:58	
Languages from Japan	JAPWA2	Japanese	28:52	1:32:41
	JAPWB1_1	Japanese	16:28	
	JAPWB1_2	Japanese	20:59	
	JAPWB1_3	Japanese	26:22	

	File	L1	Length (mm:ss)	Length L1 group
Germanic languages	ENGWA2	English	15:04	1:20:39
	ENGMB1	English	18:44	
	ENGWB1_1	English	18:02	
	ENGWB1_2	English	28:49	
	DUTMA2	Dutch	18:19	1:16:46
	DUTWA2_1	Dutch	17:33	
	DUTWA2_2	Dutch	23:05	
	DUTWB1	Dutch	17:49	
	GERMA2	German	18:23	1:13:24
	GERWA2	German	19:45	
	GERWB1_1	German	15:35	
	GERWB1_2	German	19:41	
Slavic languages	POLMA2_1	Polish	22:20	1:32:25
	POLMA2_2	Polish	30:28	
	POLMB1	Polish	26:46	
	POLWB1	Polish	12:51	
Other languages	FINWA2	Finnish	20:27	1:19:05
	HUNWA2	Hungarian	21:28	
	KORWB1	Korean	21:14	
	TURWB1	Turkish	15:56	

NAME OF THE FILE

Key of the 3 letter code: L1 + M: man / W: woman + level *CEFR* (A2 or B1) + file number (optional)

e.g. PORWA2_1: woman, Portuguese as L1, A2 level, file 1.

	File	Sex	L1	Level	Length (mm : ss)	Length L1 group
Control group	SPAM_1	M	Spanish	-	18:57	1:22:29
	SPAM_2	M	Spanish	-	26:47	
	SPAW_1	W	Spanish	-	16:49	
	SPAW_2	W	Spanish	-	19:56	

Total:

13 hs 36’

Data collection method

- One-to-one **semi-controlled** spoken interviews.
- **15-20** minutes long each recording.
- Tasks: (similar to foreign language examinations)
  - **Description of two photographs** about food.

Data collection method

- Tasks (cont.):
  - **Story retelling task** from pictures.

  - A question about two **speech acts.**
  - **Spontaneous dialogue**: opinion about topics related to food.

The corpus search interface

- http://cartago.lllf.uam.es/corele/index.html

Welcome! **¡Bienvenido!**

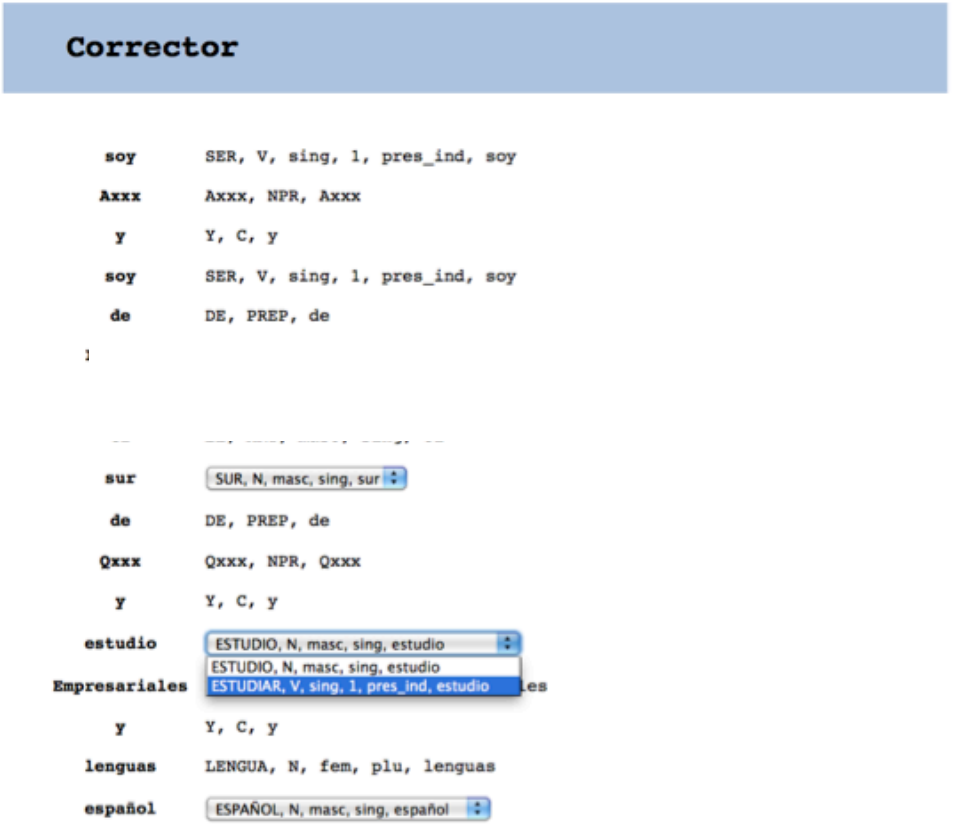
Spanish Learner Oral Corpus	Corpus Oral de Español como Lengua Extranjera (ELE)

