

# **AUTOMATIC TREATMENT OF CAUSAL, CONSECUTIVE AND COUNTERARGUMENTATIVE DISCOURSE CONNECTORS IN SPANISH: A PEDAGOGICAL APPLICATION OF NOOJ**



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# THE PURPOSE OF OUR PAPER

- WITHIN THE FRAMEWORK OF THE PEDAGOGICAL APPLICATION OF NOOJ TO SPANISH TEACHING UNDERTAKEN BY THE RESEARCH TEAM ARGENTINA (*CENTRO DE ESTUDIOS DE TECNOLOGÍA EDUCATIVA Y HERRAMIENTAS INFORMÁTICAS*, UNR, ARGENTINA), WE FIRST FOCUSED ON WORKING WITH GRAMMATICAL CATEGORIES SUCH AS VERBS, NOUNS, ADJECTIVES AND ADVERBS.
- HOWEVER, SOME DIFFICULTIES IN LEARNING WERE NOTED IN NATIVE SPEAKERS OF SPANISH SINCE LINGUISTIC TERMINOLOGY IS NOT ALWAYS FULLY UNDERSTOOD BY THEM AND ON OCCASIONS MAY BECOME AN OBSTACLE IN ITSELF.

# THE PURPOSE OF OUR PAPER

- SOMETIMES THESE DIFFICULTIES ARISE BECAUSE LINGUISTIC KNOWLEDGE ACQUIRED BY THEM LONG AGO IN LANGUAGE CLASSES HAS BEEN FORGOTTEN.
- CONSEQUENTLY, WE TURNED OUR ATTENTION TO DISCOURSE TAGS BECAUSE THE RELATIONS OF CAUSE, CONSEQUENCE, AND COUNTER-ARGUMENTATION, ARE UNIVERSAL AND MAY EASILY BE DRAWN ON.

# THE PURPOSE OF OUR PAPER

- ALONG THIS LINE OF THOUGHT, WE MADE PROGRESS TOWARDS CAUSAL DISCOURSE CONNECTOR TAGS, THINKING OF LEARNERS WHOSE MOTHER TONGUE IS PORTUGUESE (RODRIGO ET AL. 2019). ON THIS BASIS, WE CREATED A DICTIONARY OF CAUSAL CONNECTORS.
- OUR INTENTION IN THIS PAPER HAS BEEN TO CONTINUE WITH THE INTRODUCTION OF DISCOURSE TAGS BY ADDING COUNTERARGUMENTATIVE AND CONSECUTIVE CONNECTORS TO OUR DICTIONARY.

# THE STUDENTS

- WE TAKE AS REFERENCE A POPULATION OF STUDENTS OF TWO PRIMARY EDUCATION TERTIARY SCHOOLS FOR TEACHERS, WHOSE AVERAGE AGE OSCILLATES BETWEEN 18 AND 25 YEARS OLD. THEY CONSTITUTE A HETEROGENEOUS GROUP, OF LOW SOCIOECONOMIC STATUS, WHO IN FACT STUDY WITH A VIEW TO FINDING A JOB AS PRIMARY SCHOOL TEACHER AFTER GRADUATION.
- THESE STUDENTS GENERALLY COMPLETED THEIR SECONDARY STUDIES WITH INTERRUPTIONS, OR EVEN STARTED OTHER CAREERS THAT THEY HAD TO ABANDON DUE TO FINANCIAL OR FAMILY PROBLEMS.

# THE STUDENTS

- WE CHOSE THIS SPECIFIC POPULATION FOR WE CONSIDERED IT IDEAL FOR US TO ENRICH OUR RESEARCH WITH A NEW PERSPECTIVE.
- ALTHOUGH THESE LEARNERS ARE NATIVE SPEAKERS WHOSE MOTHER TONGUE IS SPANISH, THEY SOMETIMES FACE THE SAME DIFFICULTIES AS THE ONES EXPERIENCED BY LEARNERS OF SPANISH AS A FOREIGN LANGUAGE (SFL). DISJOINTED SENTENCES AND COMPLEX SYNTAX ARE A CONSTANT.
- FOR THIS REASON, OUR CONTRIBUTION USING NOOJ IS RELEVANT FOR ADDRESSING DISCOURSE CONNECTORS.

# THE RESEARCH SUBJECT MATTER: DISCOURSE CONNECTORS

- TO CONCEPTUALISE CONNECTORS WE BASED ON MARTÍN ZORRAQUINO AND PORTOLÉS (1999), WHO DEFINE A CONNECTOR AS “A DISCOURSE MARKER THAT RELATES SEMANTICALLY AND PRAGMATICALLY A DISCOURSE MEMBER WITH ANOTHER DISCOURSE MEMBER”.
- THE ASSEMBLY EFFECT RESULTING FROM THE PRESENCE OF CONNECTORS PRECISELY EXPLAINS THE FACT THAT WE DO NOT HAVE THE FEELING TO BE READING DISCONNECTED PHRASES, FOR THE RELATIONSHIP BETWEEN THEM IS LEFT TO THE READER, WHO MUST DEDUCE THE COHESION BETWEEN THEM.

# THE RESEARCH SUBJECT MATTER: DISCOURSE CONNECTORS

- WE PARTICULARLY ADDRESS THREE TYPES OF CONNECTORS: CAUSAL, COUNTERARGUMENTATIVE AND CONSECUTIVE CONNECTORS.
- IT IS INTERESTING TO HIGHLIGHT WHAT MONTOLÍO (2015) STATES ABOUT CAUSAL CONNECTORS, FOR THEY IMPLY “A KIND OF INSTRUCTION GIVEN TO THE INTERLOCUTOR, OF THE TYPE ‘WHAT FOLLOWS CONSTITUTES THE CAUSE OF WHAT HAS BEEN SAID BEFORE’ (WHICH IS THE MEANING, FOR EXAMPLE, OF PORQUE)”, OR HOW SHE DESCRIBES CONSECUTIVE CONNECTORS: “WHAT FOLLOWS IS THE CONCLUSION THAT IS DEDUCED FROM THE PREVIOUS INFORMATION.”



