

Tracking the main characters in narratives written by pupils with referential continuity ties annotation

L.M. Ho-Dac, J. Rebeyrolle

(co)Referential expressions as discourse "markers" (DMs) that contribute to discourse organisation by (indicating how to) connecting discourse units with referential continuity ties



Describe writing skills evolution through all the education grades (elementary school, high school and university)

- Make available a large resource of ecological handwritten school works for linguistics (corpus) analyses and NLP
- First studies on
 - Spelling and verbal morphology
 - Coherence and cohesion ties [Halliday and Hasan, 1976], esp. **Referential continuities** i.e. referential cohesive ties that create continuity, texture acc. to reference
- Provide a pedagogical tool for teaching writing skills by using real-life productions of other students and emphasize problems and doubts encountered by students : <http://e-calm.huma-num.fr/>

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le soussigné, GONCALVES Elodie

titulaire / mère / responsable légal (insérer les mentions utiles)

De l'élève (nom/prénom) GONCALVES Alexis

scolarisé dans la classe de 6^{ème} (niveau scolaire de l'école/college) :

J.P. Rambaud

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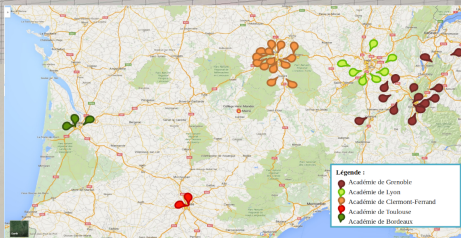
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Fait à Paris

le 12/06/11

Signature :

Il était une fois une fille et un garçon qui vivaient à la campagne. Elle habitait dans cette maison depuis longtemps. L'enfant entendait un bruit, il fait rien et était. Il se retourna en entendant ce grand bruit. aller dehors. Il voit un monstre qui le kidnape. L'enfant cria. La fille entendit le garçon donc elle appela. Depuis cette aventure, les enfants ne sortent plus la nuit.



Encoding (TEI), Transcription, Spellchecking

EC-CM2-2016-SGLEA-D1-R24-V1

Ile de France

2017-04-25 école publique en zone mixte hors REP.
Entre 300 et 400 élèves

Le monstre

Dans le nord de la France se trouvait un paysan dont sa grand-mère qui avait une maison blanche. Elle habitait dans cette maison depuis longtemps. Un jour, le paysan vue un buisson bouger pendant une nuit, il ne voulait en savoir plus, alors, il sortit dehors avec un couteau et une torche. Il regarda dans le buisson et il vi du sang et des pas derrière la cloture, il sorti dehors et suivi les pas. Il sarreta dans un buisson à l'interieur de la forêt Il regarda dans le buisson et vue un ours mort. Il reparti alors. Tout à coup un grand bruit le fit sursoter, Il se retourna en entendant ce grand bruit. dont ce bruit et il vue un monstre dont ses doit griffes dégoutxx deont, il xx vert gluant et ja xx : dans mais xx inodaxxt inimaginable. Je cri en voyant le monstre il le tuer. Depuis cette aventure, les enfants ne sortent plus la nuit.

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- Il est difficile de comprendre l'écriture de l'élève.
- Ligne 1 et 3 : les ajouts ont été effectués au dessus de la ligne à l'aide d'une sorte de flèche.
- Ligne 4 et 10 : les ajouts ont été effectués au dessous de la ligne à l'aide d'une sorte de flèche.

