Exploring grammatical development in Spanish University learners of English

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The ALEGRO Project

Adaptive
Learning of
English
GRammar
Online

A cooperation between:

- Universidad Autónoma de Madrid,
- Universitat Politécnica de Valencia
- Universitat de València

Funded by the Ministerio de Economía y Competitividad 2016-2018
(FFI2015-67992-R)

Goal of talk

- In this talk, I will outline the methodology and tools we have been using to study grammatical development in Spanish learners of English.

- Two main resources:

1. **Manual Error analysis** of the essays of our learners (to see what they do wrong)

2. **Automatic Grammar analysis** (Mood, Transitivity, Theme) to see what they are doing (and not doing)

Goal of talk

Motivation of the studies:

- To discover exactly what grammatical issues we should be teaching our students in the language classroom.
- To discover at which levels of proficiency particular grammatical issues become most relevant.

Goal of talk

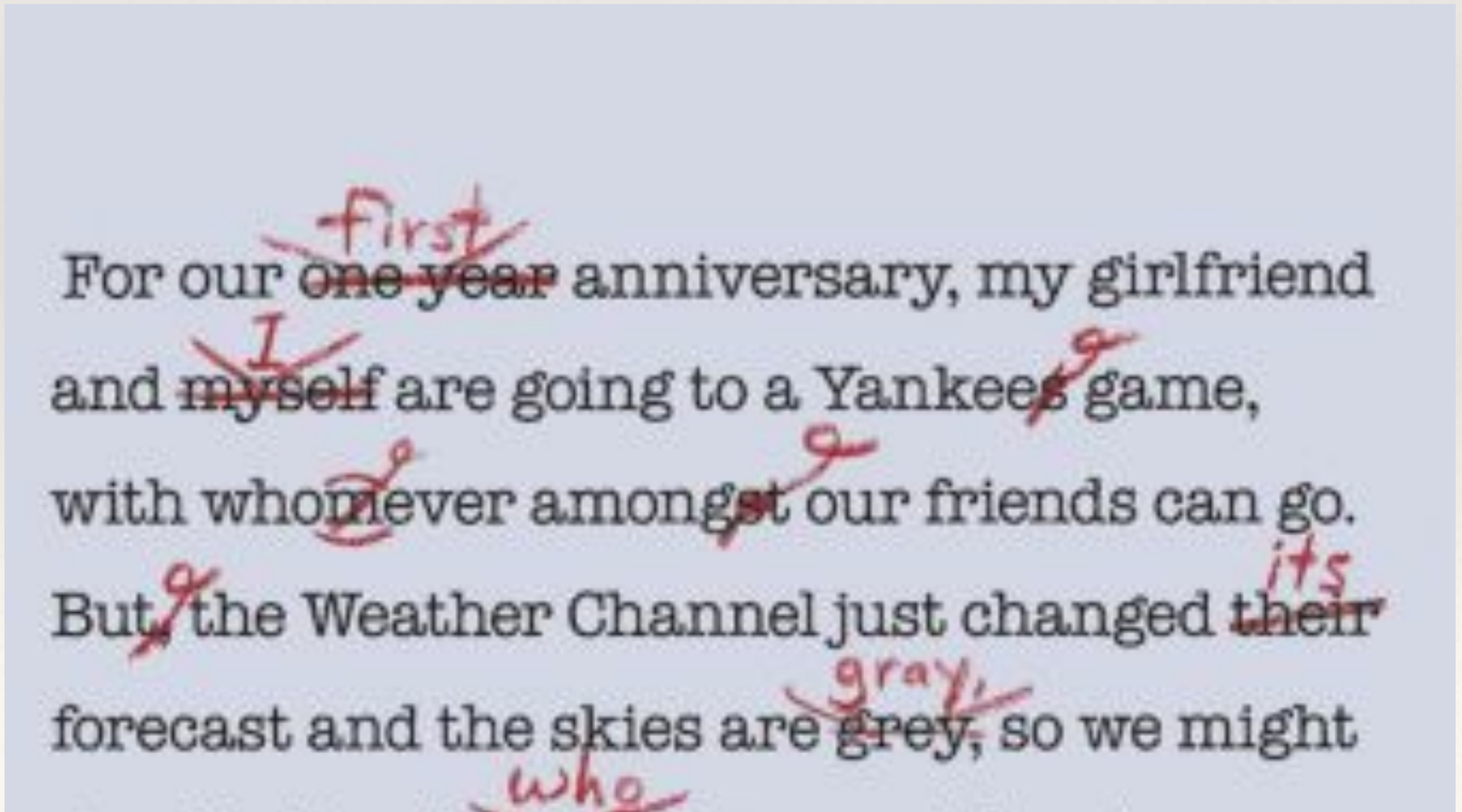
Applications of the results:

1. We are already changing the materials we present to the student in the traditional classroom, addressing directly their most prominent problems.

2. We are building an online learning system designed to identify which grammatical concepts the individual learner has mastered, which they have not, and which they are working on.

➡Student is then kept focused on those concepts they are ready for but have not totally acquired.

Part 1: Discovering the Critical Grammar Concepts for a given L1-L2.



Discovering Critical Language Problems

- **Key philosophy**: don't teach what the learners already know.

  - For close languages (e.g., Spanish-English): many structures and some vocabulary can be easily transferred.

- We thus work to identify exactly which structures/ vocabulary are problematic for a L1-L2 pair.

- Our teaching then focuses on these problematic structures.

Discovering Critical Language Problems

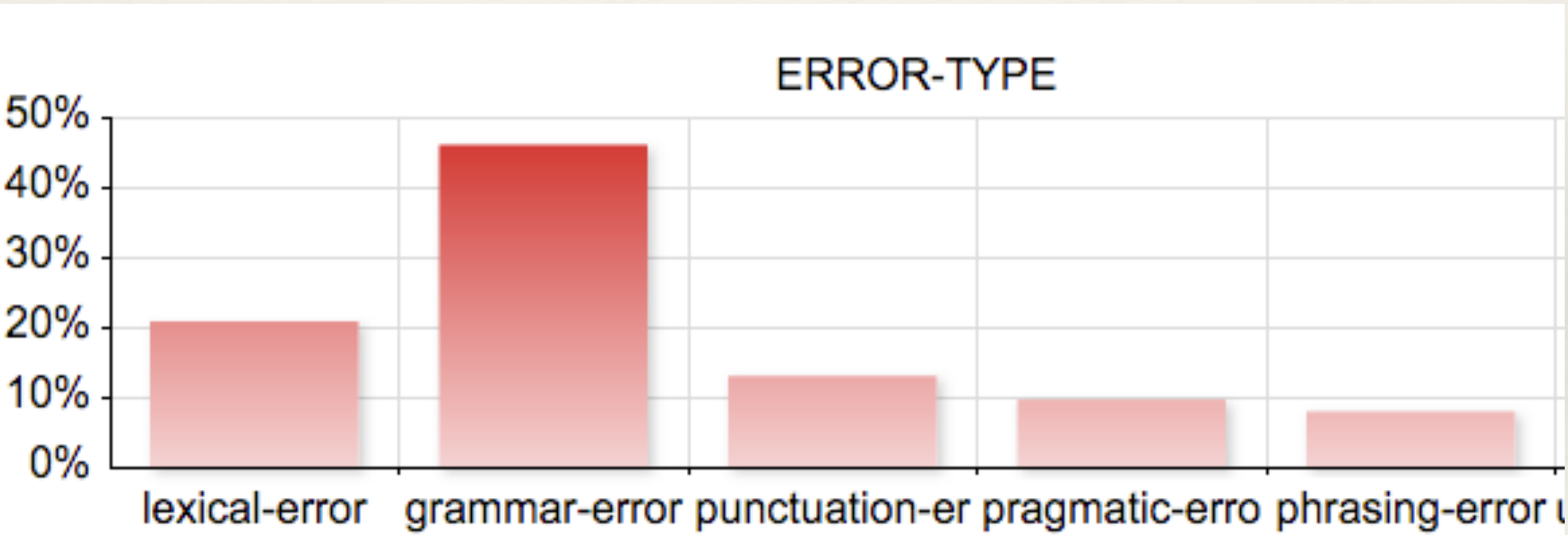
- Even for more distant languages (e.g., Chinese-English) not all structures are equally problematic for the learner.
- The goal is the same: identify exactly the structures which lead to the most errors for learners as a group.

Discovering Critical Language Problems

- Identifying critical concepts for Spanish University learners of English:
  - We conducted an error study of 305 essays (112,000 words) by our learners over 6 proficiency levels.
  - 16,000 errors identified.
  - Studying these errors reveal certain areas that cause problems for this class of learner

Discovering Critical Language Problems

- Proportion of errors falling into different error types (morphology included with grammar):



Discovering Critical Language Problems

- 12 Most Frequent **Grammar** errors

Topic	Error	Count	% (of Gramm. Errors)
Determiner	det-present-not-required	1087	**14.7%**
	det-absent-required	439	**5.9%**
	determiner-choice	250	3.4%
	determiner-agreement	231	3.1%
Head	wrong-number	408	**5.5%**
	pronoun-choice-error	134	1.8%
	wrong-category	122	1.6%
Preposition	preposition-choice	823	**11.1%**
	unnecessary-preposition	205	2.8%
Clause	subject-finite-agreement	536	**7.2%**
	obligatory-subject-absent	227	3.1%
	adjunct-order	179	2.4%

Discovering Critical Language Problems

Examples of these errors

det-present-not-required	~~*The*~~ *drugs are a problem for society.*
det-absent-required	*Drugs are ∅ problem for society.*
determiner-choice	*…families that support them during the (their) career*
determiner-agreement	*this people are worried*
wrong-number	*They take public transports*

Discovering Critical Language Problems

From Critical Error to Critical Language Concepts

- Each of these frequent errors relates to a “critical language area” (an area where more teaching is needed for the learners).