# THE CORPUS

- THE WRITING OF CHILDREN'S TALES WAS UNDOUBTEDLY A MAJOR CHALLENGE FOR OUR TERTIARY STUDENTS BECAUSE OF THE DIFFICULTIES THAT WE HAVE ALREADY STATED ABOVE, AND THAT ARE CENTRED ON A SOMETIMES DISCONTINUOUS OR FRAGMENTED SECONDARY SCHOOL TRAINING.
- HOWEVER, THEIR ATTENDANCE TO THE **WORKSHOP ON TEXTS COMPREHENSION AND PRODUCTION** MADE IT POSSIBLE FOR THEM TO COMPOSE A STORY REQUIRING ESSENTIAL TEXTUAL SKILLS FOR FUTURE WORK AS TEACHERS OF PRIMARY EDUCATION.

(WE ACKNOWLEDGE PROF. CAMILA FERRAMONDO FOR COMPILING THE CORPUS)

# THE CORPUS

- AFTER DOING REVISION OF THE BASIC NOTIONS OF SYNTAX AND SEMANTICS IN SPANISH, STUDENTS WERE ASKED TO WRITE A TALE. THE ONLY REQUIREMENT WAS THAT THE STORY SHOULD BE ADDRESSED TO CHILDREN OF EIGHT TO TWELVE YEARS OLD.
- THE STUDENTS SIGNED INFORMED CONSENT AND THE CORPUS WAS ANALISED WITH NOOJ PLATFORM.
- WHEN ANALYSING THE CORPUS WE NOTED THAT IT COMPRISES 31,116 WORDS. MANY OF THESE WORDS PRESENT DIFFICULTIES CONCERNING ORTHOGRAPHY, SO THAT WE EVEN CONSIDERED THE IDEA OF CREATING NEW DICTIONARIES TO INCLUDE THOSE WORDS. AS A GENERAL RULE, PHRASES LACK ACCENTS, PUNCTUATION MARKS, CAPITALISATION, AND PROPER SPELLING.

# THE CORPUS

- THE REASONS FOR THIS CARELESSNESS IN WRITING HAVE TO DO, MORE OFTEN THAN NOT, WITH MOBILE PHONE TEXTSPEAK AND CHATS, SINCE THESE REAL TIME AND INFORMAL TYPE OF MESSAGES ARE NOT CORRECTED BY THEIR USERS.
- WHAT ODROWAŹ-COATES (2019) STATES ABOUT THE ENGLISH LANGUAGE CAN APPLY TO OTHER LANGUAGES SUCH AS SPANISH:

*THE POPULARITY OF ENGLISH IS REINFORCED ONLINE NOT ONLY BY SOFTWARE MAKERS, BUT ALSO BY INTERNET USERS WHO EMBRACE A NEW SPELLING CODE FOR ENGLISH DEEMED AS COOL AND HIP.... IT HAS NO FORMAL CORPUS AND IS ORTOGRAPHICALLY FLEXIBLE. IT GREW IN POPULARITY DUE TO NETSPEAK OR CHAT SPEAK, WHICH IS AN INTERACTION WITH THE USE OF LIVE TEXT ONLINE*



# **WORKING WITH NOOJ**

# WHY NOOJ?

- THE TOOL DEVELOPED BY SILBERZTEIN (2015) AND (2016) CONSTITUTES A USEFUL INSTRUMENT TO ANALISE THE REFERENCE CORPUS SINCE IT ALLOWS US TO VALIDATE WHETHER OUR LINGUISTIC DESCRIPTIONS ARE ACCURATE OR NOT. THE PEDAGOGICAL APPLICATION OF NOOJ IS FOUNDED ON THE METALINGUISTIC REFLECTION THAT ARISES DURING THE PROCESS.

*WHEN LINGUISTIC DESCRIPTIONS HAVE BEEN ENTERED INTO A COMPUTER, A COMPUTER CAN APPLY THEM TO VERY LARGE TEXTS IN ORDER TO EXTRACT FROM THESE TEXTS EXAMPLES OR COUNTEREXAMPLES THAT VALIDATE (OR NOT) THESE DESCRIPTIONS... FINALLY, THE DESCRIPTION OF CERTAIN LINGUISTIC PHENOMENA MAKES IT POSSIBLE TO CONSTRUCT NLP SOFTWARE APPLICATIONS. SILBERZTEIN, MAX (2016)*

# THE DICTIONARY OF DISCOURSE CONNECTORS

- IN THE PRESENT STUDY, WE ADDED TWO NEW SUBCLASSES OF DISCOURSE CONNECTORS [C+CONSEC] AND [C+CONTRARG], WHICH REFER TO CONSECUTIVE AND COUNTERARGUMENTATIVE DISCOURSE CONNECTORS RESPECTIVELY. CONSEQUENTLY, OUR DICTIONARY OF CONNECTORS INCLUDE NOWADAYS SOME OF THE MOST USUAL CAUSAL, CONSECUTIVE AND COUNTERARGUMENTATIVE DISCOURSE CONNECTORS