PoS tagging

- Automatic tagging with GRAMPAL (Moreno Sandoval and Guirao, 2006).

  → 95.3% precision

- Semi-automatic revision (by the author)



PoS tagging

- Manual revision:
  - Correct **ambiguities**, **categories** and phrase **chunking**:

    e.g. *vino* (V ~ N) ('wine')

  - Fixed other aspects:
    - Add **unrecognised** categories/lemmas: e.g. *wasabi*
    - **Enrich** the annotation: e.g. code for foreign words
    - Fixing **multiword units**: e.g. *darse cuenta* ('to realize')

PoS tagging

- Annotation criteria:
  - Codes for **interlanguage phenomena**:
    - *ext:* borrowings: e.g. *fecha* (Port. 'cierra', 'to close')
    - *def:* wrong forms: e.g. **escribido* ('written')
  - **Morphological variants**: e.g. *superbien* (form) → *bien* (lemma)
  - **Ambiguous** tokens: *UNKN* lemma or category
  - **Multiword units**: nested entities

    e.g. *tiene que hervirlos* ('he/she has to boil them')

    (verbal periphrasis: auxiliary + conjunction + verb + clitic)
  - **Difficult** task, many **ambiguities → results** with **caution**

PoS tagging

- PoS tags:

Category		Examples
ADJ	Adjective	*blanco* ('white')
ADV	Adverb	*bien* ('well'), *mal* ('wrong')
ART	Article	*el* ('the'), *un* ('a')
AUX	Auxiliary verb	*haber* ('to have'), *ser* ('to be')
C	Conjunction	*pero* ('but'), *que* ('that')
DEM	Demonstrative adjective or pronoun	*este* ('this'), *aquel* ('that')
MD	Discourse marker	*entonces* ('so'), *quiero decir* ('I mean')
FORM	Formula	*lo siento* ('I am sorry'), *por favor* ('please')
INTJ	Interjection	*¡eh!* ('hey!')

PINT	Interrogative or exclamative pronoun		*qué* ('what'), *quién* ('who')	
N	Noun		*coche* ('car')	
NPR	Proper name		*Asturias, Universidad Autónoma*	
P	Personal pronoun		*tú* ('you'), *conmigo* ('with me')	
POSS	Possessive adjective or pronoun		*mi* ('my'), *tuyo* ('yours')	
PREP	Preposition		*a* ('to'), *por* ('for')	
Q	Quantifier	**NUM**	Numeral adjective or pronoun	*primer* ('first'), *dos* ('two')
		IND	Indefinite adjective or pronoun	*algunos* ('some')
REL	Relative pronoun		*que* ('which' or 'that'), *quien* ('who')	
UNKN	Unknown		*xxx*	
V	Verb		*amar* ('to love')	