- But each frequent error relates to a number of distinct grammatical concepts misunderstood by the student:

- E.g., subject-finite agreement:
  - “people” is plural: *People is looking for …*”
    (‘gente’=‘people’ is singular in Spanish)
  - Subject in “there” clause appears after the verb: *There is reasons….*
    (In Spanish, the verb is the same for singular and plural existents)
  - Etc.

Discovering Critical Language Problems

From Critical Error to Critical Language Concepts

- **Another example: determiner-present-not-required**

- We identified 5 distinct contexts of reference which lead to nearly all cases of wrongful insertion of articles by Spanish learners:

Referring to **specific** entities

Normal “the president” / “el presidente”)

Percentages: “10 percent” / “el 10 por ciento”

Places of work etc.: “go to university” / “ir a la universidad”

Meals: “after breakfast” / “después del desayuno”

Referring to **generic** entities:

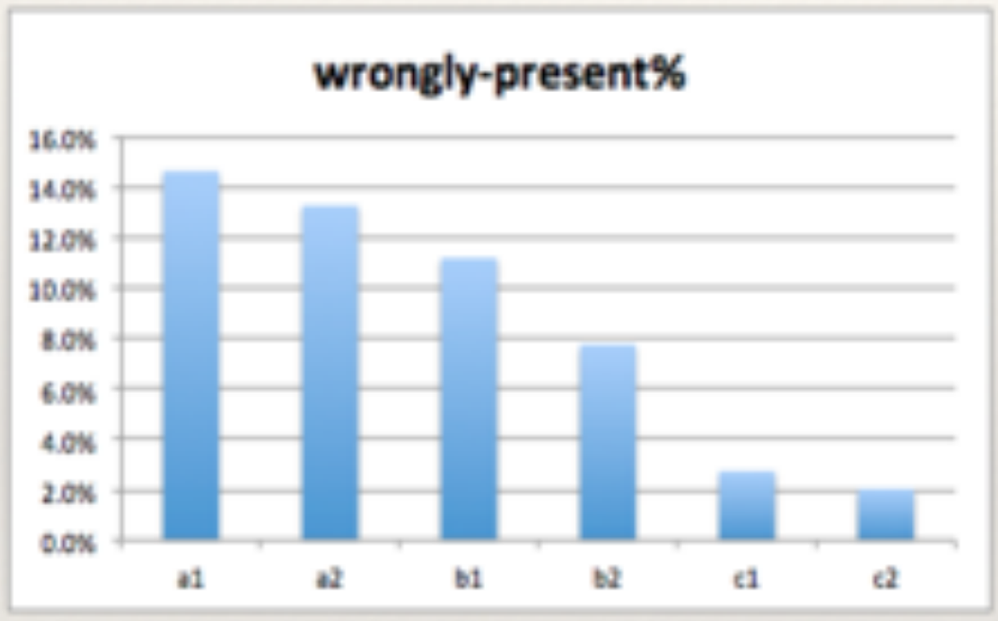
Count: singular - “the cat” / “el gato”

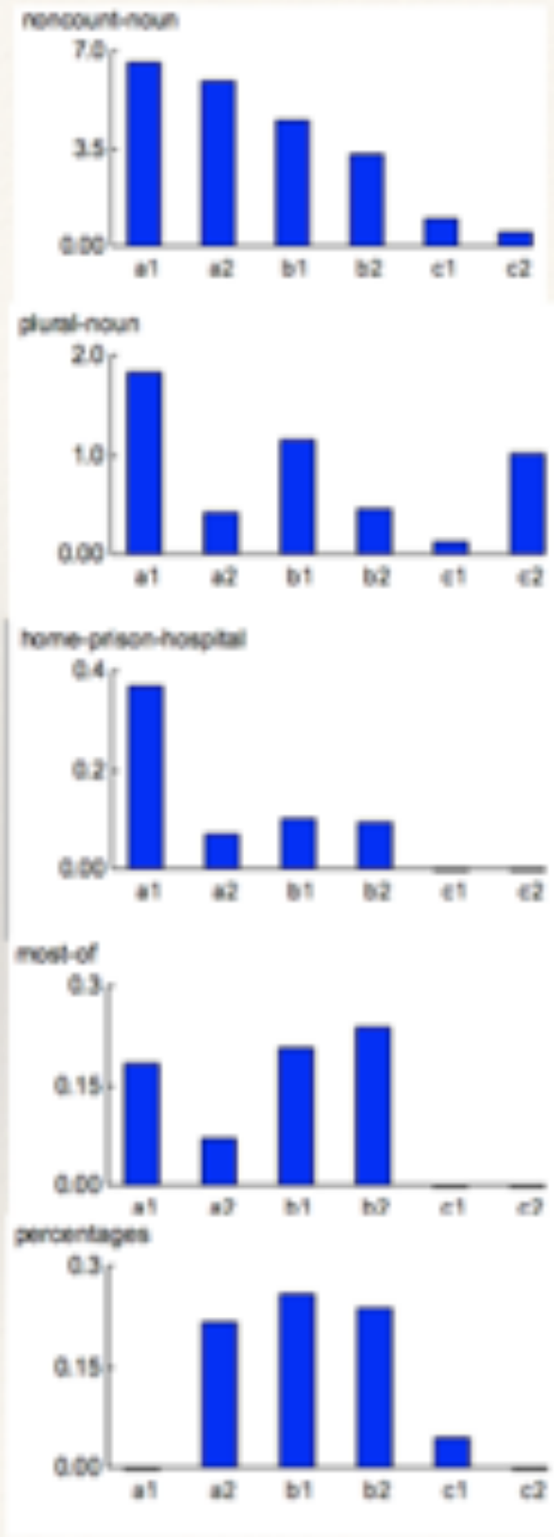
Count: plural - “Cats” / “los gatos”

Noncount: - “Love” / “el amor”

Discovering Critical Language Problems

The more delicate coding of error types allows us to see that what seems to be a smooth progression of development is actually a number of different acquisitional processes working together.





Discovering Critical Language Problems

From Critical Error to Critical Language Concepts

- In Summary:

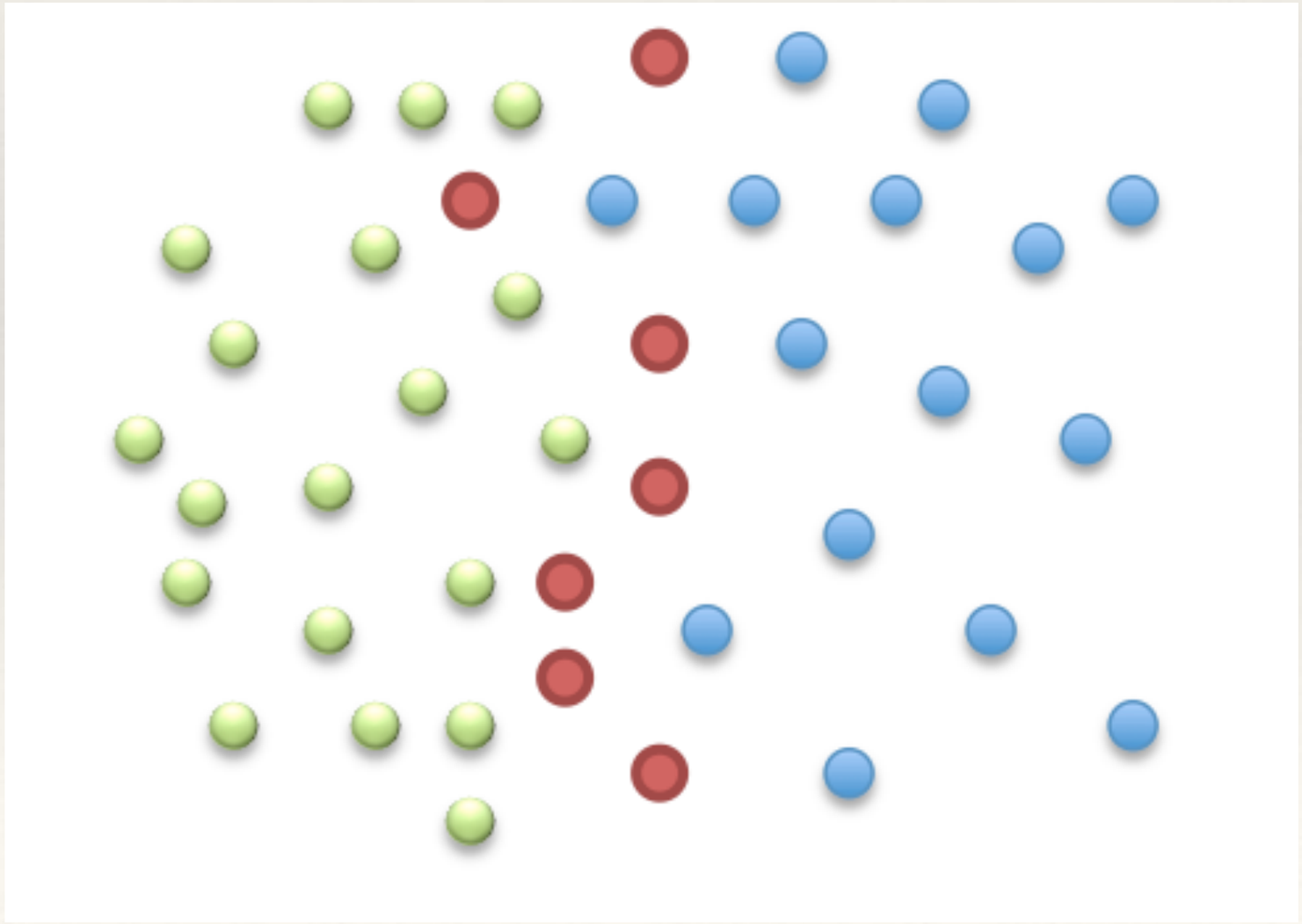
  - We initially codes our error subcorpus to identify all language errors of the learners.

  - We then focused on the 20 most frequent grammatical errors
    -> Critical Language Areas

  - For each of these critical language areas, we are now working to identify the grammatical concepts which lie behind these errors.