# THE DICTIONARY OF DISCOURSE CONNECTORS

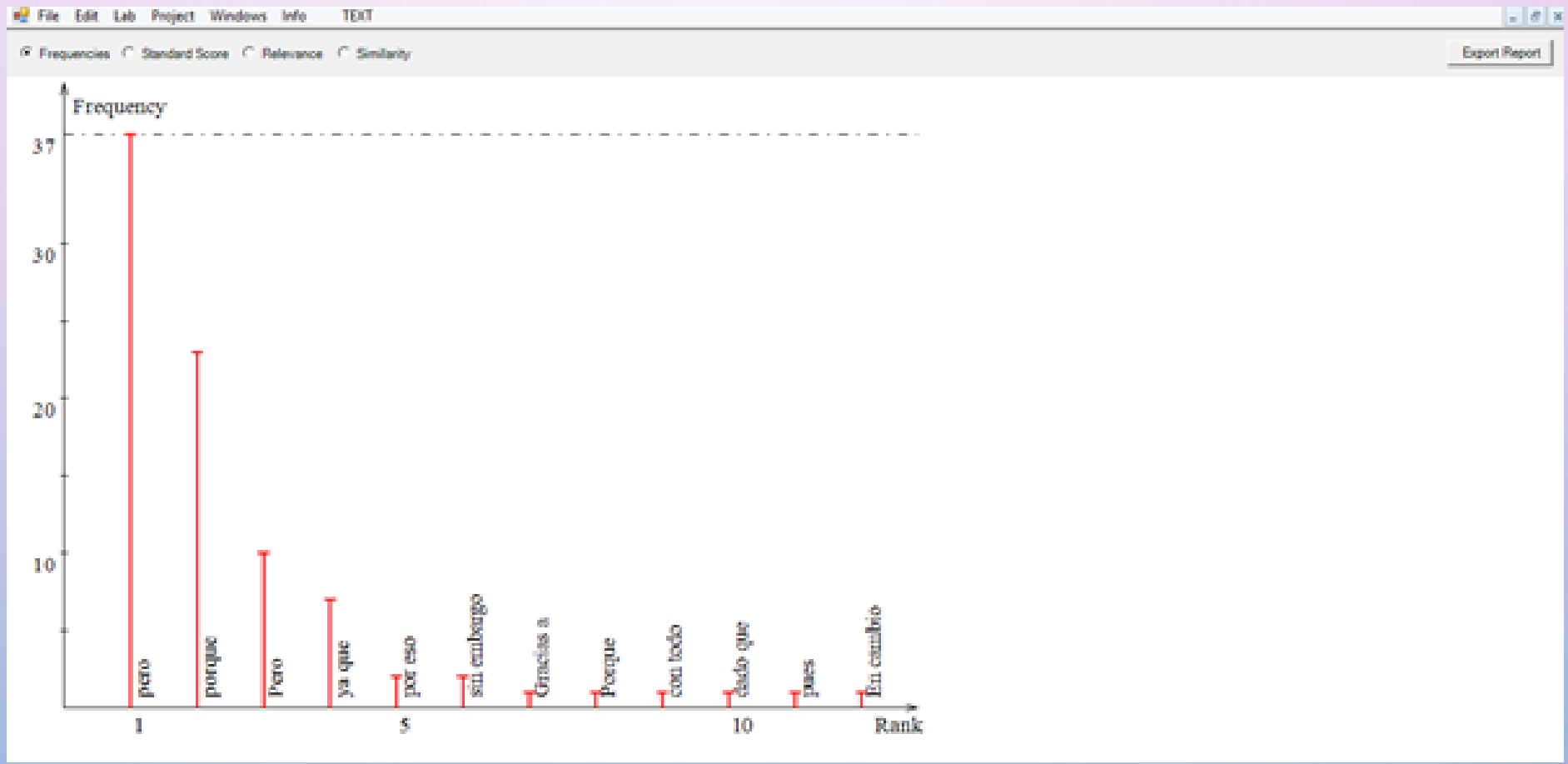
- WITH THE PURPOSE OF FORMALISING THE SPANISH EXPRESSIONS CONTAINING DISCOURSE CONNECTORS, NEW TAGS WERE INTRODUCED INTO THE SPANISH MODULE ARGENTINA FILES.
- IN A PREVIOUS STUDY, WE INTRODUCED A NEW TAG INTO THE PROPERTIES' DEFINITION FILE BY INCORPORATING A NEW CATEGORY TO NAME DISCOURSE CONNECTORS, CONNECTOR [C]. AND WITHIN THIS CATEGORY, THE TAG [+CAUS] WAS ADDED TO NAME THE SUBCLASS OF CAUSAL DISCOURSE CONNECTORS: [C+CAUS] (RODRIGO ET AL. 2019).





# THE DICTIONARY OF DISCOURSE CONNECTORS

- THE NEXT STEP WAS TO COLLECT INFORMATION ABOUT THE CONNECTORS IN OUR CORPUS. TO DO SO, WE FIRST APPLY TEXT > LOCATE TO SEARCH DISCOURSE CONNECTORS <C> IN THE TEXTS, AND FINALLY, IN ORDER TO KNOW THE FREQUENCY OF CONNECTORS, CONCORDANCE > STATISTICAL ANALYSES IS APPLIED.



# RESULTS OF STATISTICAL ANALYSIS

- THIS STATISTICAL ANALYSIS SHOWS THAT THE COUNTERARGUMENTATIVE DISCOURSE CONNECTOR *PERO* (BUT) RANKS FIRST AS THE MOST FREQUENT CONNECTOR, AND IN THE SECOND PLACE STANDS THE CAUSAL DISCOURSE CONNECTOR *PORQUE* (BECAUSE). THE LOW FREQUENCY OF CONSECUTIVE DISCOURSE CONNECTORS, AS FOR EXAMPLE, *YA QUE* (SINCE), IS QUITE STRIKING AND POINTS OUT THE NEED TO REINFORCE THE USE OF THIS TYPE OF DISCOURSE CONNECTORS AMONG STUDENTS. HOWEVER, WE WILL NOT INDICATE HERE HOW TO INCREASE THEIR USE, AND LEAVE THIS CHALLENGE TO FUTURE WORK.

# OUR NOOJ GRAMMARS. SENTENCE 1

- WE WILL ANALYSE THREE SENTENCES OF THE CORPUS.