Si vous voyez une erreur dans la transcription, merci d'envoyer un mail à hodac@univ-tlse2.fr

http://redac.univ-tlse2.fr/corpus/resolco/copies/html_normalise/

[EC-CM2-2016-SGLEA-D1-R24-V1_N.html](#)

E-CALM ressource quantitative overview

<http://e-calm.huma-num.fr>

Grade	#Texts	#Words	#Words/Textes	Corpus
Primary	3,133	330,214	105	[E][R][S]
Middle school	555	115,866	209	[E][R]
High school & Univ.	607	671,056	1,106	[E][R][LA]
Total	4,295	1,117,136	260	[E][R][S][LA]

- Diversity of instructions (teachers usual practices) **EcriScol [E]**¹ and the **Advanced Literacy [LA]**²
- Texts produced in reply to a specific instruction scientifically designed :
 - **Scoledit [S]**³
 - **ResolCo [R]**⁴

1. <http://www.univ-paris3.fr/ecriscol>

2. <https://www.ortolang.fr/market/corpora/litteracieavancee>

3. <http://www.scoledit.org/scoledit>

4. <http://redac.univ-tlse2.fr/corpus/resolco.html>

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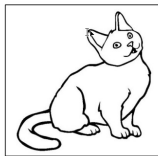
The SCOLEEDIT Corpus

**Scoledit**

A typical writing schoolwork task



1



2



3



4

Here are 4 characters. Choose one or two characters and tell a story. Circle the character(s) you have chosen.

A simple task that asks to introduce characters

that could become more complex acc. to

- the number of selected characters
- the genre of the selected characters

The RESOLCo Corpus



[Garcia-Debanc et al., 2017]

A complex instruction designed to tackle discourse coherence

Tell a story by inserting in it in the same order the three following predefined sentences :

- S1 **She** was living in this house for a long time.
- S2 **He** turned around when he heard this loud noise.
- S3 Since this adventure, **(the)* children** no longer go out at night.

*In French, determiner is required whether the NP is specific or generic

Cut and glue the strips or copy each sentence, taking care to not change any single letter.

A complex task that implicitly asks to resolve a series of cohesion problems

- Who is *She* and *He*? Are they children? Are they *the children* of S3?
- How to make accessible and salient these characters when gluing the strip?
- How introduce *this house* or *this great noise*?

Describing the acquisition of "discourse organisation" skills

Focus on referential cohesion ties

- Tracking the mentions to the main characters (topics/participants continuity [Givón, 1983])
- The Text-world Theory [Werth, 1999] : *The normal procedure for introducing information is [...] a reference is first established (typically with an indefinite NP), and then is subsequently maintained (with some kind of anaphora). This essentially simple picture is complicated by three things : (i) evoked knowledge differs enormously, both qualitatively and quantitatively, from one person to another ; (ii) if an entity is manifest in the environment, then it is often unnecessary to go through the whole reference procedure ; and (iii) as we have seen, information can be introduced non-standar­dly, by way of accommodation.*

Describing the acquisition of "discourse organisation" skills

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- The Text-world Theory [Werth, 1999] : *The normal procedure for introducing information is [...] complicated by three things : (i) evoked knowledge differs enormously [...] from one person to another; (ii) [...] it is often unnecessary to go through the whole reference procedure; and (iii) [...] information can be introduced non-standardly [...]*

Questions

- What kind of procedure the students will follow ?
- Are there "normal" (or more frequent) procedures acc. to education grades ?

The E-CALM referential continuities annotation process

Annotation of all referring expressions related to the characters imposed by the instruction (not exactly referred to) : continuity vs. coreference

- Referring expressions delimitation as defined in DEMOCRAT guidelines [Landragin, 2015]
- Considering transition from individual reference to group reference : "group" mentions
"Camille and Manu were playing ... They went up to..."
- Considering transitions from narrative to direct speech : 1st and 2nd pronouns
"Camille and Manu were playing. She said : «Come on Manu. I will ...»"
- Expert annotators only

90% annotations strictly similar* based on 100 texts annotated by 3 coders
(*same number of mentions, delimitation, and group feature)

Example from the *ResolCo* corpus (4th grade)

<http://redac.univ-tlse2.fr/corpus/resolco>

Glozz - 2.1 - Logged as hodaclm / CamilleManu_en.ac

port Tools Groups Viewers Plugins SandBox ?