  - These grammatical concepts then form the focus of our language teaching,

Part 2: Ordering Critical Concepts in Difficulty.



Ordering Critical Concepts in Difficulty

- We are identifying the critical grammar concepts that are relevant for a given L1-L2 pair.

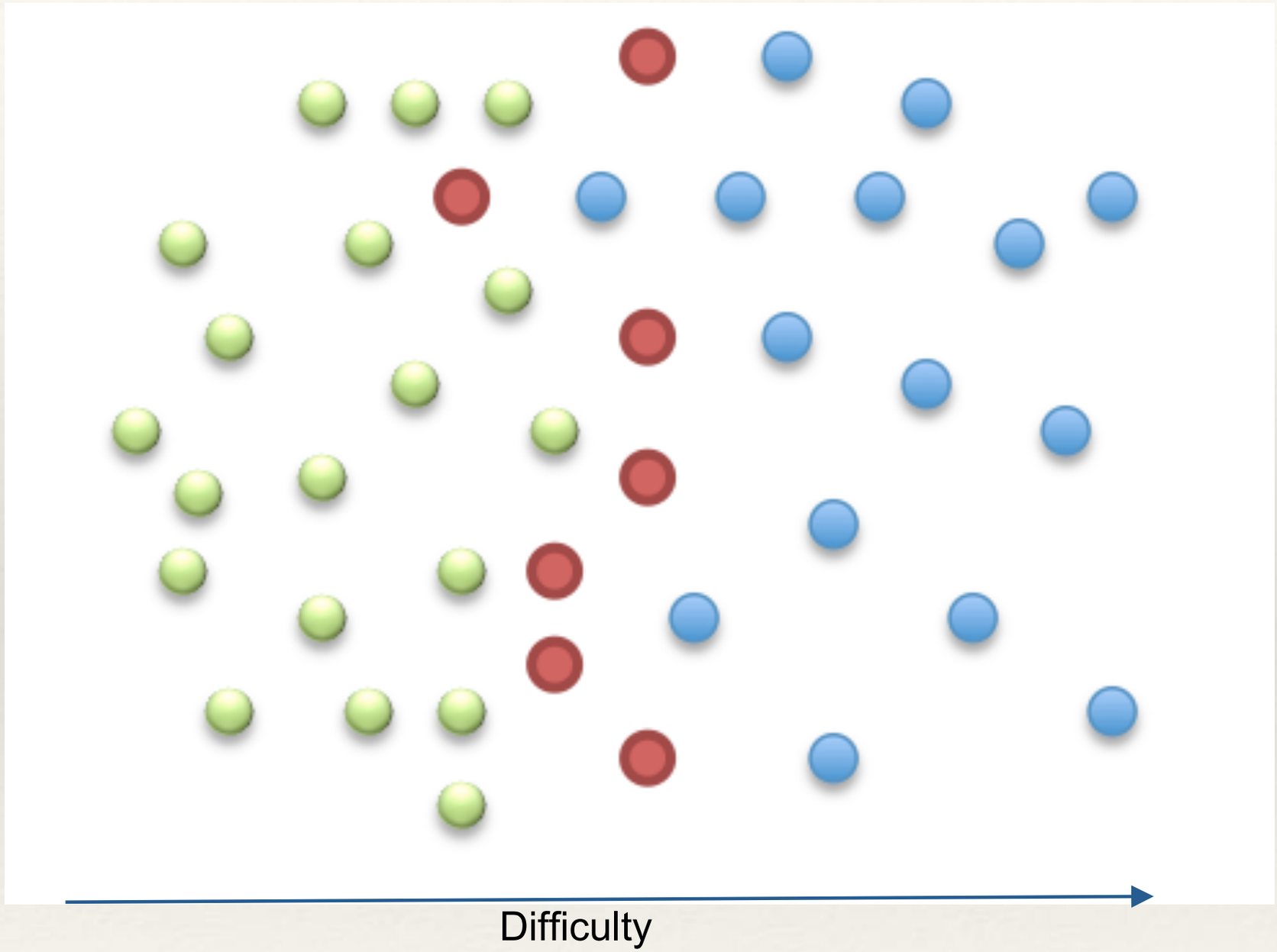
- But of these concepts, an *individual* learner will have acquired some, be working on others, and not yet ready for others.

- For our online learning system, we need to estimate which of the critical grammar concepts are most appropriate for a given individual learner.

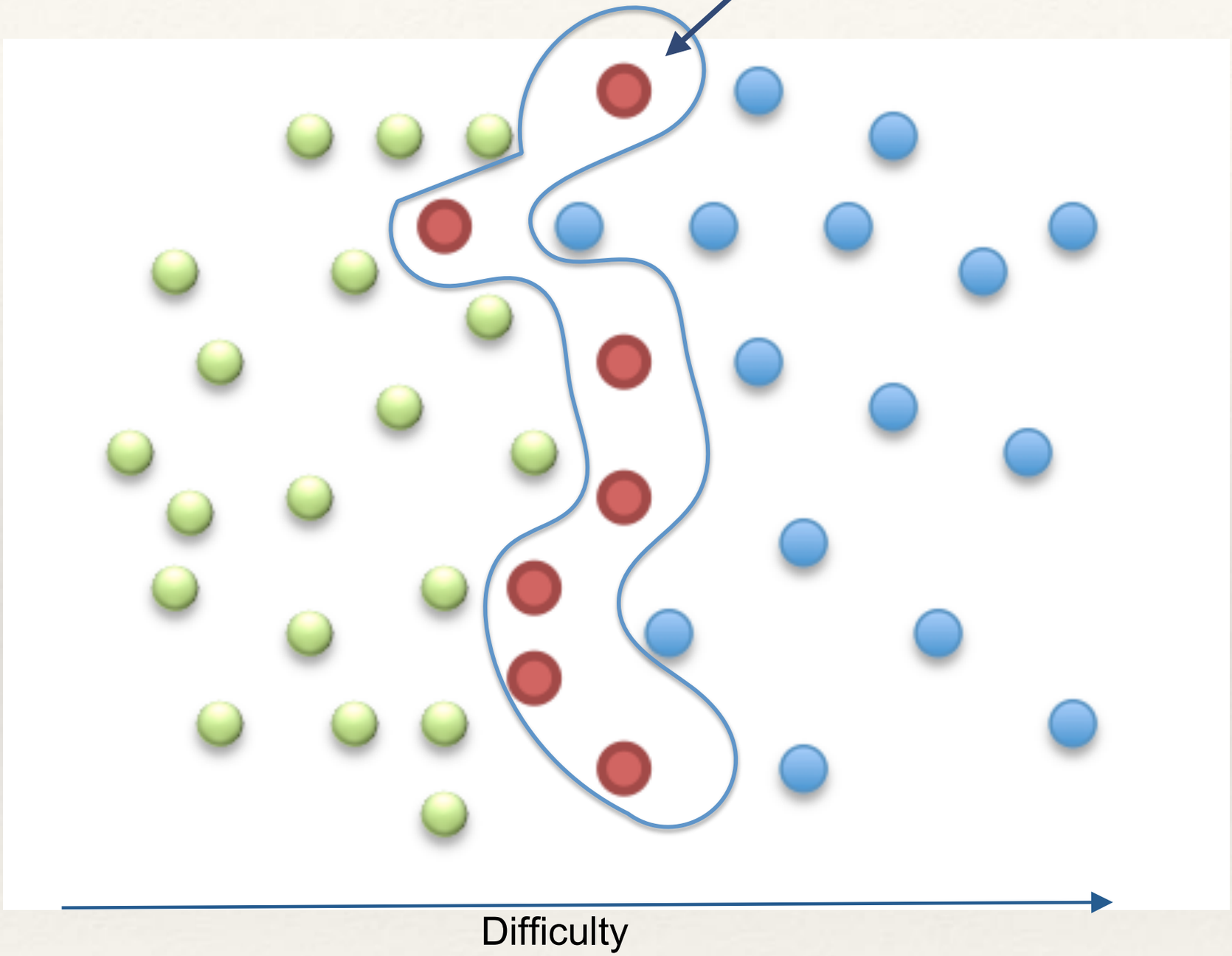
- For this, it helps if we can identify the relative order of acquisition of the critical concepts.

- The appropriate concepts for a learner are those earliest in acquisition order which the learner has not yet acquired.

A Learner Model



A Learner Model



Ordering Critical Concepts in Difficulty

- To discover the order of grammatical concepts relative to each other, we make use of a other resource: sentence correction tests

Each of the following sentences is an attempt to use a question tag. For each of them, indicate whether it is correct or not.

1. You haven't got a car, have you?
   - correct
   - wrong
2. He isn't from Germany, he is?
   - correct
   - wrong
3. He never came again, did he?
   - correct
   - wrong
4. She can't speak Arabic, can she?
   - correct
   - wrong

- Each sentence reflects one central grammatical concept the learner needs to acquire.
- The student's answer to each question indicates whether they have acquired the concept .

