ADoBo: Automatic Detection of Borrowings

Detecting unassimilated lexical borrowings in the Spanish press

Elena Álvarez Mellado[1] Luis Espinosa Anke[2]
Julio Gonzalo Arroyo[1] Constantine Lignos[3] Jordi Porta Zamorano[4]

[1]NLP & IR group, UNED

[2]School of Computer Science and Informatics, Cardiff University

[3]Michtom School of Computer Science, Brandeis University

[4]Centro de Estudios de la RAE

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What is lexical borrowing?

Lexical borrowing is the incorporation of words form one language into another language.

For ex., using in Spanish words that come from English:
podcast, app, online, crowdfunding, spin-off, big data, fake news...

- Lexical borrowing is a type of linguistic borrowing.
  - Linguistic borrowing is the process of reproducing in one language the patterns of other languages Haugen (1950)
- Borrowing and code-switching are related and have frequently been described as a continuum Clyne et al. (2003)
  - Code-switching = mixing two languages in one sentence.
    Ex: *You start a sentence in English y la acabas en español*
    Poplack (1980); Poplack et al. (1988)

Lexical borrowing vs Code switching

	Code Switching	**Lexical Borrowing**
Speaker	bilinguals	monolinguals
Grammar compliance	both languages	recipient language
Level of integration	not integrated	can be integrated
NLP approach	one tag per token (*à la POS-tagging*)[1]	extraction of spans of interest (*à la NER*)

[1] see Computational Approaches to Linguistic Code-Switching workshops (CALCS) Solorio et al. (2014); Diab et al. (2016); Aguilar et al. (2018); Solorio et al. (2020, 2021)

Why is borrowing interesting in Linguistics

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  color carne → nude
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- Linguistic adaptation:

  football → fútbol

  spaghetti → espaguetis

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- Automatically detecting lexical borrowings from text has proven to be relevant for NLP downstream tasks:
  - Parsing Alex (2008)
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- In the last decade has been a growing interest in the influence of English in other languages Görlach (2002).
    - Previous work on automatic detection of borrowings in different European languages: German, French, Italian, Norwegian, Finnish Andersen (2012); Chesley (2010); Furiassi and Hofland (2007); Garley and Hockenmaier (2012); Losnegaard and Lyse (2012); Mansikkaniemi and Kurimo (2012)
    - In Spanish, the automatic detection of anglicisms has been seldom explored Serigos (2017); Álvarez Mellado (2020)

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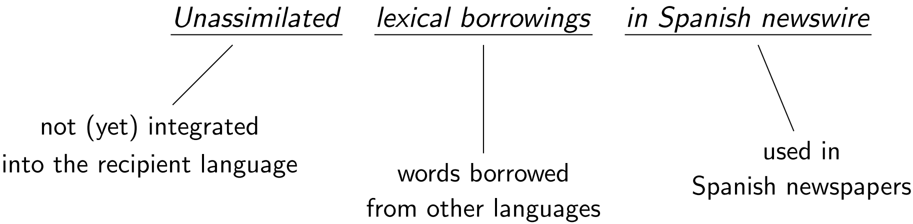
The task



Unassimilated *lexical borrowings* *in Spanish newswire*

not (yet) integrated
into the recipient language

words borrowed
from other languages

used in
Spanish newspapers

Words from other languages (mainly English) that have recently been imported into Spanish and that are being used in Spanish newspapers

Ex: *Las prendas bestsellers se estampan con motivos florales, 'animal print' o a retales tipo patchwork*

Borrowing detection is harder than it seems

Why dictionary lookup is not enough:

- *Prime time* is a borrowing:
  - *prime* is form of the verb *primar*
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- Not every English word is necessarily a borrowing.
  - *Sgt.Peppers Lonely Hearts Club Band*
  - *Eternal sunshine of the spotless mind*
  - *Stranger Things*

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  - *Stranger Things*
- Prior work based on dictionary lookup produced very modest results (F1=47, F1=26) Serigos (2017); Álvarez Mellado (2020)

The corpus

We distributed a corpus:

- Composed of Spanish newspapers
- Annotated with lexical borrowings with 2 tags:
  - `ENG`: for English borrowings
  - `OTHER`: for borrowings from other languages
- In CoNLL format
- With BIO encoding
  Because borrowings can be single token (*app*) or multitoken (*machine learning*)

The corpus: example

```
En   O
este   O
mes   O
especialmente   O
puede   O
ser   O
de   O
utilidad   O
apuntarnos   O
al   O
batch   B-ENG
cooking   I-ENG
```

```
Benching   B-ENG
,   O
estar   O
en   O
el   O
banquillo   O
de   O
tu   O
crush   B-ENG
mientras   O
otro   O
juega   O
de   O
titular   O
```