Annotations in the image:

- Yellow box: ID=26, Camille and Manu
- Blue box: she
- Green box: Come on Manu
- Blue box: I'll show you my shelter
- Blue box: She
- Green box: he
- Green box: he
- Green box: They
- Green box: they
- Green box: they
- Green box: the children

Relations shown in the interface:

- coref Elle
- coref Il
- coref lesEnfants

Feature name	Feature value
type	

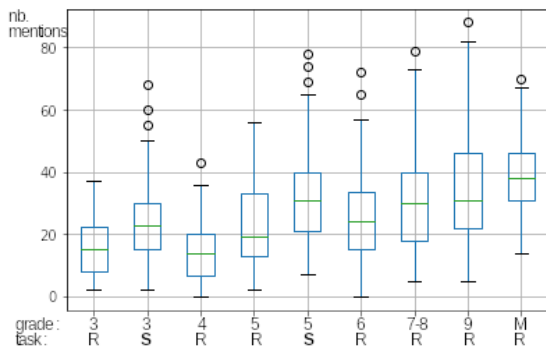
Annotation model:

Units	Relations	Schemas
maillon-candidat	coref Elle	
maillon Elle	coref Il	
maillon Il	coref lesEnfants	
maillon_lesEnfant		
phraseConsigne		

Overview of the annotated E-CALM subpart

	nbTexts	1 char.	2 char.	3 char.	4 char.	nbMentions
SCOLEDIT	348	21	273	41	13	9,465
RESOLCO	383	6	14	362	0	9,935
E-CALM	731	27	287	403	13	19,400

- Preferred choice in **Scoledit** texts : 2 characters
- The higher the grade, the more the number of mentions
- The easier the task (**S**), the more the number of mentions
- A frequent use of "group" mentions : 45% **S** texts, 75% **ResolCo** texts



What kind of procedure the students will follow ?

What referential marker for Introduction, Maintain, Shift

- Using [Sandoz et al., 2023] study as a guide, a kind of benchmark
Mélanie Sandoz, Katia Iglesias, Amélie M. Achim & Marion Fossard
(2023) The contribution of discursive and cognitive factors in referential choices made by elderly people during a narrative task, *Aging, Neuropsychology, and Cognition*,
DOI :[10.1080/13825585.2022.2150141](https://doi.org/10.1080/13825585.2022.2150141)

[Sandoz et al., 2023] study

- Oral interactions ("Tell successively each of the stories depicted in the nine sequences to your addressee which has the same set of images but in a random order and has to recreate the story told")
- 3 level of complexity : 1 character, 2 char. of different genders, 2 char. of the same gender



a. Example of a level 1 story



b. Example of a level 2 story



c. Example of a level 3 story

- 3 "discourse" stages : introduction, maintain, shift
- 3 types of referential markers : **IN**definite NP, **PR**onouns (clitic and zero pro.) and **D+** NP (other kind of NP and stressed pronouns)

[Sandoz et al., 2023] results

No surprises

*"results showed a significant effect of the discourse stages, [...]. Indeed, production of **indefinite markers was favored when introducing a new character**, while **pronouns were mainly used to maintain a character in focus**. **For the shift** of the character who is in focus, participants produced **preferentially definite markers**, [...]."*

An effect of the age

*"[...] we also found that the effect of the discourse stage was modulated by age, suggesting that increasing age has an effect on referential choices. More particularly, **older participants tended to produce less definite markers and more pronouns at the shift stage**, compared to the other stages."*

An effect of the number of characters but no effect of their gender

*"A higher probability of producing **definite markers at the maintaining stage for the levels 2 and 3**, than at the level 1 [...]. No significant interaction was observed for the effect of gender."*

Confronting E-CALM data to [Sandoz et al., 2023]

Differences with [Sandoz et al., 2023]