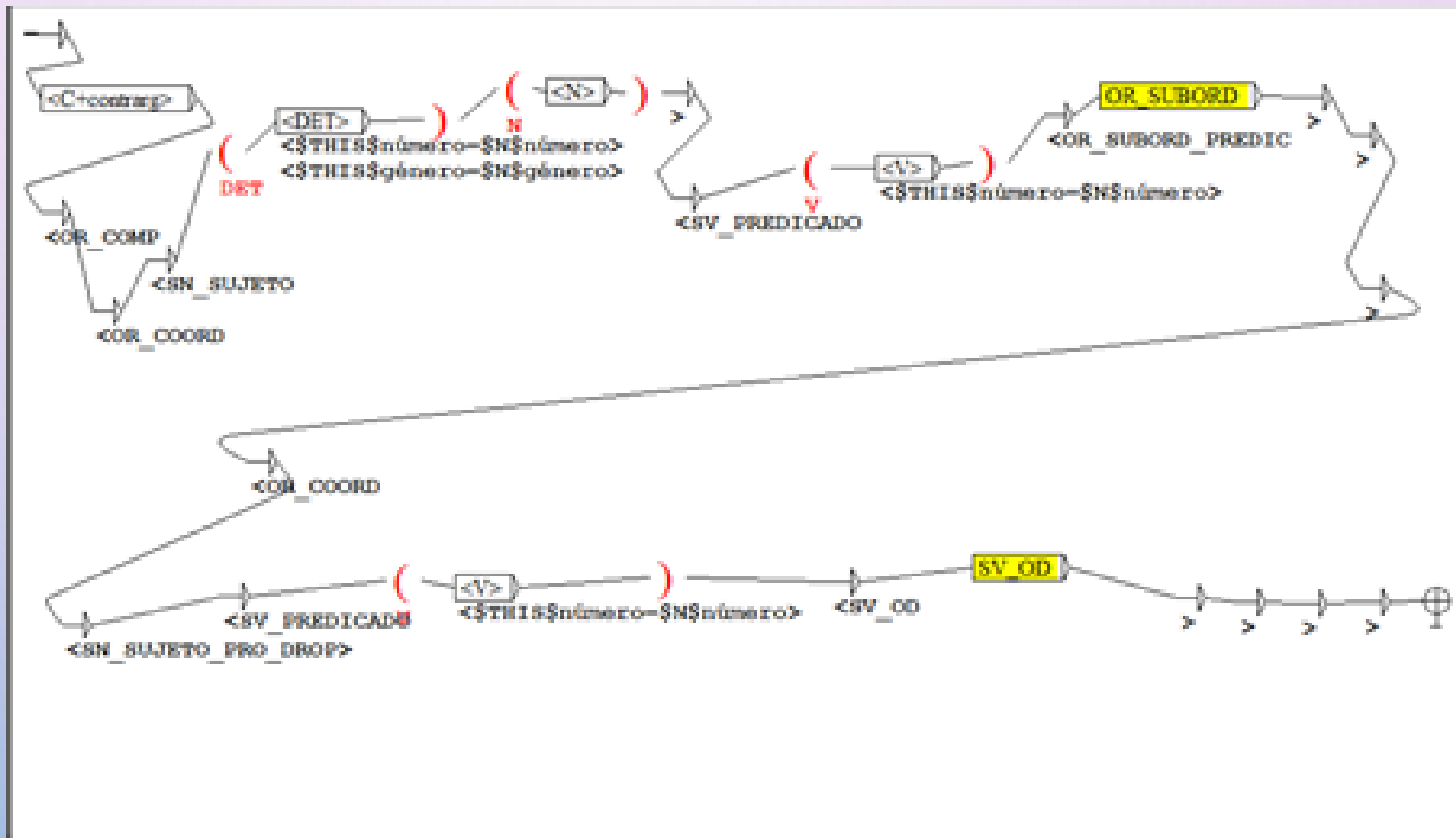
SENTENCE 1: **PERO** LA VERDAD (ES) QUE NO SOY DE TENER AMIGOS PREFIERO ESTAR SOLO

SENTENCE 1 BEGINS WITH THE EXTRASENTENTIAL COUNTERARGUMENTATIVE DISCOURSE CONNECTOR **PERO** (BUT), AND IT CONTAINS TWO ASYNDECTIC COORDINATE CLAUSES: LA VERDAD (ES) QUE NO SOY DE TENER AMIGOS, “THE TRUTH (IS) THAT (I) AM NOT INCLINED TO HAVE FRIENDS”, AND PREFIERO ESTAR SOLO, “(I) PREFER TO BE ALONE.” THE COORDINATOR HAS BEEN OMITTED, BUT IT CAN BE DEDUCED FROM THE SENTENCE STRUCTURE OF THE CONTEXT.

