Grammatical profiling with UD annotation (WiP)

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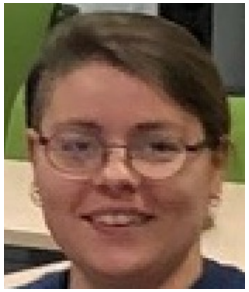
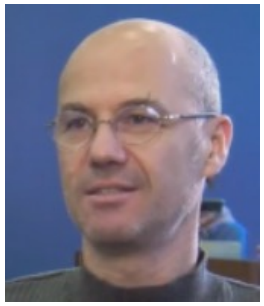
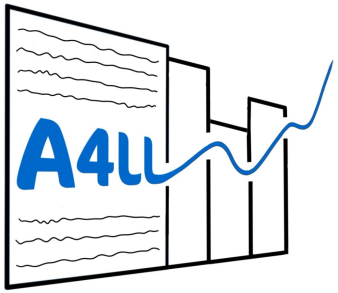






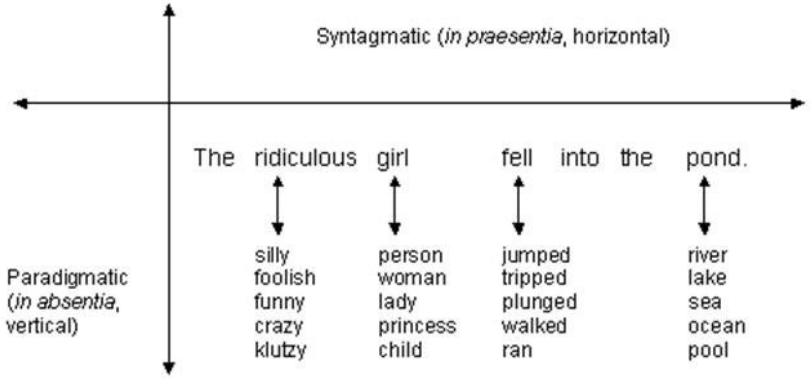
Analytics for Language Learning (Rennes)

Deep learning for language assessment (UPCité/KCL)

UD annotation as a window for grammatical profiles

Modelling stages of learner competence:

- UD for syntagmatic axis (proxy for complexity)
- UD for paradigmatic axis (micro-system approach)



From http://courses.nus.edu.sg/course/elltankw/history/Vocab/B.htm

Syntagmatic axis

Treebanks in UD ->

- Extract regularities in learner production
- Query syntax: GREW-match

http://universal.grew.fr/?corpus=UD_English-GUM@2.10

Extraction tool (GRE) Grammatical rule extraction
https://github.com/santiagohy/grammar-rules-extraction

Queries for error candidates

- Dependency relation labels : Parataxis

pattern { GOV -[parataxis]-> DEP }

- Compound

pattern { GOV -[compound]-> DEP }

- Combining features : (*the admission**s** committee*)

```
pattern {
  DEP [Number=Plur];
  GOV -[compound]-> DEP;
}
```