- Corpus vs. Experimental Data
- Written texts produced in reply to two tasks with another kind of level of complexity
- More than 2 characters with no control on their gender but
 - no gender effect acc. to [Sandoz et al., 2023]
 - the majority of SCOLETIT texts have only 2 characters
- No marking of the different stages
- More diverse referential markers (proper nouns, 1st/2nd pers. pronouns) + plural ("group reference" mentions)

E-CALM annotated data processing decisions

Discourse stages location

- intro** First mention of the characters of the prompt (*she, he, the witch, the wolf, the robot, the cat*)
- maint** Succession of mentions to the same character without interruption by other characters (of the prompt)
- shift** Mention of an already introduced character after the mention of another character, even if the mention is a "group" pronoun :
- *There is a witch [...]. A wolf [...]. **They** [...]*
Shift for *the witch*, Maintain for *the wolf* (considered as 2 mentions)

referential/task complexity (gender not taken into account)

- level1** Scoledit with 1 character
- level2** Scoledit with 2 characters
- level3** Resolco (always 2 or 3 characters, depending on the "Children" status)

E-CALM annotated data processing decisions

Referential markers = all annotated mentions (subject position or not)

IN indefinite NP

PR clitic pronouns, relative pronouns, zero anaphora and possessive determiner^a

PN proper nouns

D+ all remaining mentions that contains at least one NOUN

Ref. marker	Discourse stages			total
	intro	maint	shift	
IN	742	133	149	1,024
D+	500	1663	2246	4,409
PR	154	8625	3149	11,928
PN	90	762	586	1,438
all	1491	11,607	6302	19,400

a. **The witch.... Her cat...**

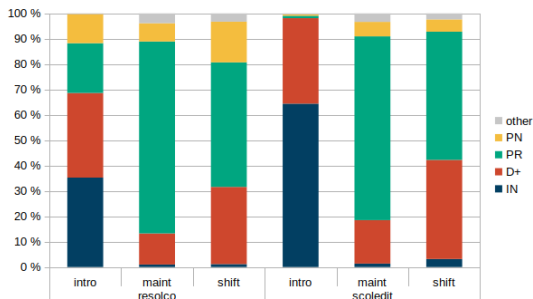
E-CALM results

Which ref. marker at each discourse stage acc. to the task

intro less IN in [R] (headings
and narrative "style")

maint mostly PR

shift D+, PR or PN

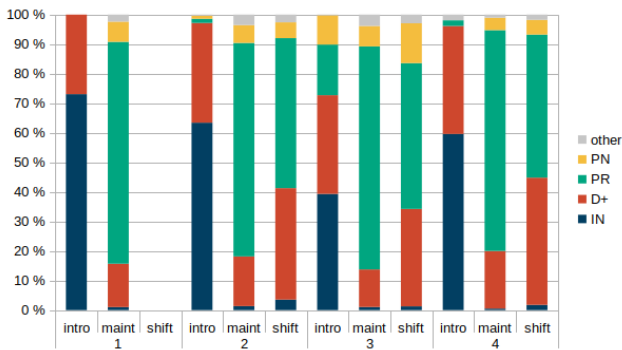


Main effects of the task on the [\[intro\]](#)

E-CALM results

Which marker at each discourse stage acc. to the number of the characters

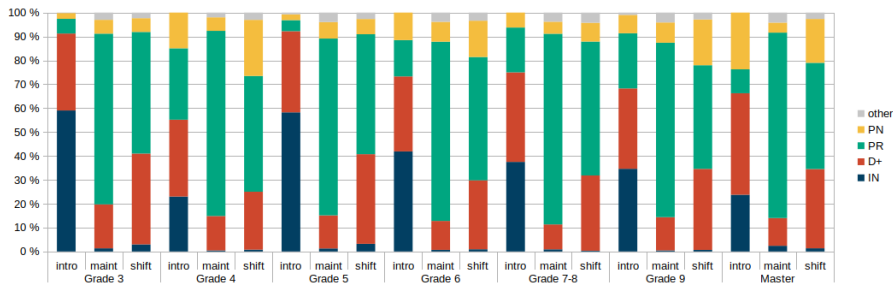
- No more D+ at the [maint] stage for more than 2 char. (cf. Sandoz et al. (2023))