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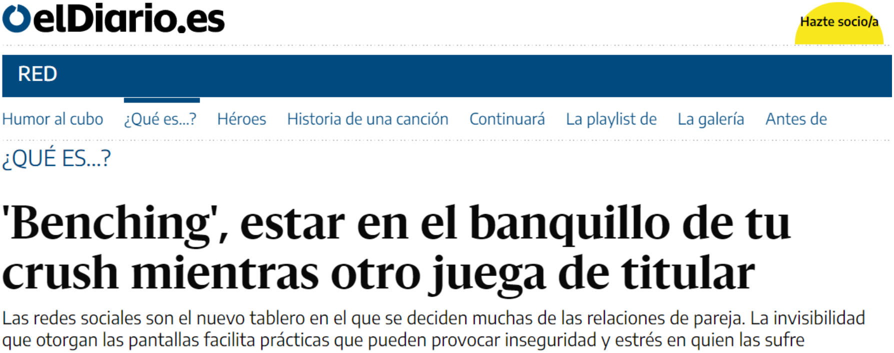

¿QUÉ ES...?

'Benching', estar en el banquillo de tu crush mientras otro juega de titular

Las redes sociales son el nuevo tablero en el que se deciden muchas de las relaciones de pareja. La invisibilidad que otorgan las pantallas facilita prácticas que pueden provocar inseguridad y estrés en quien las sufre

Figure: Published at elDiario.es on December 2020[2]

[2] https://www.eldiario.es/red/que-es/benching-banquillo-crush-juega-titular_1_6484819.html

The corpus: counts

Set	**Tokens**	ENG	OTHER	**Unique**
Train	231,126	1,493	28	380
Dev.	82,578	306	49	316
Test	58,997	1,239	46	987
Total	372,701	3,038	123	1,683

Table: Corpus split and counts.

Evaluation

- Results of the task were computed using SeqScore[3], a Python package for evaluating sequence labeling tasks, configured to emulate the conlleval evaluation script (Palen-Michel et al., 2021).
- F1-measure was used as the official evaluation score for the final ranking.
- Evaluation was done exclusively at the span level. This means that only exact matches were considered, and no credit was given to partial matches.
- Additional evaluation was done removing orthographic cues: removing all quotation marks and converting all text to lower case.

[3] https://github.com/bltlab/seqscore

Shared task results

Team	System	Type	Prec.	Rec.	F1	Ref.	Pred.	Corr.
Marrouviere	(1)	ALL	88.81	81.56	85.03	1,285	1,180	1,048
		ENG	90.70	82.65	86.49	1,239	1,129	1,024
		OTHER	47.06	52.17	49.48	46	51	24
Versae	(2)	ALL	88.77	81.17	84.80	1,285	1,175	1,043
		ENG	90.31	82.73	86.35	1,239	1,135	1,025
		OTHER	45.00	39.13	41.86	46	40	18
Marrouviere	(3)	ALL	89.40	66.30	76.14	1,285	953	852
		ENG	90.98	67.55	77.54	1239	920	837
		OTHER	45.45	32.61	37.97	46	33	15
Marrouviere	(4)	ALL	92.28	61.40	73.74	1,285	855	789
		ENG	93.43	63.12	75.34	1,239	837	782
		OTHER	38.89	15.22	21.88	46	18	7
Versae	(5)	ALL	62.76	46.30	53.29	1,285	948	595
		ENG	62.97	47.62	54.23	1,239	937	590
		OTHER	45.45	10.87	17.54	46	11	5
Mgrafu	(6)	ALL	65.15	37.82	47.86	1,285	746	486
		ENG	65.31	38.90	48.76	1,239	738	482
		OTHER	50.0	8.69	14.81	46	8	4
BERT4EVER	(7)	ALL	75.27	27.47	40.25	1,285	469	353
		ENG	75.43	28.25	41.10	1,239	464	350
		OTHER	60.00	6.52	11.76	46	5	3
BERT4EVER	(8)	ALL	76.29	25.29	37.99	1,285	426	325
		ENG	76.48	25.99	38.80	1,239	421	322
		OTHER	60.00	6.52	11.76	46	5	3
BERT4EVER	(9)	ALL	76.44	24.75	37.39	1,285	416	318
		ENG	76.64	25.42	38.18	1,239	411	315
		OTHER	60.00	6.52	11.76	46	5	3

Álvarez Mellado et al. (2021)

BERT4EVER team: CRF model with data augmentation

Jiang et al. (2021)

- Combined several CRF models trained on different portions of the task's training data
- The models were used to label a freely-available open corpus in Spanish
- Models were then re-trained on the output
- F1 score of 40.25

Versae submission: using STILTs

De la Rosa (2021)

- Experimented with using supplementary training on intermediate label-data tasks
- Fine-tuned several multilingual language models (mBERT, RoBERTa)
- F1 score of 84.80

Some final thoughts on ADoBo shared task

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- We had a moderate turnout

  50 registered participants, 9 submissions, from 4 different teams, 2 paper submissions

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A post-competition questionnaire showed that participants would like to see future editions of ADoBo. Here are some of the topics that were suggested:

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- Semantic borrowing detection
- Diachronic assimilation of borrowings
- Code-switching
- Other ideas? Feel free to reach out!

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