Ordering Critical Concepts in Difficulty

- To discover the order of grammatical concepts we look at pairs of questions in the quizzes:

1. **Derive tables comparing how often students demonstrates (non) acquisition of two distinct concepts covered in the test:**

		Concept B	
		Not Acquired	Acquired
Concept A	Not Acquired	45	5
	Acquired	15	35

Ordering Critical Concepts in Difficulty

2. Ignore cases where no order between the concepts is indicated

		Concept B	
		Not Acquired	Acquired
Concept A	Not Acquired	45	5
	Acquired	15	35

Ordering Critical Concepts in Difficulty

3. Derive order of the concepts

		Concept B	
		Not Acquired	Acquired
Concept A	Not Acquired	45	5
	Acquired	15	35

A < B (A acquired before B)

Ordering Critical Concepts in Difficulty

4. Combine pairwise orderings

$$A < B$$

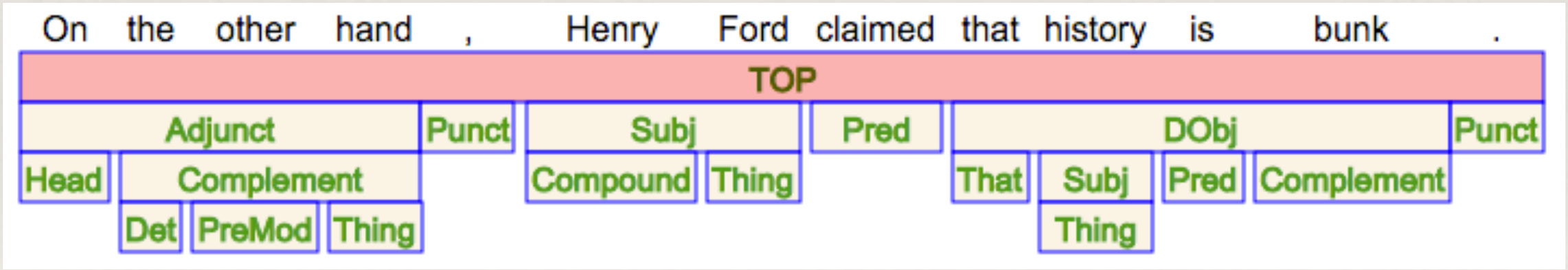
$$B < C$$

$$A < B < C$$

Ordering Critical Concepts in Difficulty

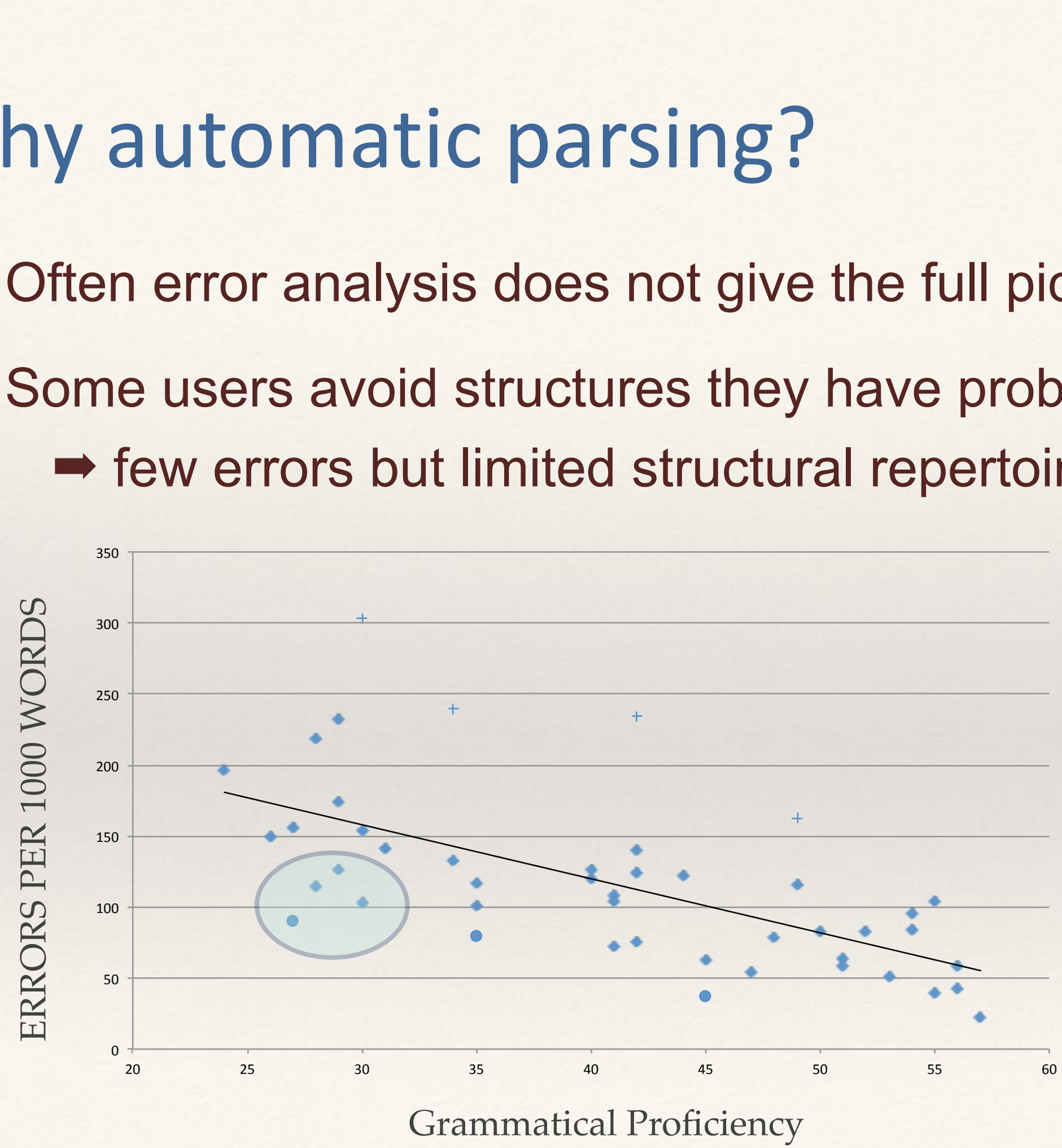
- In the end, we produce the ordering of all grammatical concepts covered in our various quizzes.
- As the learners interact with our online system, the system collects even more data as to pair-wise order of difficulty.
- System thus refines the overall order of acquisitional difficulty as it is used.

Part 3: Exploring Syntactic Development via Automatic Grammar Parsing



Why automatic parsing?

- Often error analysis does not give the full picture.
- Some users avoid structures they have problems with
  - ➡ few errors but limited structural repertoire.



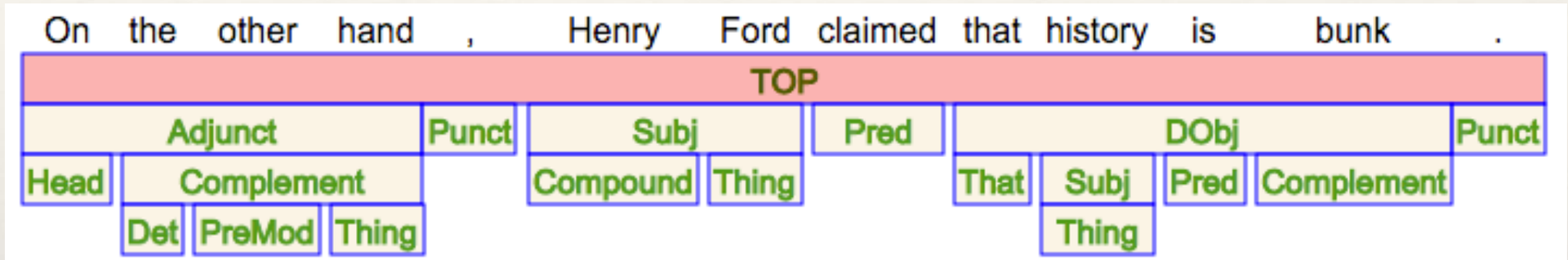
The Corpus

- The study is based on:
    - 713,000 word corpus of essays written by Spanish University students of English (Wricle+UPV Learner corpus)
    - 190,000 words of essays written by natives (BAWE)
- Each essay is associated with a CEFR proficiency level based on the Oxford Placement Test.

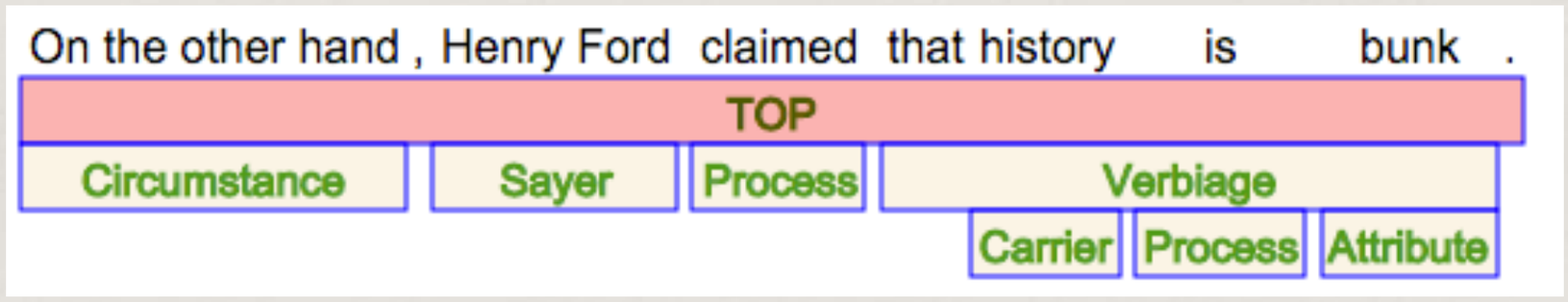
BAWE: https://www2.warwick.ac.uk/fac/soc/al/research/collections/bawe/

Automatic SFL Annotation

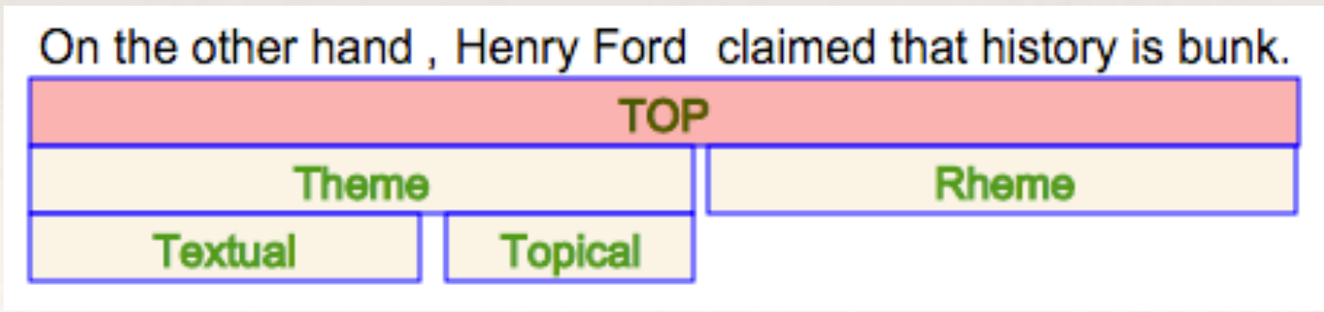
- A number of (almost) SFL analyses provided automatically by UAM CorpusTool (English only):
  - Mood