PoS tagging

- Sample of annotated file (XML):

```
<w cat="C" lem="y" for="y" id="959">y</w>
<w cat="C" lem="y" for="y" id="960">y</w>
<w cat="MD" lem="pues" for="pues" id="961">pues</w>
<w cat="ART" lem="el" gen="masc" num="plu" for="los" id="962">los</w>
<w cat="N" lem="verdura" gen="fem" num="plu" for="verduras" id="963">verduras</w>
<w cat="V" lem="hervir" num="sing" per="3" tie="pres_ind" asp="modal" for="tiene que hervir" id="964">
<w cat="AUX" lem="tener" num="sing" per="3" tie="pres_ind" for="tiene">tiene</w>
<w cat="C" lem="que" for="que">que</w>
<w cat="V" for="hervirlos" pro="1">
hervirlos
<w cat="V" lem="hervir" tie="inf" for="hervir" />
<w cat="P" lem="lo" gen="masc" num="plu" per="3" for="los" id="965"/>
</w>
</w>
```

Category, lemma, form and id

Nested entity

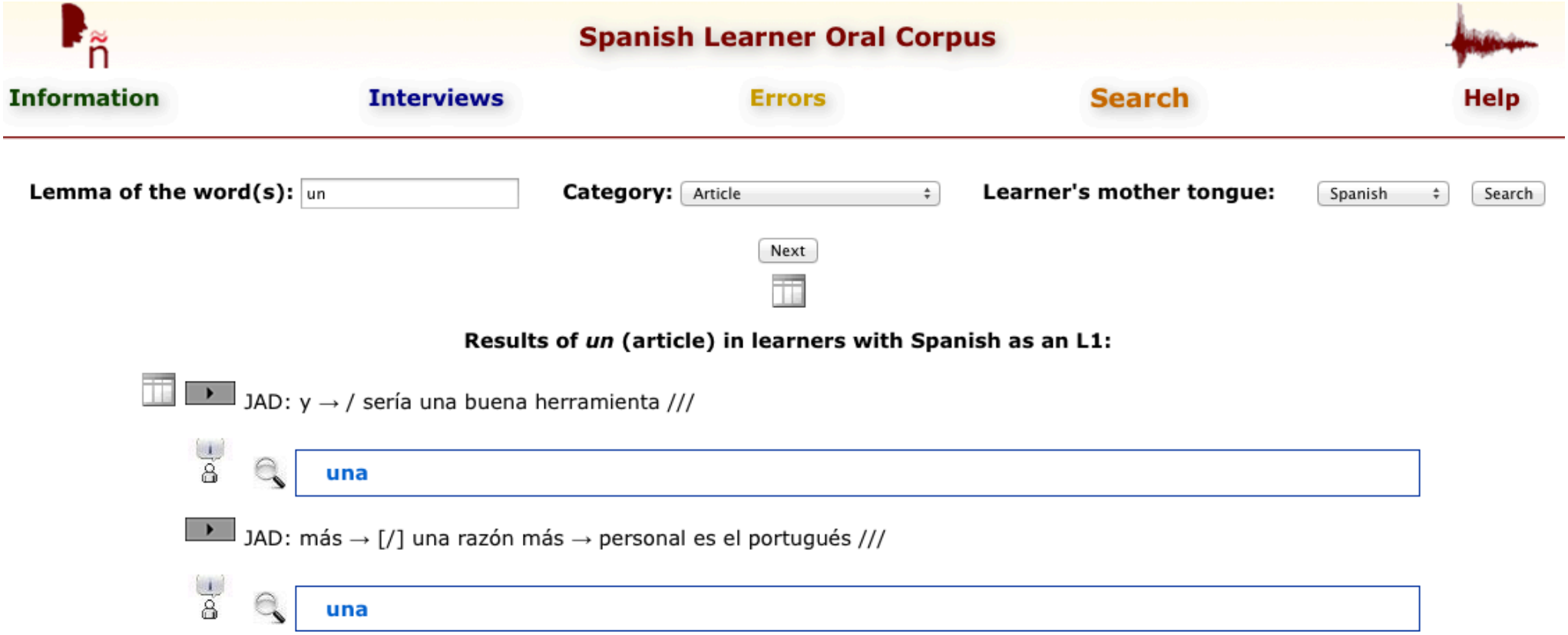
PoS tagging

- Unit of count: **lexical unit** (LU) → Fernández's criteria (1990):
  - **Single words**, except contractions: e.g. *del* (*de* + *el,* 'of the')
  - **Multiwords**:
    - idioms: e.g. *darse cuenta* ('to realize')
    - discourse markers: e.g. *es decir* ('I mean')
    - formulas: e.g. *de nada* ('you're welcomed')
    - proper nouns: e.g. *Puerto Rico*
    - foreign calques: e.g. **frutas de mar* ('marisco', Eng. 'seafood')
  - **Spoken phenomena:**
    - repetitions: 1 LU: e.g. *al [/] al principio* ('at [/] at first')
    - reformulations: 2 LUs: e.g. *es [/] está abierta* ('is [/] is open')