# OUR NOOJ GRAMMARS. SENTENCE 1

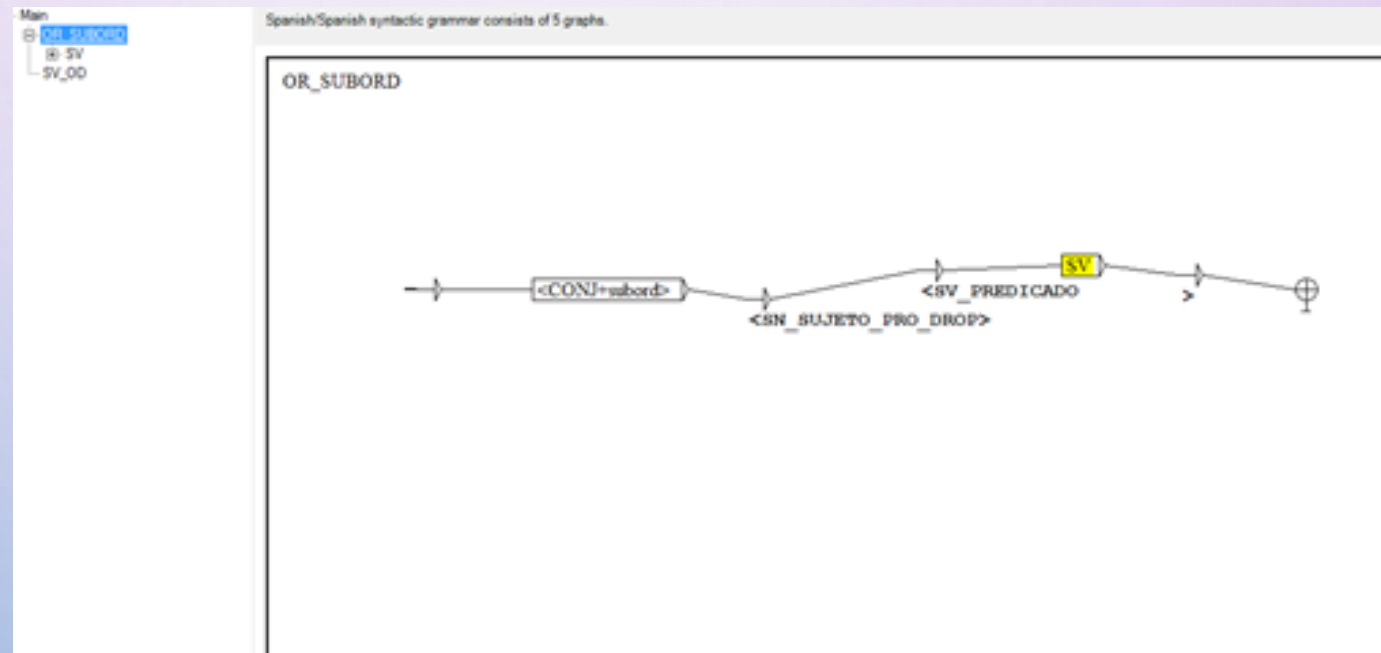
- A SYNTACTIC GRAMMAR IS CREATED WITH NOOJ, WHICH INCLUDES EMBEDDED GRAPHS FOR THE SAKE OF CLARITY.
- THE VERB TO BE OF THE FIRST COORDINATE CLAUSE, *LA VERDAD (ES) QUE NO SOY DE TENER AMIGOS*, HAS BEEN OMITTED IN THE ORIGINAL SENTENCE OF THE CORPUS, BUT WE SUPPLY IT SO AS NOT TO MAKE THE GRAMMAR MORE COMPLEX.
- IN THIS PARTICULAR GRAMMAR, WE HAD NO DIFFICULTY IN CREATING EMBEDDED GRAPHS INSIDE EMBEDDED GRAPHS UP TO THREE LEVELS.

# MAIN GRAMMAR



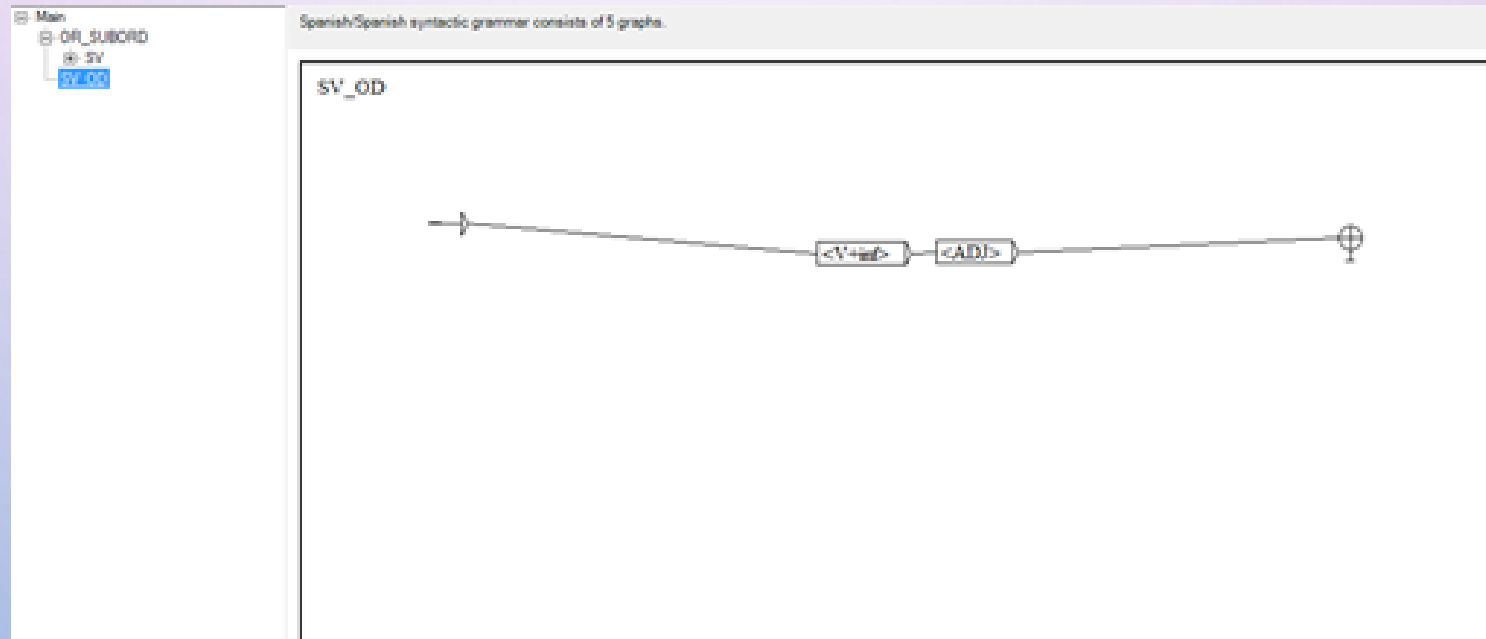
# GRAPH 1: EMBEDDED GRAPH OF THE SUBORDINATE CLAUSE INSIDE THE FIRST COORDINATE CLAUSE