  - Transitivity



  - Theme



Automatic SFL Annotation

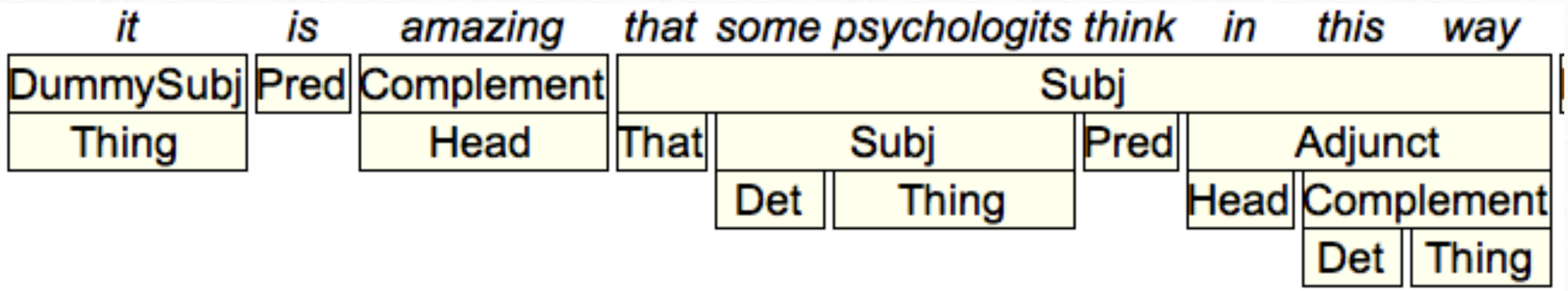
- UAM Corpustool makes use of the Stanford parser to produce a basic syntactic analysis

```
(ROOT
  (S
    (PP (IN On)
      (NP (DT the) (JJ other) (NN hand)))
    (, ,)
(NP (NNP Henry) (NNP Ford))
(VP (VBD claimed)
  (SBAR (IN that)
    (S
      (NP (NN history))
      (VP (VBZ is)
        (NP (NN bunk))))))
(. .)))
```

- Mood analysis automatically derived from this.
- Transitivity and Theme analysis derived from the Mood analysis.

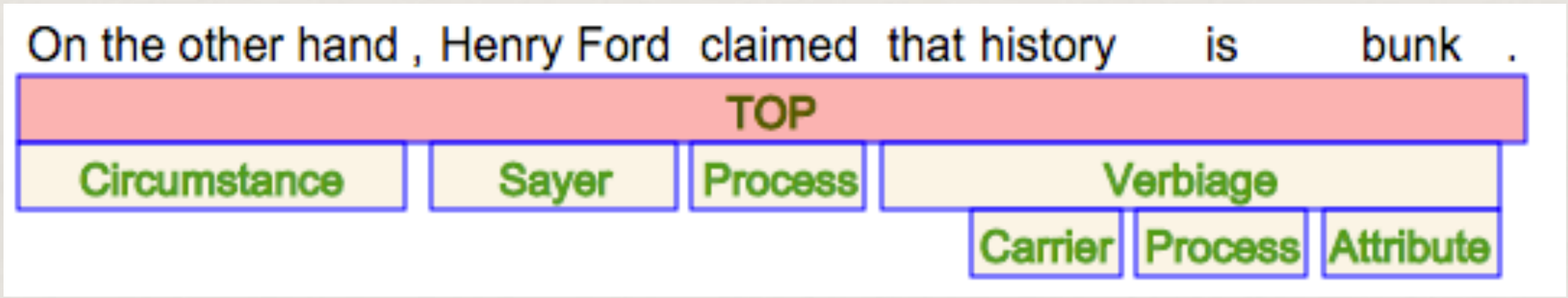
Featurisation

- The parser produces a functional role (e.g., Subj) and one class feature for each constituent.
- To be useful for this kind of study, we need to **featurise** the data:
  - recognition of structural patterns and adding a tag for this.



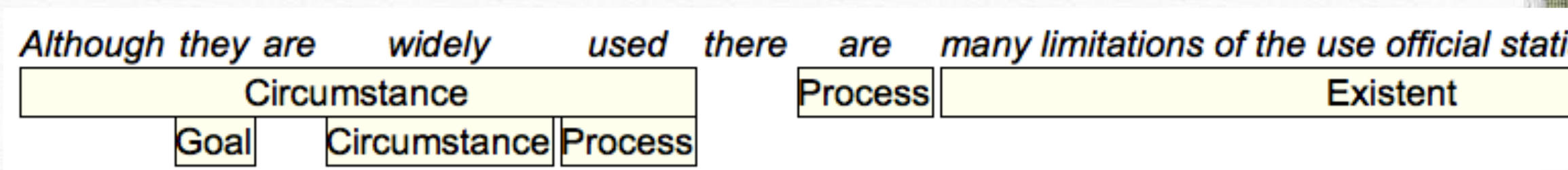
'it' + [be] +comment-adj +that-clause —> **extraposition**