Candidates for metrics

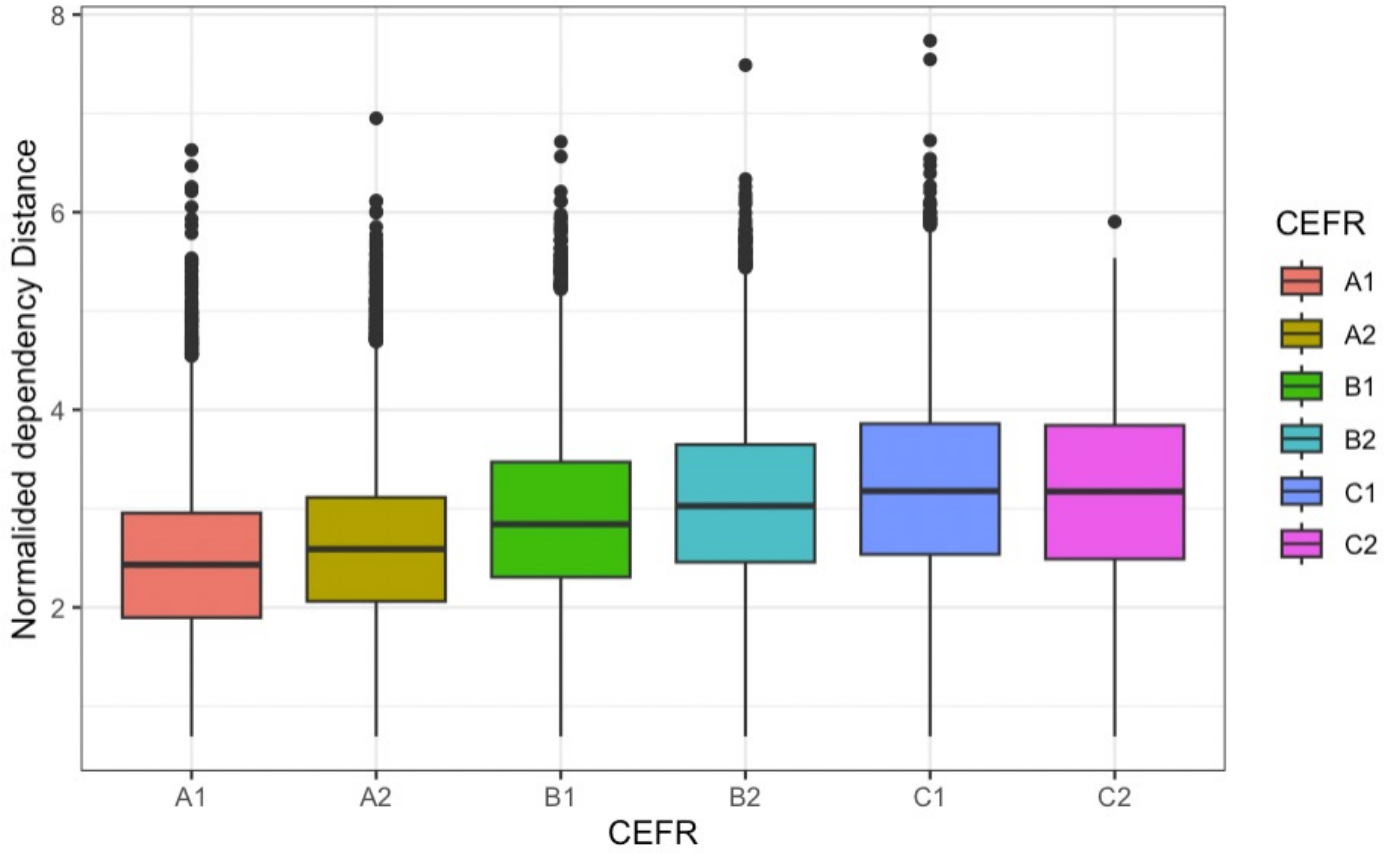
Text number	Sentence number	Word order	Word	POS	Governor order	Governor	Dependency relation	Dependency distance
t10	s7	1	She	PRP	3	does	nsubj	2
t10	s7	2	always	RB	3	does	advmod	1
t10	s7	3	does	VBZ	3	does	root	0
t10	s7	4	homework	NN	3	does	dobj	1
t10	s7	5	on	IN	3	does	prep	2
t10	s7	6	the	DT	7	weekend	det	1
t10	s7	7	weekend	NN	5	on	pobj	2
t10	s7	8	.	.	3	does	punct	5

(Ouyang, 2020)

Relevance of UD distance (normalised or not)

EFCAMDAT Spanish component

Spanish component of the EFCAMDAT



Deep Learning for Language Assessment (aims)

- Metrics and features
- Data collected in Rennes and on Prolific
- Keylog data and CEFR prediction

A4LL Scientific challenges

Analytics for LL : Create a language-learning analytics system

Three main research questions to uncover some of the features of Interlanguage

i) what are the **language features** related to specific **proficiency** levels?