Analysis

http://cartago.lllf.uam.es/corele/search.html

Analysis



http://cartago.lllf.uam.es/corele/search.html

PoS tagging

- Learners' production (rate per 1000 LUs):

	PT	IT	FR	EN	DU	GE	PL	CH	JP	OT	TOT	SP
ADJ	41.1	35.9	36.2	28.3	37.3	37.2	47.7	46.6	47.0	44.5	40.2	34.7
ADV	142.3	135.5	170.4	187.4	152.9	196.3	166.7	186.6	180.7	186.5	170.5	108.2
ART	78.0	90.0	85.8	76.0	85.1	79.6	60.2	75.0	47.5	52.9	73.1	79.8
AUX	1.6	2.6	1.1	1.3	1.2	1.3	1.1	3.3	0.6	1.9	1.6	1.2
C	105.2	106.1	112.0	108.9	124.6	102.3	103.9	91.5	115.7	126.1	109.6	114.3
DE	13.2	11.4	5.6	4.9	8.8	9.4	12.8	6.1	9.4	7.8	8.9	11.3
DM	27.4	32.0	54.9	40.3	29.8	29.1	20.4	20.1	34.9	26.6	31.5	67.5
FOR	4.8	6.3	8.3	12.0	4.4	12.2	3.2	0.3	5.1	2.9	6.0	3.2
IND	36.6	34.7	23.4	32.1	38.6	22.7	40.9	32.1	26.9	33.6	32.2	33.9
INJ	9.7	2.4	9.5	20.9	10.4	17.7	6.6	15.3	18.0	9.4	12.0	3.7

PoS tagging

- Learners' production (rate per 1000 LUs):

	PT	IT	FR	EN	DU	GE	PL	CH	JP	OT	TOT	SP
INT	7.8	4.1	8.4	8.9	8.8	7.7	10.9	6.4	8.1	7.3	7.8	3.7
N	151.7	145.8	141.4	144.8	141.3	144.7	158.2	182.4	177.9	147.5	153.6	137.5
NM	9.7	12.3	15.1	8.7	13.8	13.1	9.8	15.3	14.5	10.7	12.3	10.5
POS	6.4	9.9	8.4	9.3	4.8	5.7	6.2	6.4	9.0	10.3	7.6	5.7
PRE	94.3	101.7	92.8	80.0	90.6	92.2	113.9	79.2	74.4	79.9	89.9	88.5
PRN	20.7	15.2	19.0	22.6	16.3	18.8	21.7	26.8	27.4	21.6	21.0	7.5
PRO	43.5	52.6	27.1	32.3	37.1	33.4	34.9	33.7	32.3	38.8	36.6	68.6
REL	12.8	20.9	15.3	7.0	15.2	5.0	8.3	4.2	1.5	5.9	9.6	24.2
UN	10.8	6.5	3.0	12.2	10.2	16.4	22.1	11.2	5.8	5.2	10.3	5.7
V	182.3	174.1	162.3	162.5	168.8	155.2	150.3	157.6	163.4	180.6	165.7	189.6

A sample analysis of articles in L2 Spanish - Motivation

- Dimensions of [±specific reference] and [±hearer knowledge]

→ use of article is related to the speakers' ability to identify the referent:

- **Definite article** (*el*): shared knowledge
- **Indefinite article** (*un*): new information

e.g. *He comprado, **un** coche, pero **el** vehículo no tiene airbag*

'I bought **a** car, but **the** vehicle does not have airbag'