3.1 Transitivity



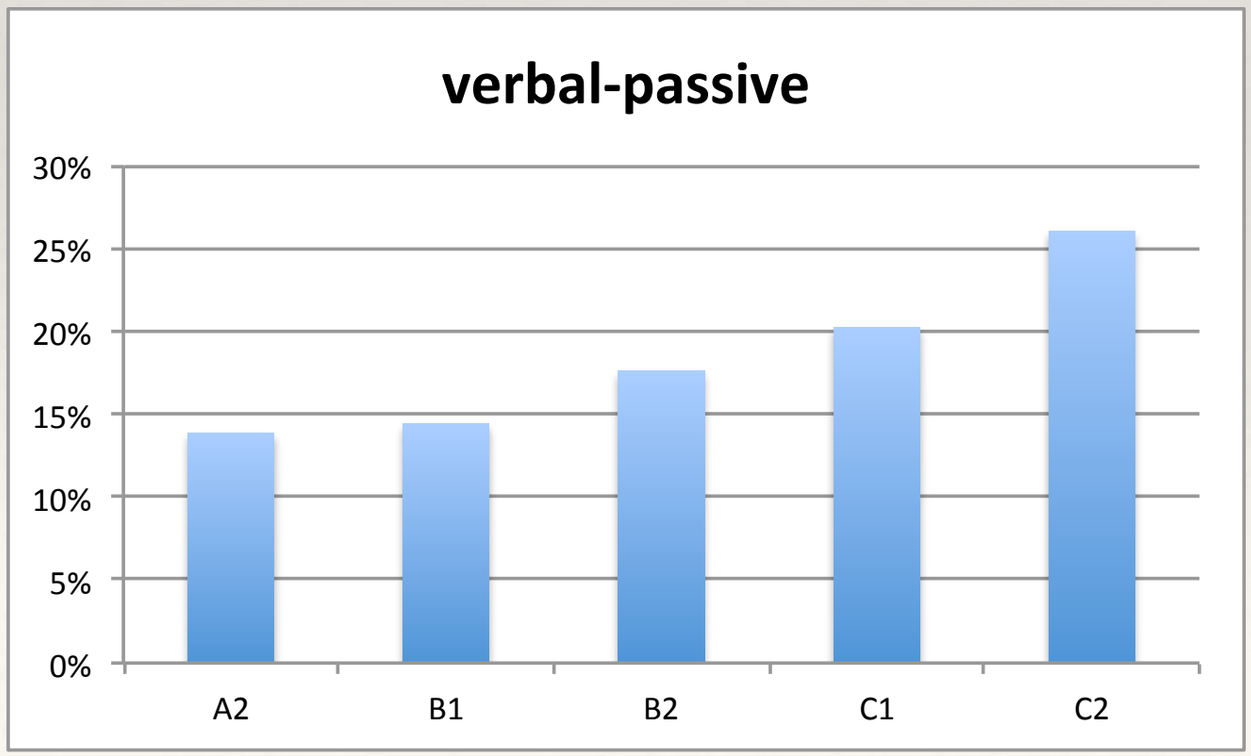
Transitivity

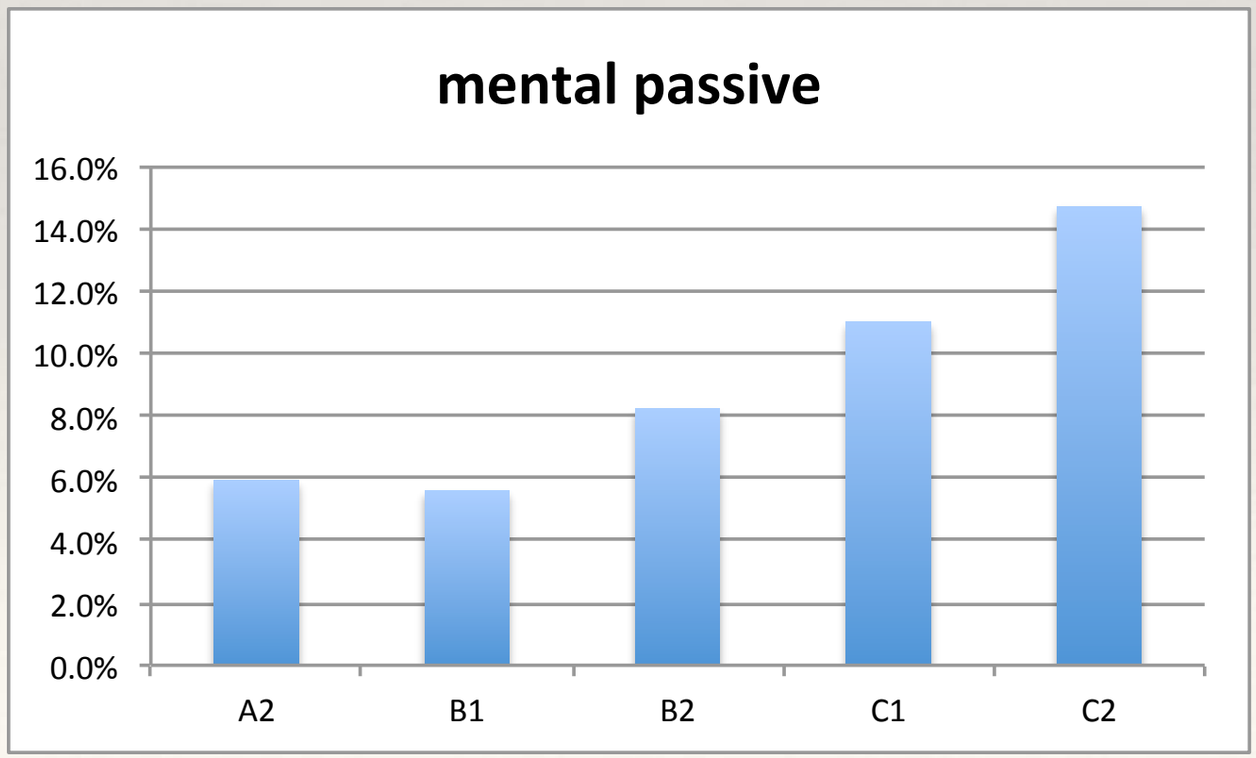
- **Recognition of semantic roles**
  - Actor, Process, Goal, Sensor, Phenomenon, etc.
- **Each clause assigned a process type**
  - material, mental, verbal, relational, existential
- **Key patterns recognised:**
  - **verbal-passive** (*it has been said that…*)
  - **mental-passive** (*it is believed that…*)
  - **Say-type vs. tell-type,**
  - **please-type vs. like-type**



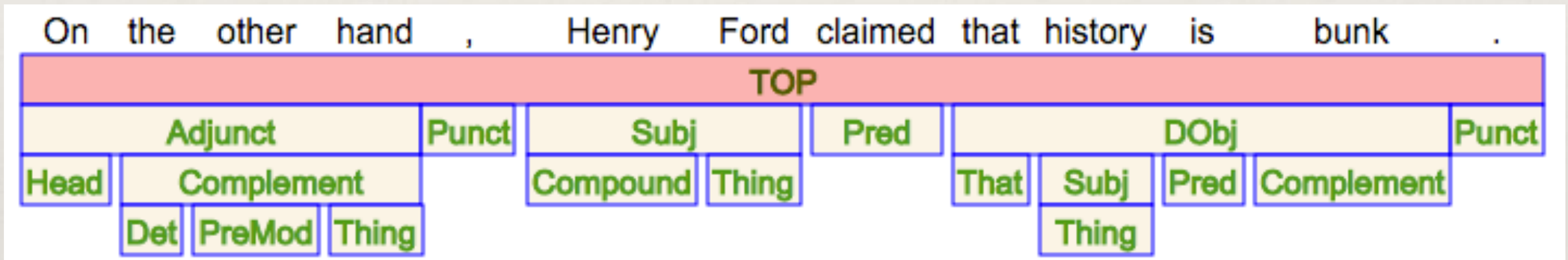
Transitivity

- Interesting result: student moving towards use of the impersonal passive for reporting claims:
  - *It is said that …. / It is believed that…*



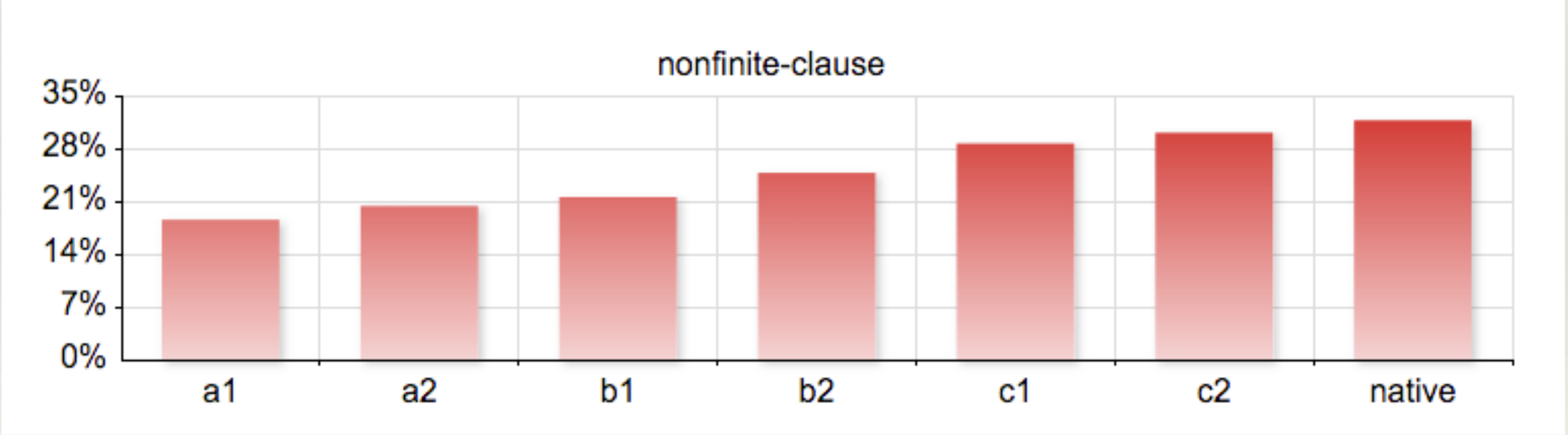


3.2 Mood


On the other hand , Henry Ford claimed that history is bunk .
TOP
Adjunct
Punct
Subj
Pred
DObj
Punct
Head
Complement
Compound
Thing
That
Subj
Pred
Complement
Det
PreMod
Thing
Thing

Studies in Mood

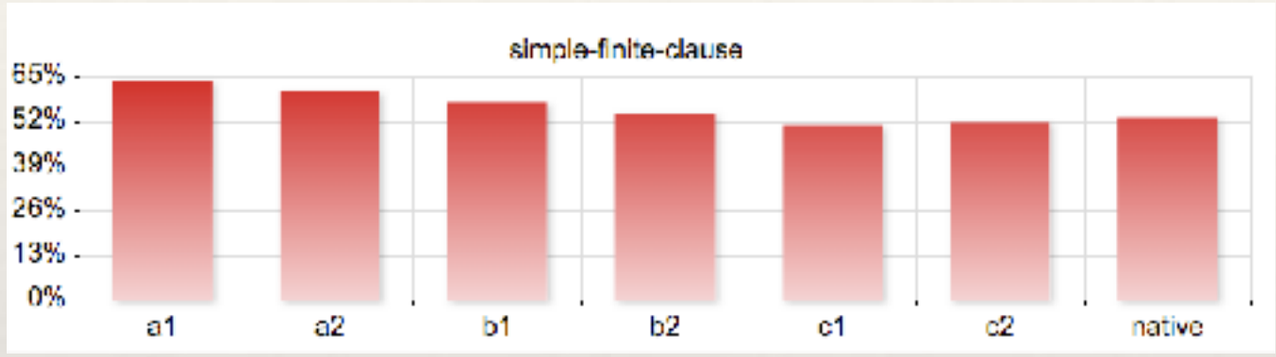
- Given corpus consists of essays, results for Grammatical Mood (declarative, interrogative, imperative) not too relevant (almost all finite-clauses are in declarative mood).
- Higher use of **finite** rather than **nonfinite** with increasing proficiency

