

# Combining systemic functional linguistics and cognitive discourse functions in analysing upper primary learners' expression of science and history content in L2 English

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# Outline

- 1. The UAM-CLIL group's TRANS-CLIL research project and corpus**
- 2. Cognitive Discourse Functions & SFL**
- 3. Method: prompt, data collection and analysis**
- 4. Results: example of preliminary profile**
- 5. Summary and implications....**

# TRANS-CLIL Project

## Transition primary-secondary in bilingual schools: grades 6-7 (10-12 yrs)

- Effect of placement in a **higher/lower intensity** bilingual study programme on **academic language competence:**

in L2 English? in L1 Spanish?

- Students' performance at
  - time 1: end of Primary
  - time 2: beginning of Secondary

# TRANS-CLIL Project

Research into the language of education

**School genres = level of texts**



**Academic/Cognitive Discourse Functions**



**+ registers = level of lexico-grammar**

Christie & Derewianka 2008, Llinares et al. 2012, Martin & Rose 2008, Rose & Martin 2012 etc.  
Beacco 2010; Dalton-Puffer 2007, 2013; Vollmer 2006, 2010, 2015

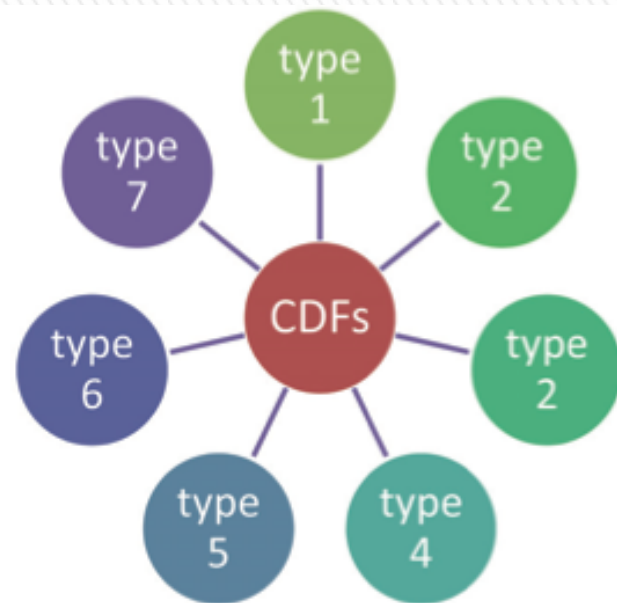
# Cognitive Discourse Functions...



# Cognitive discourse functions (CDFs)

A zone of convergence between content and language as “the cognitive processes involving subject-specific facts, concepts and categories are verbalized in recurring and patterned ways during the event of co-creating knowledge in the classroom.

Dalton-Puffer 2013: 216



# Categories of CDFs and their members

CLASSIFY	Classify, compare, contrast, match, structure, categorize, subsume
DEFINE	Define, identify, characterize
DESCRIBE	Describe, label, identify, name, specify
EVALUATE	Evaluate, judge, argue, justify, take a stance, critique, recommend, comment, reflect, appreciate
EXPLAIN	Explain, reason, express cause/effect, draw conclusions, deduce
EXPLORE	Explore, hypothesize, speculate, predict, guess, estimate, simulate, take other perspectives
REPORT	Report, inform, recount, narrate, present, summarize, relate

# What are Cognitive Discourse Functions?

These **discourse functions** mark **cognitive** operations *and* their **verbal performance** at the same time; they are at the interface between cognition and verbalisation  
EG: *Analyse, argue, assess, calculate, classify*

Vollmer 2006: 21

**The construct of cognitive discourse functions** links “**subject specific cognitive learning goals** with the **linguistic representations** they receive in classroom interaction”

Dalton-Puffer 2013: 220



# What are Cognitive Discourse Functions?

## Based on

- Bloom's (1956) Taxonomy of cognitive functions, revised by Anderson *et al.* (2000)

See also Krathwohl 2002

- Council of Europe on Language across the Curriculum (LAC) from 2006

Beacco 2010; Vollmer 2006, 2010, 2015 etc

- Speech Act Theory

# What are Cognitive Discourse Functions 3?

Result of revision and distilling of the different taxonomies and nomenclatures to **seven, manageable CDFs** (Dalton-Puffer 2013)

Type	Communicative intention	Label
1	I tell you how we can cut up the world according to certain ideas	<b>CLASSIFY</b>
2	I tell you about the extension of this object of specialist knowledge	<b>DEFINE</b>
3	I tell you details of what can be seen (also metaphorically)	<b>DESCRIBE</b>
4	I tell you what my position is vis a vis X	<b>EVALUATE</b>
5	I give you reasons for and tell you causes of X	<b>EXPLAIN</b>
6	I tell you something that is potential	<b>EXPLORE</b>
7	I tell you about something that is external to our immediate context on which I have a legitimate knowledge claim	<b>REPORT</b>