THIS EMBEDDED  
GRAPH INCLUDES  
ANOTHER  
EMBEDDED GRAPH



# GRAPH 2: EMBEDDED GRAPH INSIDE THE SECOND COORDINATE CLAUSE

THIS GRAPH  
RECOGNISES  
THE DIRECT  
OBJECT OF  
THE MAIN  
VERB



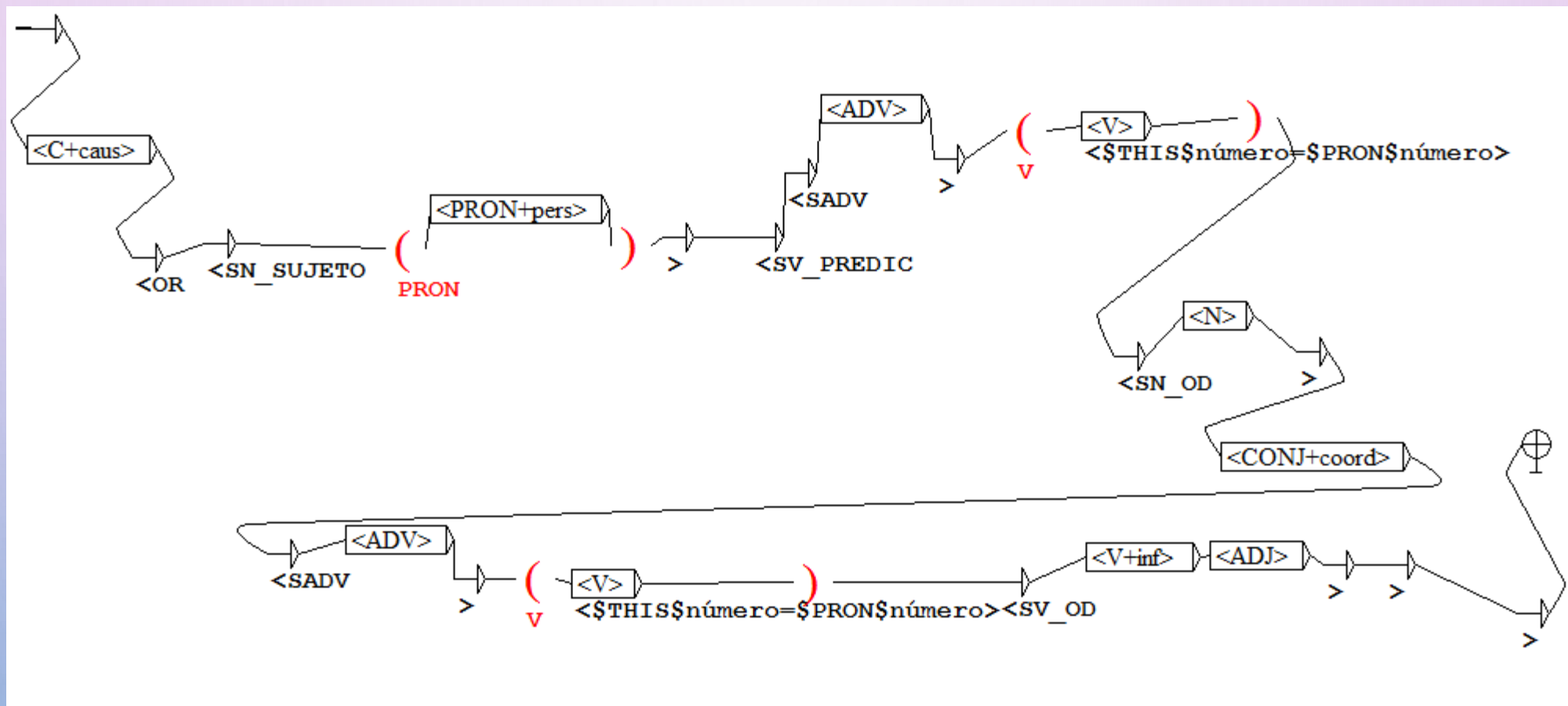


# OUR NOOJ GRAMMARS. SENTENCE 1

- AN ADDITIONAL DETAIL IS THAT THE 1ST PERSON PRONOUN SUBJECT HAS BEEN DROPPED, I.E., THERE IS A PRO-DROP NULL OR IMPLICIT SUBJECT BOTH IN THE SECOND COORDINATE CLAUSE (*PREFIERO ESTAR SOLO*) AS WELL AS IN THE SUBORDINATE CLAUSE OF THE FIRST COORDINATE CLAUSE (*NO SOY DE TENER AMIGOS*).
- WE TAKE UP AGAIN THE ADVANCEMENTS WE ACHIEVED IN PREVIOUS WORK (RODRIGO ET AL. 2019) IN THE PROCESSING OF SENTENCES WITH AN EMPTY ELEMENT.