No obvious effect excepted when 3 char. texts (i.e. RESOLCo) for [intro]

E-CALM results

Which marker at each discourse stage acc. to the grade?



intro The higher the grade, the less the proportion of IN in [intro] (more PN or D+)

maint No variation acc. to the grade

shift Variations that required more qualitative analyses

Conclusion

- Results in the line with the literature and [Sandoz et al., 2023]
- First results on the acquisition of writing skills for building cohesion and producing coherent texts

Q : What kind of procedure the students will follow ?

Q : Are there "normal" (or more frequent) procedures acc. to education grades ?

A : The same than (young) adults : [intro] with IN or PN, [maint] with PR, shift with D+ or PN

A resource waiting to be investigated

- Sequences of mentions in these referential continuities
- Strategies for managing several referents (step by step, all together, etc.) [Ho-Dac et al., 2021]
- Specific study on the transitions from individual reference to group reference ("group" feature)

A resource waiting to be further investigated

Correlation with the other annotation layers

- Revisions (e.g. erasures and additions during the writing process)
- Misspellings
- Teacher comments
- Rhetorical structure

New insights for studying discourse organization and written skills acquisition

- Is there a correlation between error rates and discourse organisation?
- Is there a correlation between revisions and discourse organisation?

Some Examples

- 6th grade text (R), minimalist ref. continuities http://redac.univ-tlse2.fr/corpus/resolco/copies/html_normalise/CO-6e-2016-VTAC603-D1-R14-V1_N.html
- 9th grade text (R), *she* [intro] with PR (the prompt's first sentence) : http://redac.univ-tlse2.fr/corpus/resolco/copies/html_normalise/CO-3e-2018-VTAC305-D1-R10-V1_N.html
- 9th grade text (R), *he* [intro] with PR (the prompt's second sentence) : http://redac.univ-tlse2.fr/corpus/resolco/copies/html_normalise/EC-CM1-2016-VRX-D1-R6-V1_N.html
- 3rd grade text (S) with a heading introducing characters with D+ : <http://scoledit.org/scoledition/production.php?id=1101&niv=CE2>
- 3rd grade text (S) with 4 characters and a D+ for introducing the wolf <http://scoledit.org/scoledition/production.php?id=1197&niv=CE2>
- 5th grade text (S) with a lot of "group" mentions : <http://scoledit.org/scoledition/production.php?id=828&niv=CM2>
- Master narrative "style" text, *she* [intro] with PN : http://redac.univ-tlse2.fr/corpus/resolco/copies/html_normalise/UN-M2-2021-UCL-D1-R18-V1_N.html



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Annodis and related projects : Case studies on the annotation of discourse structure. In Ide, N. and Pustejovsky, J., editors, [Handbook of Linguistic Annotation](#), pages 1241–1264. Springer Netherlands, Dordrecht.



Doquet, C., David, J., Fleury, S., and (Eds) (2017).

Spécificités et contraintes des grands corpus de textes scolaires : problèmes de transcription, d'annotation et de traitement.

In [Corpus \[Online\]](#), volume 16 (Special Issue). OpenEdition.



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Vers l'annotation discursive de textes d'élèves.

[Corpus](#), 16.



Givón, T. (1983).

Topic continuity in discourse : an introduction.

In T.Givon, editor, [Topic continuity in discourse : a quantitative cross-language study](#), pages 1–42. John Benjamins : Amsterdam/Philadelphia.



Halliday, M. and Hasan, R. (1976).

[Cohesion in English](#).

Longman : London.



Ho-Dac, L.-M., Garcia-Debanc, C., and Rebeyrolle, J. (2021).

La continuité référentielle dans le corpus RÉVOLCO : méthode d'annotation et premières analyses.