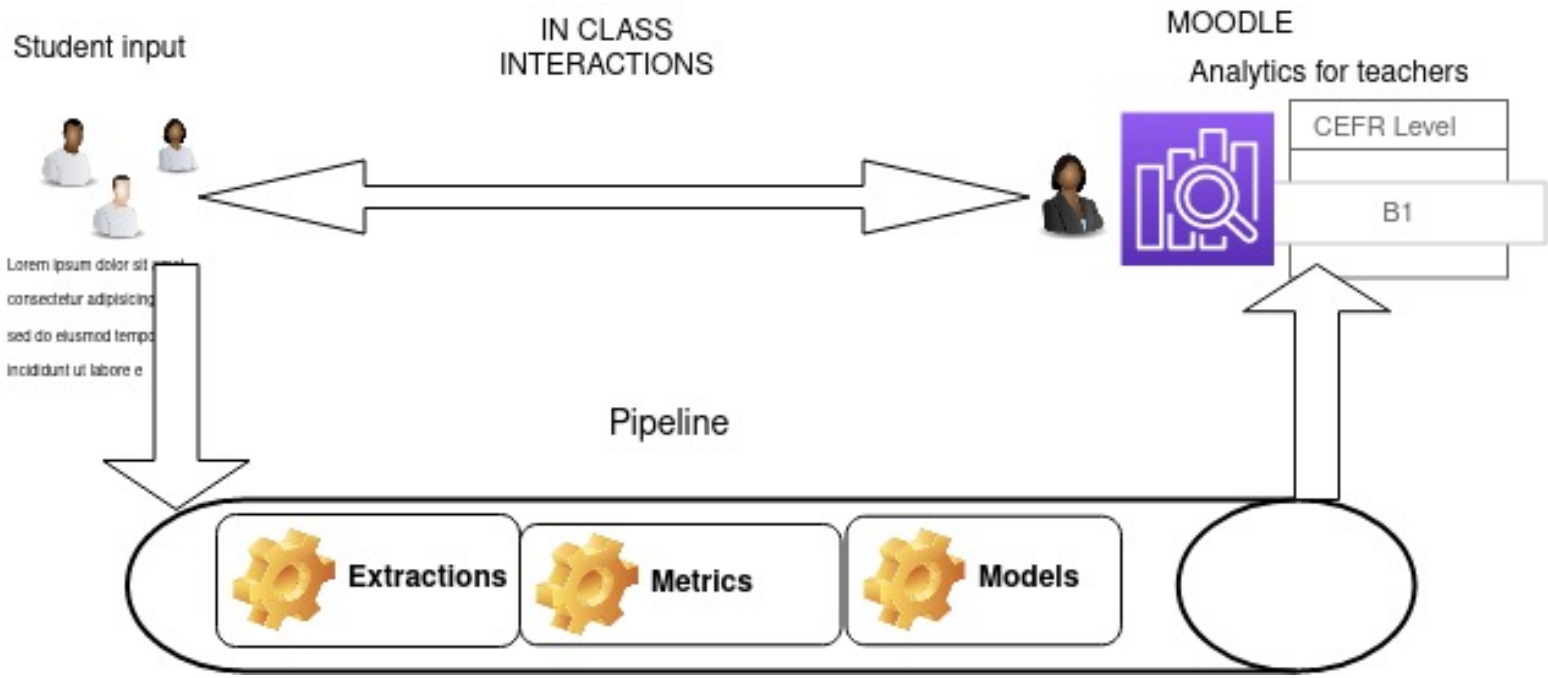
ii) how can these features be measured **automatically**?

iii) how can measures be converted into **meaningful analytics** for descriptive feedback and teaching decisions?

Our approach

1. Richly annotated L2 data (Rennes students)
2. Identifying and designing automatic measures in L2 writings
3. Modeling L2 writing & proficiency
4. Creating an interoperable data pipeline

The system


Student input
IN CLASS
INTERACTIONS
MOODLE
Analytics for teachers
CEFR Level
B1
Pipeline
Extractions
Metrics
Models

Metric processing tools

- Microsystem tool - in dev
- Collocation tool - in dev
- Error detection - to be dev
- Keylogs - in dev
- Syntactic complexity tool – to be adapted
- Cohesion tool - to be adapted

Micro-system concept

- Paradigmatic relations and functions
- Determination MS with articles A, THE and 0

1 "Ladies and Gentlemans, My flat was robbed the previous evening. In coming back at my home, I saw that the window was broken." (EFCAMDAT writing ID: 2498)

2 "What do you think about positive discrimination in **the*** companies?" (EFCAMDAT writing ID: 569744)

3 "Why the* gender's discrimination is still a problem in our society?" (EFCAMDAT writing ID: 579779)

Research Question

Which linguistic representation can be defined for a micro-system?

Which UD feature could be mobilised for the analysis?