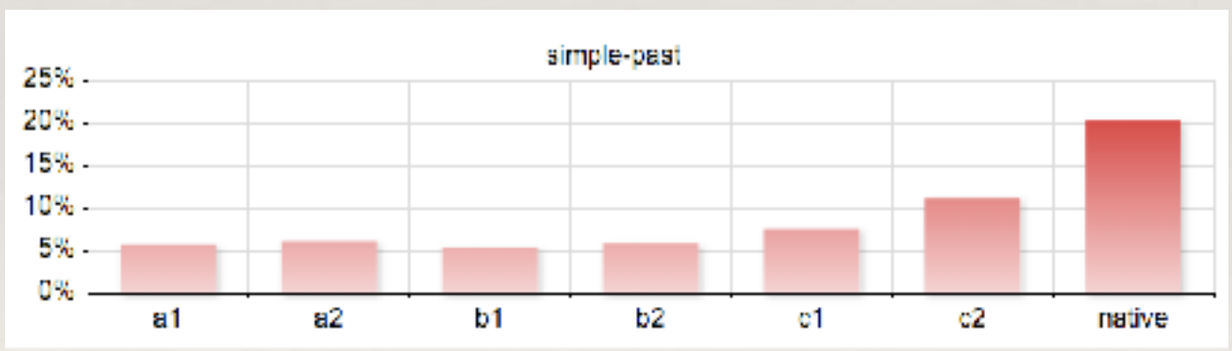


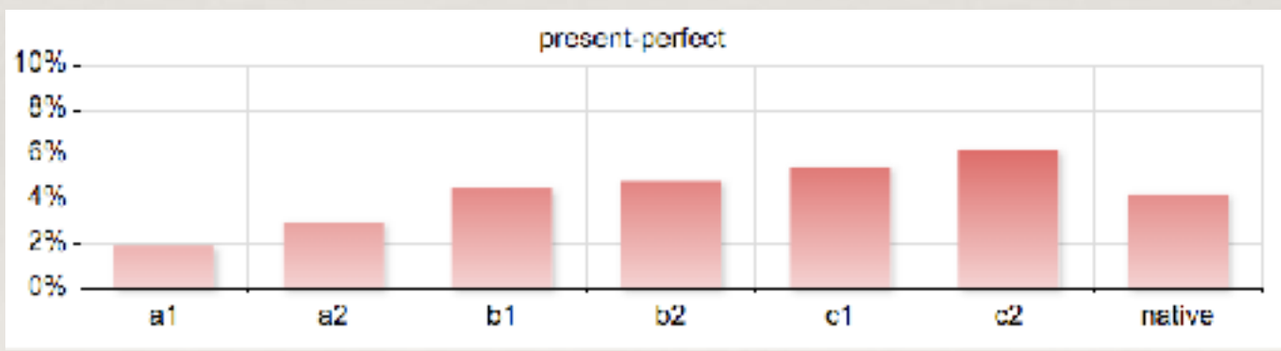
Studies in Tense-Aspect

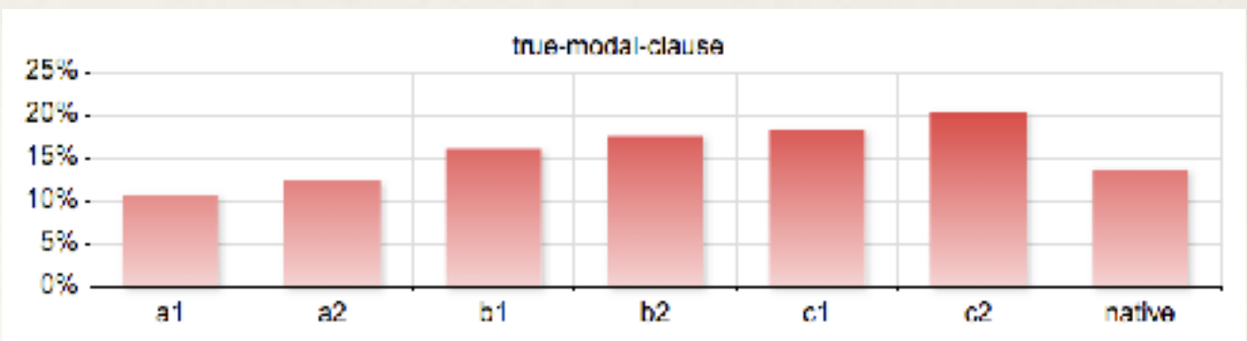
Tense-Aspect combinations

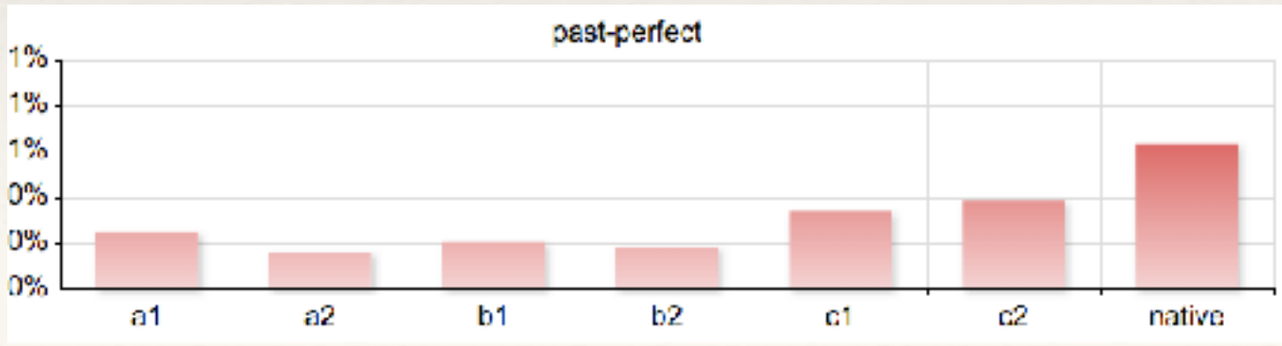
- Moving away from the simple-present towards other tense-aspect combinations:





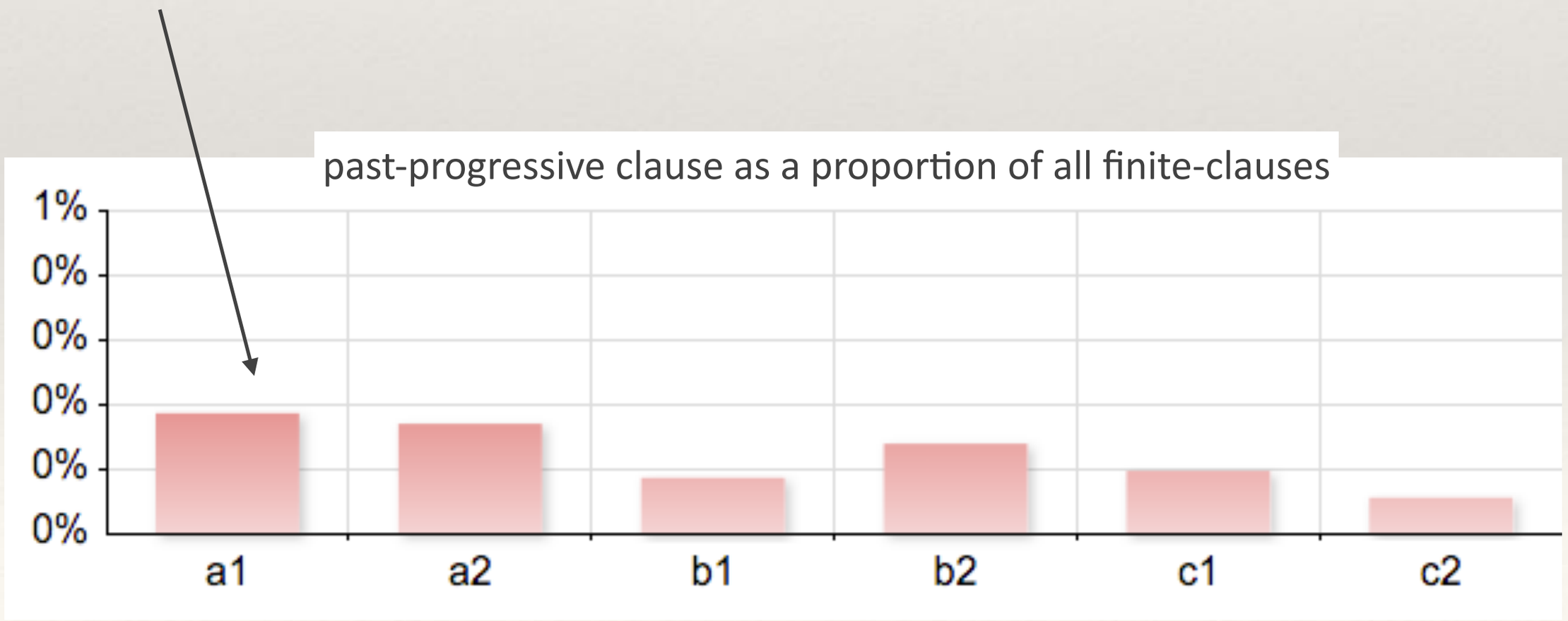




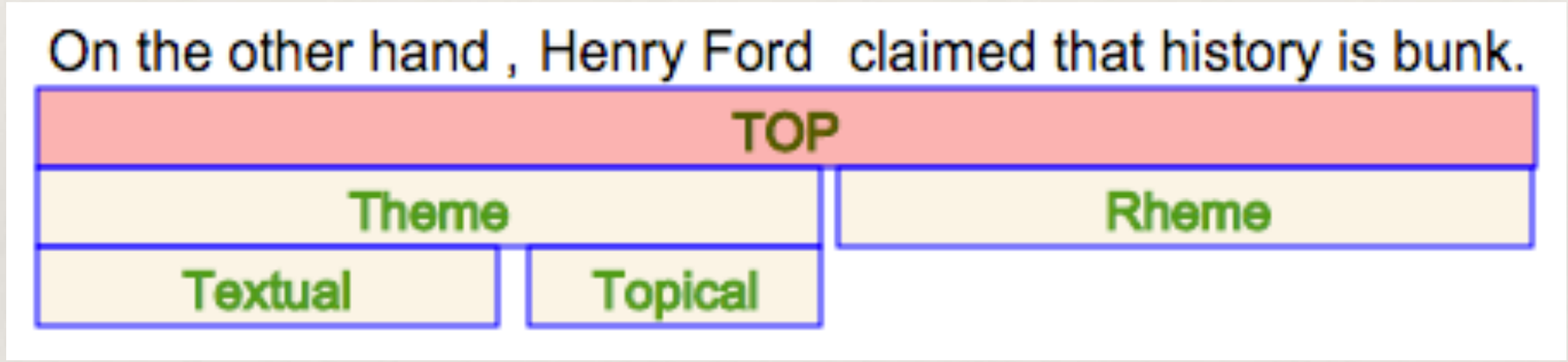


Studies in Tense-Aspect

- Alternative tense incorrectly transferred from L1:
  - Past-perfect tends to be more commonly used in mainland Spanish than in English.
  - New learners of English have to learn to use the simple-past instead in some contexts of use.