[Langue française](#), 211(3) :99–114.



Landragin, F. (2015).

Description, modélisation et détection automatique des chaînes de référence (democrat).

[Bulletin de l'AFIA](#), 92 :11–15.



Sandoz, M., Iglesias, K., Achim, A. M., and Fossard, M. (2023).

The contribution of discursive and cognitive factors in referential choices made by elderly people during a narrative task.

[Aging, Neuropsychology, and Cognition](#), 0(0) :1–22.



Werth, P. (1999).

Text worlds : Representing conceptual space in discourse.

Longman : London.

The RESOLCO task : a series of cohesion problems

Example of primary source collected at Grade 4

01/02/2019

qui arrive-t-il
aux enfants?
Que fait l'ogresse?

ogresse

Il était une fois une petite fille qui s'appelle Baba Yaga elle habitait dans cette maison antoi depuis long temps.
Deux petit enfan san parti lui rendre visite Lola et Max. Il se ~~sont~~ retourna en entendant ce grand bruit d'ogresse ensuite les enfants ont couru. Depuis cette aventure les enfants ne sortent plus la nuit.

The RESOLCO task : a series of cohesion problems

Example of primary source collected at Grade 4

01/02/2019

qui arrive - t'il
avec enfants?
Que fait l'ogresse?

ogresse

Once upon a time there was an ogress called Baba Yaga. She was living in this house for a long time. Two small children have gone to visit her. Lola and Max. He turned around when he heard this ogress great noise. Then the children ran and since this adventure, the children no longer go out at night.

bruit
cette

Teacher comments

- Who is "He" ?
- What happens to the children ?
- What is the ogress doing ?

Deletion, Addition as a trace of hesitations

(ResolCo only, Stanza UD POS tagging) Very few on connectives

	Revisions	Tokens	% all Revisions	% this POS
allPOS	1944	102192	100 %	2 %
VERB	374	14305	19 %	3 %
NOUN	328	17408	17 %	2 %
DET	233	15015	12 %	2 %
PRON	206	11887	11 %	2 %
PUNCT	178	10763	9 %	2 %
ADP	157	11392	8 %	1 %
PROPN	91	2614	5 %	3 %
ADV	90	6289	5 %	1 %
ADJ	89	4029	5 %	2 %
CCONJ	74	3264	4 %	2 %
AUX	74	2961	4 %	2 %
SCONJ	23	1265	1 %	2 %

Most frequent revised DM

et, longtemps, mais, depuis, puis, comme, jusque, soudain, après, ...

The E-CALM referential continuities annotation process

Context and previous work for French



ANNODIS [Asher et al., 2017]

- A diversified corpus of written French texts annotated with various discourse structures including "Topical Chains"
- *Top-down annotation* : from multi-level structures to cues
- Focus on topical chains i.e. chains involving the main "characters"
- Assisted annotation : pretagging + Glozz
- naive coders



DEMOCRAT [Landragin, 2015]

ANR Democrat

- A diversified corpus of written French texts annotated with all referring expressions
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- Annotation of all ref. expressions
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Computer Assisted Annotation

Glozz - 2.1 - Logged as hodaclm / CamilleManu_en.ac

port Tools Groups Viewers Plugins SandBox ?

Camille and Manu were playing at night in the forest.

Suddenly she had an idea: "Come on Manu, I'll show you my shelter".

She had lived in this house for a long time. And in the house he turned around when he heard this loud noise. They went up to the attic and heard another noise. And they saw a shadow of a giant rat. And they ran back home. Since this adventure, the children no longer go out at night.

Features Informations	
Feature name	Feature value
type	maillon_Elle
groupe	Oui
incertitude sur la délimitation	Non
incertitude sur le rattachement	Non
commentaire	

Model As Text Tools		
Annotation model:		
Units	Relations	Schemas
maillon-candidat	coref Elle	
maillon_Elle	coref Il	
maillon_Il	coref_lesEnfants	
maillon_lesEnfant		

Each referent, one after the other

Glozz - 2.1 - Logged as hodaclm / CamilleManu_en.ac

port Tools Groups Viewers Plugins SandBox ?