»

# Systemic Functional Grammar...

» **Logical Metafunction: constructing logical relations**

» **Interpersonal Metafunction: enacting social relations**

Halliday & Matthiessen (2013) *An Introduction to Functional grammar*. London: Arnold

# Research Questions

- 1. Which CDFs are realized? When? How much?**
- 2. How does frequency & variety of CDFs relate to students' results in external examinations in English language competence and Spanish/maths/science tested in Spanish?**
- 3. How are CDFs realized (lexico-grammar)?**



**METHOD:**

**data collection, analysis ...**

# Written Data (Time 1)

**Data:** 3 classes = 83 students (Grade 6)

2 x written task (1 Spanish, 1 English,  
Science / History)

= 166 texts = < 25,000 words



# Sample Prompt + CDFs

## SEGMENT OF PROMPT

## CDF TRIGGERED

- |   |             |
|---|-------------|
| A) <b>Define</b> for your readers what an ecosystem is                                    | A. Define   |
| B) <b>Tell</b> the readers of the blog something that you did                             | B. Report   |
| C) <b>Describe</b> your animal  | C. Describe |
| D) <b>Compare</b> the ecosystems of [your town] and Hervás                                | D. Classify |
| E) <b>Explain</b> why this is the best ecosystem for your animal                          | E. Explain  |
| F) <b>What will be the effects</b> to the ecosystem after the animal has been introduced? | F. Explore  |
| G) Do you think it is <b>important</b> to protect the environment? Why? Why not?          | G. Evaluate |

# Written Production End 6th Grade

	Spanish	English
- Number of texts:	83	83
- Tokens in texts:	12746	12417
- Words in texts:	11340	11067
- Av. Text Length:	136.63	133.34
- Min. Segment Length:	48	55
- Max. Segment Length:	325	330

# Coding

*UAM Corpustool*, analysis + negotiation of each CDF by paired researchers + team discussion



Students classified according to:

-English level: CEFR A=A1/A2 , CEFR B=B1/B2

-Maths, Spanish and Science: CDI 1= 8=>, CDI 2=<8





Coding View Edit Options Help << < > >> Delete

EN-WR-ECO-TX-GC-62  
 Ecosystem is all living things in the world.  
 In Hervás we recycle and we help enviroment didn't trush the trush to the floor.  
 If we don't help the enviroment a lot of animals will die. Like a sloth that sleep a lot and live for 10 or 20 years.  
 Boadilla is more noisy than Hervás and we don't help a lot enviment like in there so the sloth will live better there.  
 Protecting enviroment is important because if not more animals will die. We can put trush in each place and we can use less the car

Selected UNIT\_CDF1 Gloss

Coding View Edit Options Help << < > >> Delete

EN-WR-ECO-TX-GC-62  
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Selected	CDF	Gloss
cdf	classification definition description evaluation explanation exploration report	

Comment:

- A) **Define** for your readers what an ecosystem is
- B) **Tell** the readers of the blog something that you did
- C) **Describe** your animal
- D) **Compare** the ecosystems of [your town] and Hervás
- E) **Explain** why this is the best ecosystem for your animal
- F) **What will be the effects** to the ecosystem after the animal has been introduced?
- G) Do you think it is **important** to protect the environment? Why? Why not?

**Q1. Which CDFs are realized? When?  
How much?**

**Q2. How does frequency & variety of  
CDFs relate to students' results in  
external examinations in English  
language competence and Spanish/  
maths/science tested in Spanish?**

# CDFs + CDI (content test) results

## ENGLISH

	CDI1 (12.43 words per CDF)	CDI2 (20.04 words per CDF)
	<b>Explo (19.08)</b>	Class (24.16)+++
	Class (17.57)	Eval (22.18)++
	Eval (17.57)	Descrp (12.91)
	Descr (15.30)	Report (11.59)
	Explana (8.88)	<b>Explor (10.43)+++</b>
	Report (8.50)	Explan (8.11)
	Def (7.93)	Def (4.80)++

## SPANISH

	CDI1 (13.18 words per CDF)	CDI2 (13.33 words per CDF)
	Eval (19.20)	Class (19.92)
	Class (17.36)	Eval (19.43)
	Repor (12.74)	<b>Explo (15.71)+</b>
	<b>Explo (10.71)</b>	Report (10.20)
	Descr (9.23)	Descr (9.72)
	Expla (7.75)	Explan (6.64)
	Def (2.40)	Def (5.51)



# CDFs + CEFR (language test) results

	PET b (17.49 words per CDF)	PETa 13.22 words per CDF)
	Class (21.62)	Class (19.20)
	Eval (20.47)	Eval (19.20)
	Explor (14.15)	Descr (15.57)
	Descr (13.46)	Explor (15.21)
	Report (10.01)	Explan (10.87)
	Explana (7.59)	report (10.50)
	Def (6.21)	Def (6.52)