## OUR NOOJ GRAMMARS. SENTENCE 2

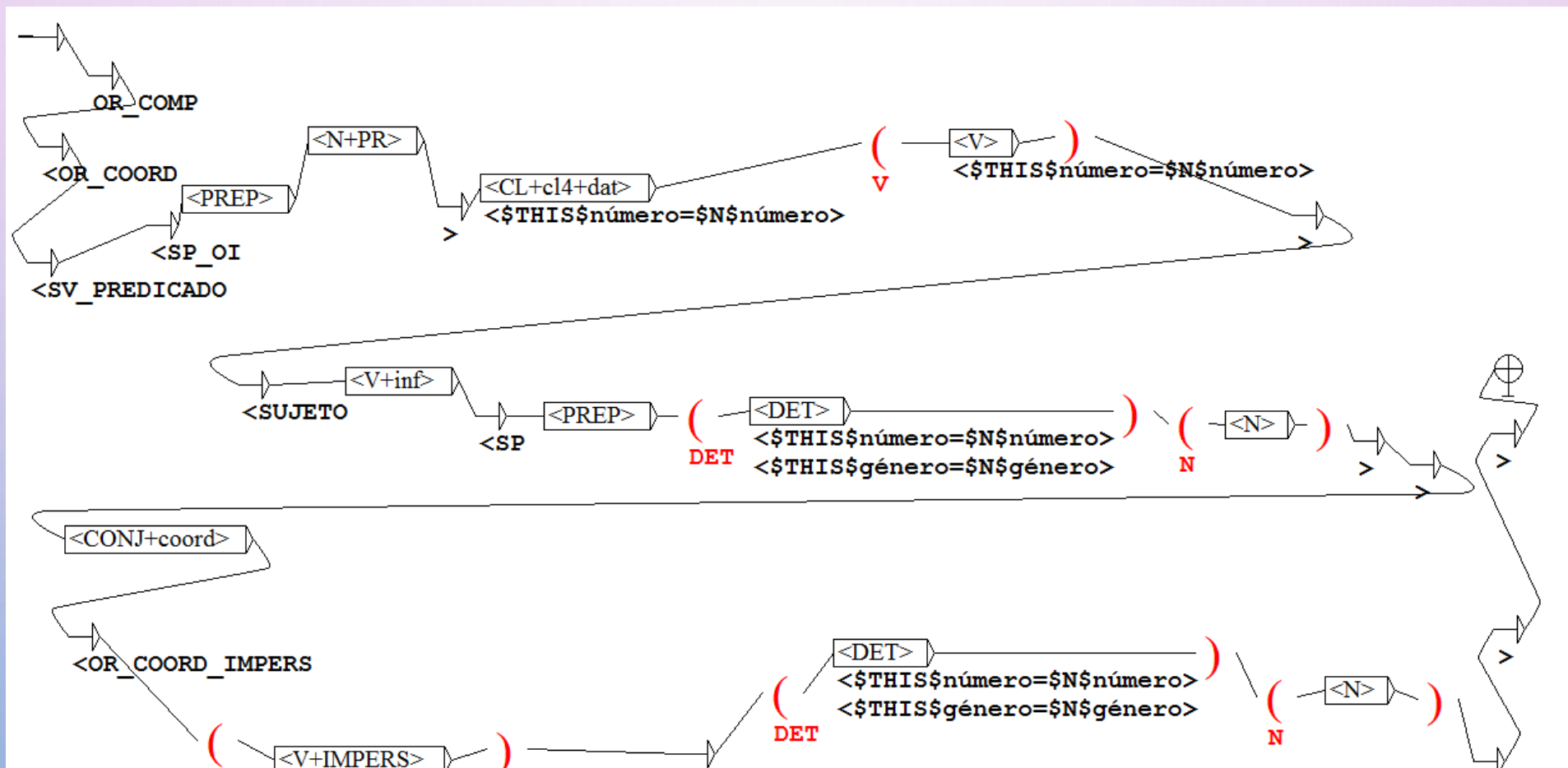
- SENTENCE 2: **PUES** YO SI TENGO AMIGAS **PERO** TAMBIÉN PREFIERO ESTAR SOLA “WELL YES I HAVE FRIENDS **BUT** (I) ALSO PREFER TO BE ALONE”
- SENTENCE 2 BEGINS WITH THE EXTRASENTENTIAL CAUSAL DISCOURSE CONNECTOR **PUES** (WELL) AND HAS A PREDICATE MADE UP OF TWO NUCLEUS VERB PHRASES COORDINATED BY THE INTRASENTENTIAL COUNTERARGUMENTATIVE DISCOURSE CONNECTOR **PERO** (BUT).





## OUR NOOJ GRAMMARS. SENTENCE 3

- SENTENCE 3: *A PABLO LE ENCANTABA IR AL PARQUE PERO HABÍA UN PROBLEMA* “FOR PAUL (IT) WAS ENJOYABLE FOR HIM TO GO TO THE PARK BUT (THERE) WAS A PROBLEM”
- SENTENCE 3 IS MADE UP OF TWO CLAUSES COORDINATED BY THE INTRASSENTENTIAL COUNTERARGUMENTATIVE DISCOURSE CONNECTOR *PERO* (BUT). THE SUBJECT OF THE FIRST COORDINATE CLAUSE IS THE SUBORDINATE CLAUSE <IR AL PARQUE> “TO GO TO THE PARK”, BUT THE SECOND COORDINATE CLAUSE *HABÍA UN PROBLEMA*, “(THERE) WAS A PROBLEM”, IS IMPERSONAL IN SPANISH AND HAS NO SUBJECT AT ALL.



# LINGUISTIC ANALYSIS OF SENTENCE 3 GRAMMAR (FIRST CLAUSE)

*A PABLO LE ENCANTABA IR AL PARQUE ...*

A Pablo le encantaba ir al parque pero había un problema

0	2	8	11	21	24	24.01	27	34
OR								
SV				SUJETO				pero,C+contrarg
SP		le,CL+cl4+3era+sg+dat	encantar,V+pi+ind+1a+sg	ir,V+inf	SP			pero,CONJ+coord
a,PREP	Pablo,N+PR		encantar,V+pi+ind+3a+sg		a,PREP	el,DET+artdet+masc+sg	parque,N+masc+sg	pero,N+masc+sg