Author=hodaclm
LastModifiedBy=hodaclm

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commentaire	

Model As Text Tools

Annotation model:

Units	Relations	Schemas
maillon-candidat	coref_Elle	
maillon_Elle	coref_II	
maillon_II	coref_lesEnfants	
maillon_lesEnfant		

Including transitions from individual to group

Glozz - 2.1 - Logged as hodaclm / CamilleManu_en.ac

port Tools Groups Viewers Plugins SandBox ?

Camille and Manu were playing at night in the forest.

Suddenly she had an idea: "Come on Manu, I'll show you my shelter".

She had lived in this house for a long time. And in ID=15
Type=maillon_Elle
Author=hodaclm
LastModifiedBy=hodaclm they went up to the attic and heard another noise. And they saw a shadow of a giant rat. And they ran back home. Since this adventure, the children no longer go out at night.

Features Informations	
Feature name	Feature value
type	maillon_Elle
groupe	Oui
incertitude sur la délimitation	Non
incertitude sur le rattachement	Oui
commentaire	Non

Model As Text Tools

Annotation model:

Units	Relations	Schemas
maillon-candidat	coref_Elle	
maillon_Elle	coref_II	
maillon_II	coref_lesEnfants	
maillon_lesEnfant		

Linking mentions to explicit ref. continuities

Glozz - 2.1 - Logged as hodaclm / CamilleManu_en.ac

port Tools Groups Viewers Plugins SandBox ?

ID=26
Camille and Manu were playing at night in the forest.

Suddenly she had an idea: "Come on Manu, I'll show you my shelter".

She had lived in this house for a long time. And in the house

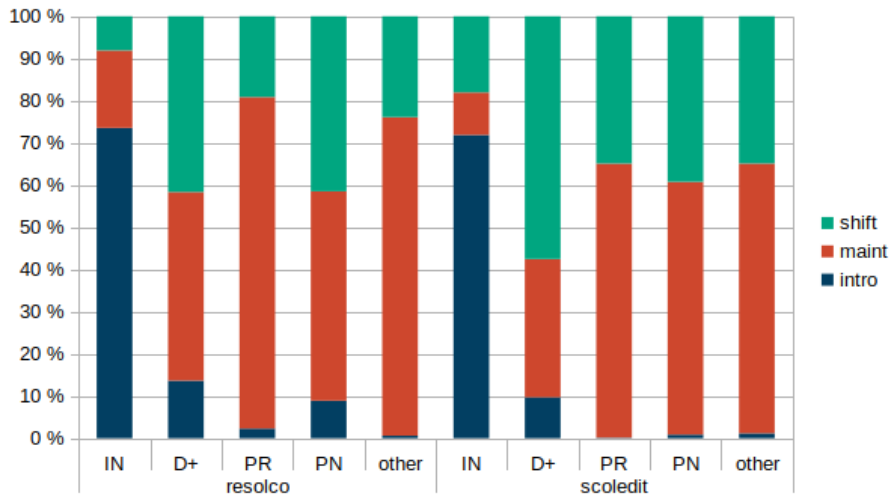
he turned around when he heard this loud noise. They went up to the attic and heard another noise. And they saw a shadow of a giant rat. And they ran back home. Since this adventure, the children no longer go out at night.

Feature name	Feature value
type	

Model	As Text	Tools
Annotation model:		
Units	Relations	Schemas
maillon-candidat	coref Elle	
maillon Elle	coref Il	
maillon Il	coref lesEnfants	
maillon_lesEnfant		
phraseConsigne		

E-CALM results

Which discourse stage for each Ref. Marker acc. to the task?



E-CALM results

Which discourse stage for each Ref. Marker acc. to the grade?