→ **anaphoric relations**

- Other selection criteria:
  - General classes: e.g. *Los gatos cazan ratones* ('Cats chase mice')
  - Intensify statements: *e.g. ¡Tengo un hambre!* ('I am so hungry!')
  - Lexical restrictions: idioms, proper nouns…

See Leonetti (1999), Morimoto (2011), Brucart (2012)

A sample analysis of articles in L2 Spanish - Motivation

- Languages without articles:

  e.g. Polish, Japanese, Chinese, Finnish, Turkish, Korean…

  - Use demonstratives (definiteness)
  - Use numerals or quantifiers (indefiniteness)

   See Brucart (2012)

→ These learners face specific learning difficulties to use the article:

- Omission: e.g. *Pidió la cuenta ***a** camarero*
- Hypercorrection: e.g. *Está lleno de ***la** gente*

→ **Contrastive interlanguage analysis**

Results

- **Learners**:

  Mean (M) = 73.08 articles per 1,000 LUs (SD = 18.78)

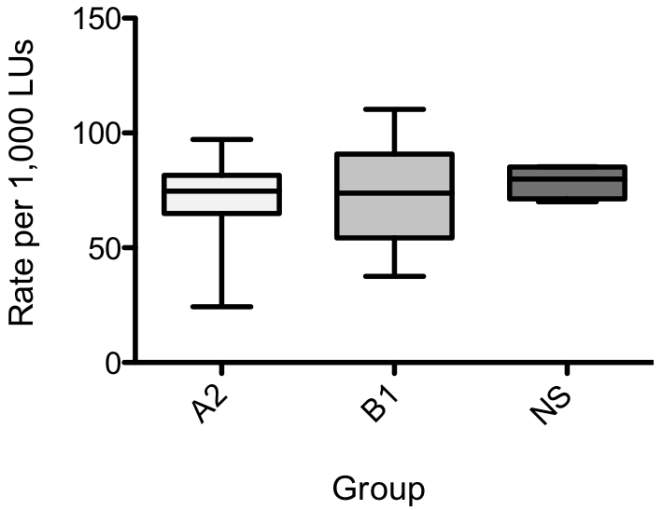
- **Native speakers** (NS):

  Mean (M) = 78.80 articles per 1,000 LUs (SD = 7.56)

Similar

- Differences between groups **not statistically significant**:

  Kruskal-Wallis $\chi 2$ (2, 44) = 0.44, p = 0.80



Results

- **Lower production** of indefinite article in both groups
  - → in line with previous analyses
- **Foreign articles (FA)** very frequent at A2
  - → especially, Portuguese learners (*a/o,* 'el'/'la')

	el	M	SD	*un*	M	SD	FA	M	SD	Total	M	SD
A2	1,291	49.16	12.02	566	21.40	6.67	64	1.79	5.74	1,921	72.34	16.39
B1	1,378	51.84	15.01	605	21.92	9.62	2	0.07	0.21	1,985	73.82	21.31
Total	2,669	50.50	13.49	1,171	21.66	8.17	66	0.93	4.10	3,906	73.08	18.78
NS	487	55.32	8.31	203	23.49	1.70	0	0	0	690	78.80	7.56

Articles produced by each group (NS vs. NNS)

Results

- **Higher SD** in **learners** usage (SD = 18.78)

  → some groups of learners produced fewer articles

  Not tested statistically (not enough data)

Group	*el*	M	SD	*un*	M	SD	FA	M	SD	Total	M	SD
PT	369	92.25	31.15	139	34.75	8.26	64	16.00	19.51	572	77.53	19.15
IT	361	90.25	49.63	194	48.50	27.01	0	0.00	0.00	555	86.74	17.92
FR	393	98.25	36.13	157	39.25	10.81	0	0.00	0.00	550	84.59	11.79
DU	280	70.00	13.44	162	40.50	8.39	1	0.25	0.50	443	85.21	3.95
EN	247	61.75	15.00	113	28.25	15.52	0	0.00	0.00	360	80.09	18.53
GE	247	61.75	16.94	117	29.25	7.50	0	0.00	0.00	364	78.57	11.22
PL	211	52.75	16.05	108	27.00	13.14	0	0.00	0.00	319	59.18	6.26
CH	207	51.75	11.27	62	15.50	4.65	0	0.00	0.00	269	76.38	17.76
JP	176	44.00	13.29	46	11.50	4.04	0	0.00	0.00	222	48.94	8.52
OT	178	44.50	17.08	73	18.25	9.95	1	0.25	0.50	252	53.59	23.16
Total	2,669	50.50	13.49	1,171	21.66	8.17	66	0.93	4.10	3,906	73.08	18.78