# LINGUISTIC ANALYSIS OF SENTENCE 3 GRAMMAR (SECOND CLAUSE)

...PERO HABÍA UN PROBLEMA

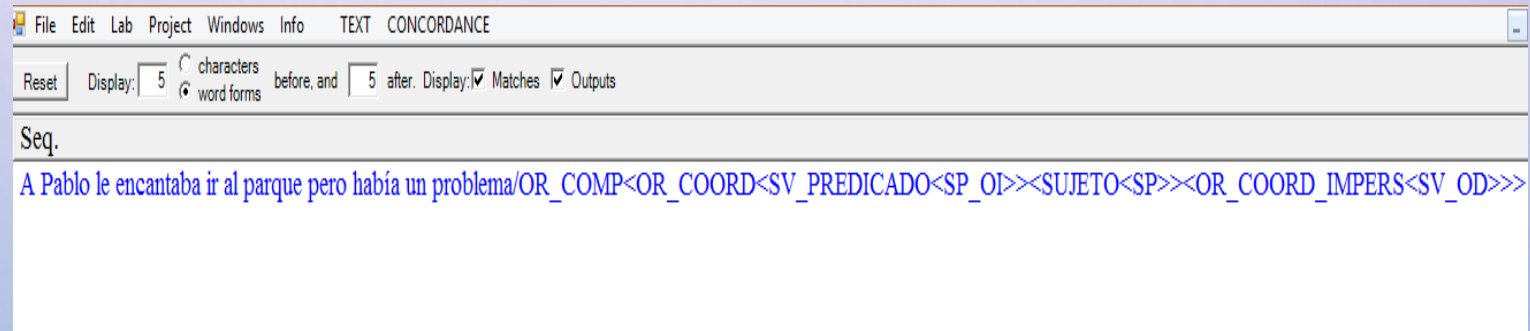
A Pablo le encantaba ir al parque pero había un problema

	24	24.01	27	34	39	45	48
O				pero, C+contrarg	OR		
f	SP			pero, CONJ+coord	haber, V+pi+ind+3a+sg	SV	
	a, PREP	el, DET+artdet+masc+sg	parque, N+masc+sg	pero, N+masc+sg	haber, V+pi+ind+1a+sg+IMPERS	un, DET+artindet+masc+sg	problema, N+masc+sg



# LOCATE IN SENTENCE 3 GRAMMAR

- FINALLY, WE APPLY LOCATE AND THEN OUTPUTS IN ORDER TO SHOW ITS STRUCTURE.



The screenshot shows a software window titled "TEXT CONCORDANCE". The menu bar includes "File", "Edit", "Lab", "Project", "Windows", "Info", "TEXT", and "CONCORDANCE". The toolbar contains a "Reset" button, a "Display:" field with the value "5", a "characters" icon, a "word forms" icon, the text "before, and", another "5" in a field, the text "after.", and checkboxes for "Display:", "Matches", and "Outputs". The main text area displays the search result: "Seq." followed by the sentence "A Pablo le encantaba ir al parque pero había un problema" in blue text, with its grammatical structure: "/OR\_COMP<OR\_COORD<SV\_PREDICADO<SP\_OI><<SUJETO<SP>><<OR\_COORD\_IMPERS<SV\_OD>>>>".

# CONCLUSIONS

- THIS PAPER IS MAINLY BASED ON SILBERZTEIN (2015) AND (2016). IN THE FIRST PLACE, AS WE ONLY HAD THE TAG [C+CAUS] TO IDENTIFY CAUSAL DISCOURSE CONNECTORS, WE INTRODUCED TWO NEW TAGS IN OUR DICTIONARY: [C+CONSEC] AND [C+CONTRARG], IN ORDER TO ANALYSE CONSECUTIVE AND COUNTERARGUMENTATIVE CONNECTORS RESPECTIVELY.
- CORPUS ANALYSIS SHOWED THAT COUNTERARGUMENTATIVE CONNECTORS GREATLY OUTNUMBER CAUSAL CONNECTORS AND THAT THERE IS ALMOST A STRIKING ABSENCE OF CONSECUTIVE CONNECTORS.

# CONCLUSIONS

- IN THE SECOND PLACE, WE ANALYSED THREE SENTENCES OF THE CORPUS. THIS ANALYSIS GAVE US AN INTERESTING VIEW OF THE DEGREE OF PLASTICITY OF NOOJ'S GRAPH EDITOR SINCE IT ALLOWED US TO ACCOUNT FOR VARIOUS SENTENCES AND CLAUSES: COORDINATE CLAUSES, SUBORDINATE CLAUSES INSIDE COORDINATE CLAUSES, CLAUSES WITH NULL SUBJECT, AND PREDICATES WITH MORE THAN ONE NUCLEUS VERB PHRASE. WE DID NOT ONLY ANALYSE DIFFERENT SENTENCES BUT WE WERE ALSO ABLE TO APPLY GENERATION AND LINGÜISTIC ANALYSIS IN ORDER TO VALIDATE OUR INITIAL LINGUISTIC DESCRIPTION.

# CONCLUSIONS

- ALL THIS WORK RELIES ON OUR RESEARCH PROJECT ABOUT THE PEDAGOGICAL APPLICATION OF NOOJ.
- METALINGUISTIC REFLECTION AS THE GENERATOR OF LEARNING PROVIDES SUPPORT FOR OUR RESEARCH. IN OUR STUDY, WE SHOW HOW IT IS POSSIBLE TO PROCESS WITH NOOJ THE TEXTS PRODUCED BY TERTIARY STUDENTS THAT WILL BECOME PRIMARY EDUCATION TEACHERS.

# CONCLUSIONS

- WE REALISED HOW TEXTSPEAK WRITING LICENCE (DEVIATING FROM CONVENTIONS) IS ALMOST AT THE SAME LEVEL OF EXPRESSIONS THAT ARE CLOSE TO ORALITY AND MAKE SYNTACTIC STRUCTURE EXTREMELY RICH.
- THE ANALYSIS OF THIS CORPUS LEAD US TO CONSIDER OUR ROLE OF TEACHERS IN THE SENSE OF HOW IT IS NECESSARY TO INTERVENE IN THE LEARNING PROCESS, WHAT ASPECTS MAY BE CHANGED AND WHAT ASPECTS SHOULD BE MAINTAINED AND FOSTERED.

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