# CDFs + CDI/CEFR results combined

## ENGLISH

	PET b/CDI1 382 Cdfs and 4875 words (12.76 mean number of words per CDF)	PETa/CDI2 148 CDFs and 2175 words (14,70 mean number of words per CDF)
	<b>Explor (18.62)</b>	Class (21.22)
	Class (17.90)	Eval (18.73)
	Eval (16.93)	Descr (14.36)
	Desc (14.75)	Explan (11.86)
	Explana (8.71)	<b>Explor (11.24)++</b>
	Report (7.98)	Report (10.61)
	Def (7.50)	Def (4.37)

## SPANISH

	PET b/CDI1 (13.53)	PETa/CDI2 (11.30)
	Evalua (18.32)	Class (25.66)
	Class (15.91)	Eval (23.52)
	Report (12.78)	Explo (16.39)
	Explo (11.09)	Report (12.83)
	Des (9.40)	Des (12.12)
	Explan (6.03)	Explan (4.99)
	Def (3.13)	Def (4.99)



EXPLAIN	Explain, reason, express cause/effect, draw conclusions, deduce
EXPLORE	Explore, hypothesize, speculate, predict, guess, estimate, simulate, take other perspectives
REPORT	Report, inform, recount, narrate, present, summarize, relate

**Q 3: How are CDFs realized (lexico-grammar)?**

**A focus on Explore**

# Example of explore (English): S1 (CDI 1+CEFR B) v. S2 (CDI 2+CEFR B)

## PROMPT ECOLOGY

*Where would you introduce the animal?*

*What would be the effects on the environment? What would life be like today if this had not happened or the person had not existed?*

*How*

CDI1+CEFRB

*If I wanted to introduce a new specie, I will choose the dinosaur. // It is a strong, savaje and very big. // The name of the dinosaur would be T-rex... // I will introduce the peregrine falcon in Boadilla because of there are a lot of mouses. //*

*So there will be less animals.*

*I won't pull up plants or use less our cars.*

Whole text: 187 words  
12.43 per CDF

## PROMPT HISTORY

*happened or the person had not existed?*

CDI2+CEFRB

*if he didn't discovered America all would change. // For example all the maps would be bad, the persons that live there would improve they could come and they can fight with us thinking we are bad persons. // In my opinion the discovered of America is very important because all will chang if Colombus didn't found America //*

Whole text: 106 words  
20.04 per CDF



# Example of explore (English): S1 (CDI 1+CEFR A) v. S2 (CDI 2+CEFR A)

## PROMPT ECOLOGY

*Where would you introduce the animal?*

*What would be the effects on the environment? What would life be like today if this had not happened or the person had not existed?*

*How would you protect the environment?*

*happened or the person had not existed?*

CDI1+CEFR A

S1

*Many fishes will disappear*

*I would protect the forest of Boadilla  
but don't thought rubbish*

CDI2+CEFR A

S2

*We can destroid the planet*



# Example of explore (Spanish): Similar problems with subjunctive

## PROMPT ECOLOGY

*Where would you introduce the animal?*

*What would be the effects on the environment? What would life be like today if this had not happened or the person had not existed?*

*How would you protect the environment?*

*happened or the person had not existed?*

S1 (CEFR B, CDI 2)

*yo introduciría el arnitorrinco en hervas porque allí hay mas lagos, riachuelos, y serian mejores habitats que aquí.*

*Yo creo que haria que España sea un pais mas famoso por este extraordinario animal.*

S2 (CEFR B, CDI 1)

*Si no estubieramos cuidando el medioambiente hace tiempo no estubiéramos ahora viviendo*

## PROMPT HISTORY

S2 (CEFR B, CDI 2)

*si no hubiesen inventado la tecnologia, el ferrocarril no nos pudiésemos comunicar.*

S3 (CEFR B, CDI 2)

*Nuestra vida hubiese sido normal lo que pasa es que no hubiese habido comercio con America y los paises de alrededor.*



# CONCLUSIONS

- » The ranking in hierarchy of CDfs is similar in English and Spanish overall (with compare and evaluation as top choices; and definition as the least frequently used).
- » General academic ability (CDI) seems to be related to choice of CDfs more than English level (CEFR).
- » More frequent and longer instances of explore do not indicate a wider repertoire of lexico-grammatical resources to express these meanings.
- » Similar lexicogrammatical problems in managing the linguistic resources to express explore regardless of their English and general academic level.... AND ALSO in THEIR L1.
- » But more lexicogrammatical problems in general in those students with both lower English and lower academic ability (to be further explored).
- » Need to combine quantitative with more fine-grained qualitative analysis, using the tools of SFL in combination with CDfs.