Results

- Two groups **clustering learners**:
  - [+article] L1: Germanic and Romance languages
  - [-article] L1: Polish, Chinese, Japanese, Finnish, Korean, Turkish

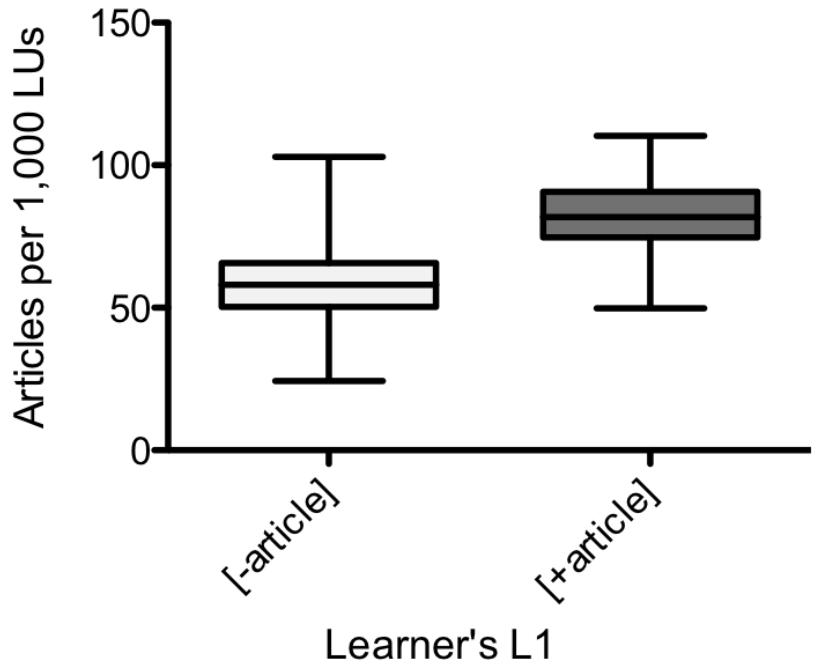
Group	*el*	M	SD	*un*	M	SD	FA	M	SD	Total	M	SD
[-Art]	714	42.90	13.68	257	15.15	7.00	1	0.06	0.21	972	58.10	17.17
[+Art]	1,955	55.06	11.35	914	25.56	6.13	65	1.45	5.16	2,934	82.08	13.28
Total	2,669	50.50	13.49	1,171	21.66	8.17	66	0.93	4.10	3,906	73.08	18.78

Results

- Results **statistically significant**:

  Mann-Whitney U = 44, p < 0.0001, ***

  → Negative influence of the lack of articles in learners' L1



Discussion

- Evidence that **learners whose L1 lacks articles underused** this category.
- **Pedagogical implications** for Chinese, Polish, Japanese, Finnish or Korean learners.

  → Also for learners whose L1 lacks article: Russian, Czech

- **Variation** in article usage according to **task** or **deictic context**
- **Lack of data per L1 to generalise the results**
- Not taking into account the **obligatory/non-obligatory uses** (**obligatory occasion analysis approach**; see Ellis & Barkhuizen 2005: 73ff)

Conclusions

- This corpus allows users to explore interlinguistic phenomena.
- Available online:

  http://cartago.lllf.uam.es/corele/search.html

- Future needs:
  - **Increase corpus data**.
  - Have **more annotators** tag the data and **calculate inter-annotator agreement**.

Thank you for your attention!

Contact

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Corpus interface: http://cartago.lllf.uam.es/corele/index.html

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Comunidad de Madrid
CONSEJERÍA DE EDUCACIÓN

EUROPEAN SOCIAL FUND

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