Pipeline

1. **Annotation**: create_data frames of UD sentences :
   - Output: full CONLL-U annotated file
2. **Extraction**: GREW graph queries
   - Output: Set of forms making up a MS

- main node = target Microsystem word

CONLL-U sentence

sent_id = GUM_academic_huh-31

s_prominence = 4

s_type = decl

transition = establishment

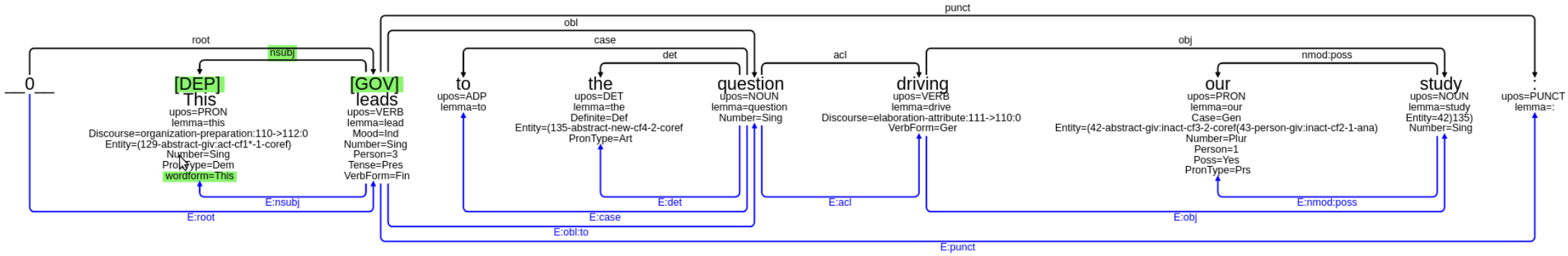
text = This leads to the question driving our study:

1	This	this	PRON	DT	Number=Sing|PronType=Dem	2	nsubj	2:nsubj	Discourse=organization-preparation:110->112:0|Entity=(129-abstract-giv:act-cf1*-1-coref)
2	leads	lead	VERB	VBZ	Mood=Ind|Number=Sing|Person=3|Tense=Pres|VerbForm=Fin	0	root	0:root	_
3	to	to	ADP	IN	_	5	case	5:case	_
4	the	the	DET	DT	Definite=Def|PronType=Art	5	det	5:det	Entity=(135-abstract-new-cf4-2-coref
5	question	question	NOUN	NN	Number=Sing	2	obl	2:obl:to	_
6	driving	drive	VERB	VBG	VerbForm=Ger	5	acl	5:acl	Discourse=elaboration-attribute:111->110:0
7	our	our	PRON	PRP$	Case=Gen|Number=Plur|Person=1|Poss=Yes|PronType=Prs	8	nmod:poss	8:nmod:poss	Entity=(42-abstract-giv:inact-cf3-2-coref(43-person-giv:inact-cf2-1-ana)
8	study	study	NOUN	NN	Number=Sing	6	obj	6:obj	Entity=42)135)|SpaceAfter=No
9	:	:	PUNCT	:	_	2	punct	2:punct	_

Extraction query

pattern {DEP [wordform="this"|"these"|"This"|"These"] ; GOV -[nsubj|obl|nsubj:pass|nmod|obj|nsubj:outer|conj|root]-> DEP; }

Searching and identifying “this” proform in the graph:



Micro-system data representation

- Features collected in a table (.CSV)
- Includes metadata in

nb_annees_L2 L1 Sejours_duree_semaines Sejours_frequence Lang_exposition L2 **Note_dialang_ecrit(CEFR)** Lecture_regularite autre_langue tache_ecrit Texte_etudiant Date_ajout pseudo

- Includes linguistic annotation

Proform: ([-5;+5] tokens, lemma, UPOS, morphological features), dependency_distance_to_root

Its Head: head_form head_lemma head_textform head_upos head_wordform head_xpos head_dependency_rel

Future work: operationalise co-occurrence restrictions

- Developing multi-node extraction
  - Which node as main element (GOV?)?
  - Adjacent slots of in the micro system (paradigm) as syntagmatic dimension of the learner production (* *was seen yesterday*)
- To capture POS or UD error patterns for micro-systems / articulate with repertoire of forms (see *WOULD* in plenary talk) & lexical routines

Case study

- Modelling CEFR according to occurrence of proforms in texts
- NLP4CALL 2023

Expected outcomes

- Identifying features of L2 developmental stages (profiles/interlanguage strata)
- Mapping stages to proficiency

- A MOODLE module for L2 Analytics with actionable visualizations (A4LL)

ACKNOWLEDGEMENTS

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https://sites-recherche.univ-rennes2.fr/lidile/en/a4ll/

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References

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Questions?

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THANK YOU !

DLLA Project

Micro-system paper