3. Theme


On the other hand , Henry Ford claimed that history is bunk.
TOP
Theme
Rheme
Textual
Topical

Theme-Rheme

- Recognition of Topical, Interpersonal and Textual Themes (Halliday)
  - **Textual**: relate clause to previous clauses (*thus, but*…)
  - **Interpersonal**: Speaker comment or provision of probability etc. (*Luckily, apparently*, etc.)
  - **Topical**: The first ideational item in the clause

3.3 Theme

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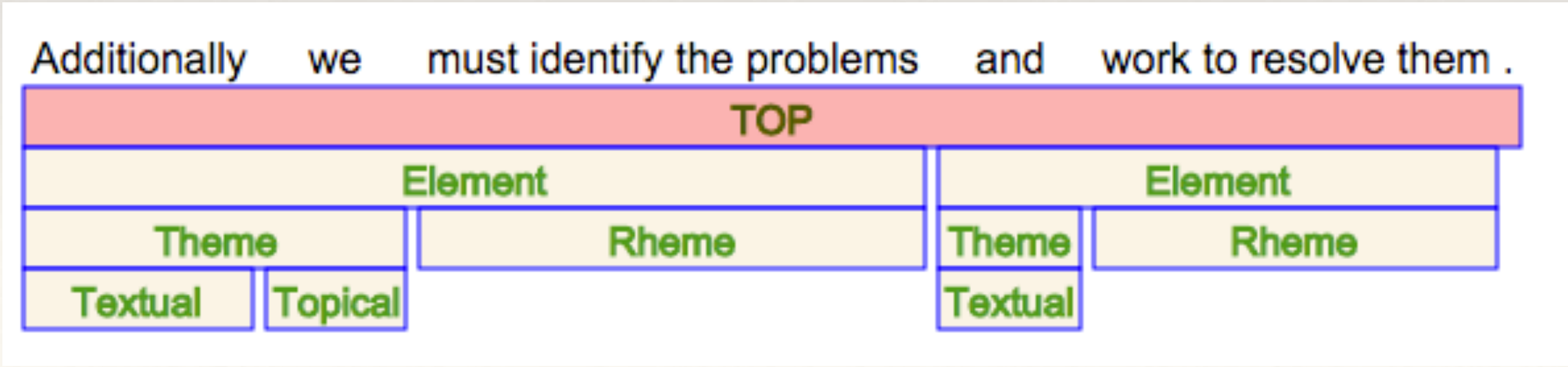
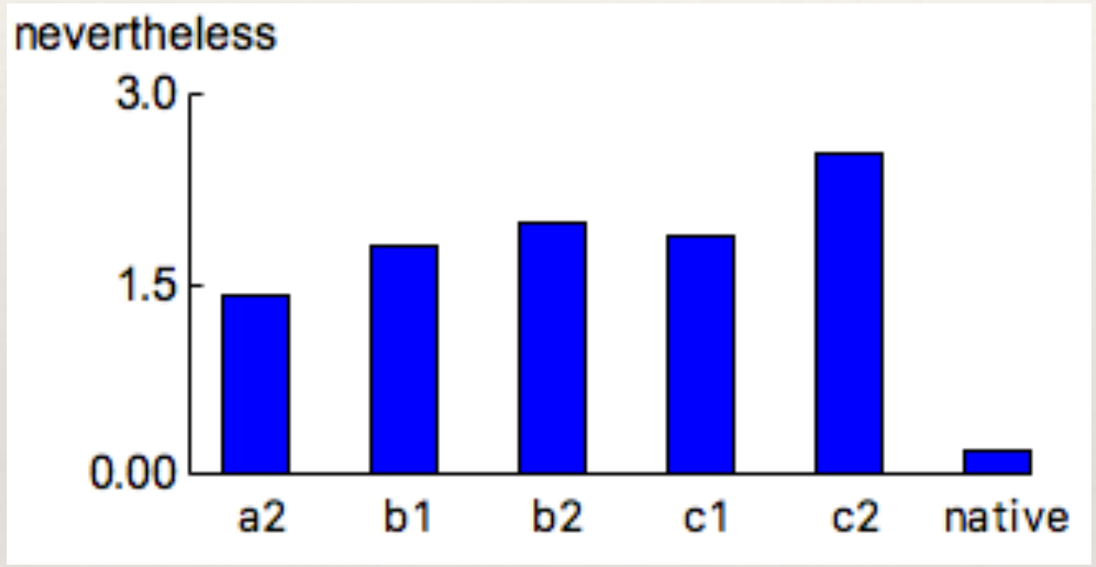


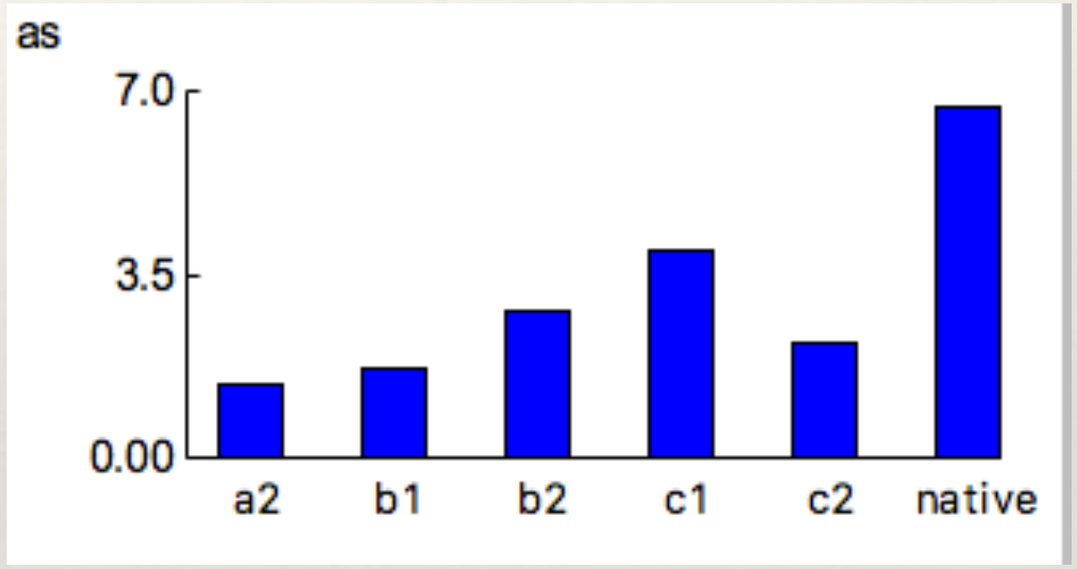
Theme-Rheme

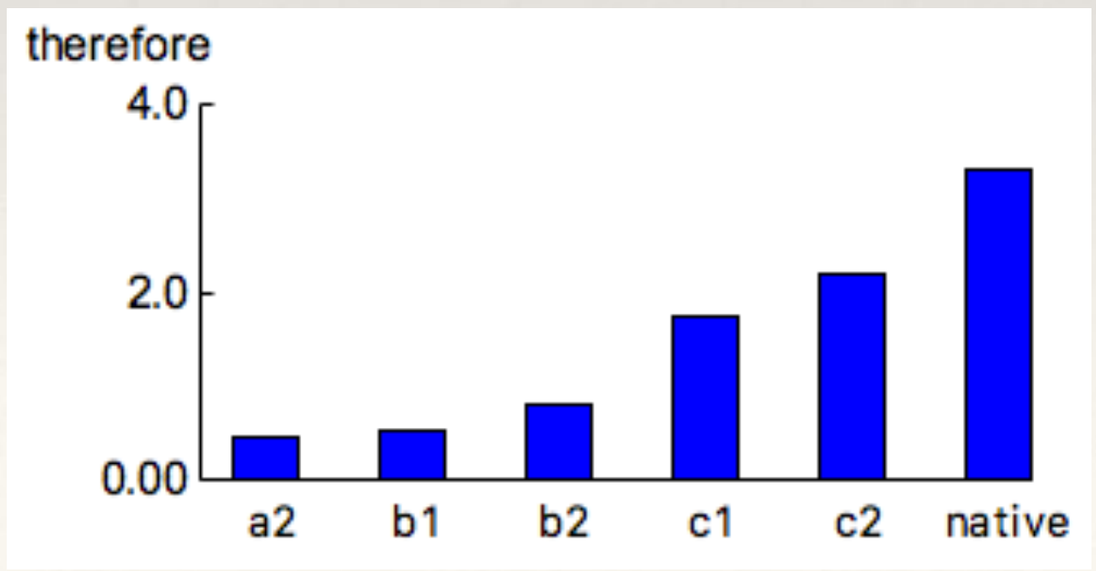
- Featurised in terms of:
  - **degree** of use of textual, interpersonal themes
  - **marked** topical themes: *fronted-adjunct, elided-theme, dummy-theme*, etc.
  - **textual** semantic types: *structuring* (*firstly*), *arguing* (thus), *extending* (and)
  - **interpersonal** semantic types: *evidence (probably), evaluation (happily), admission (honestly),* etc.

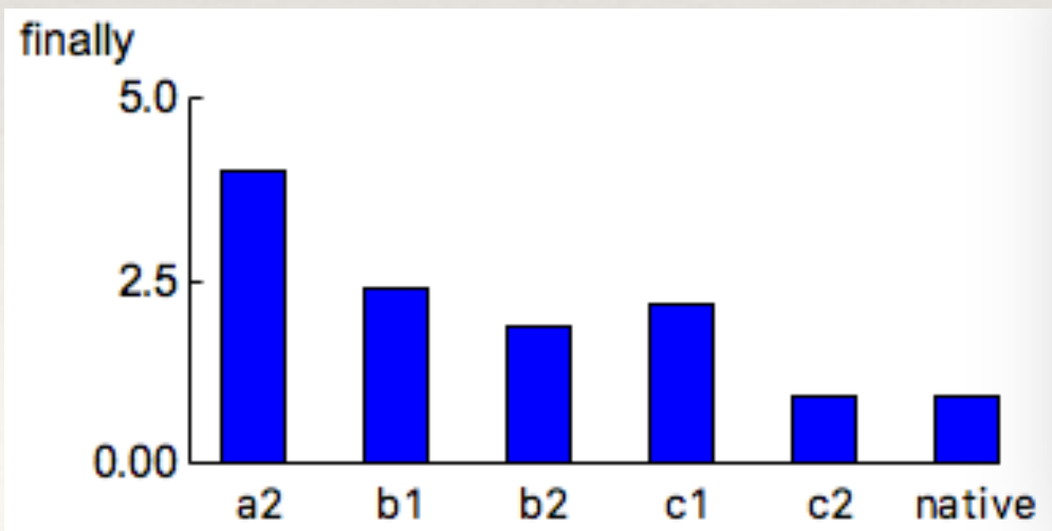
3.3 Theme

- Allows us to explore the changing use of textual themes with rising proficiency, and compared to natives



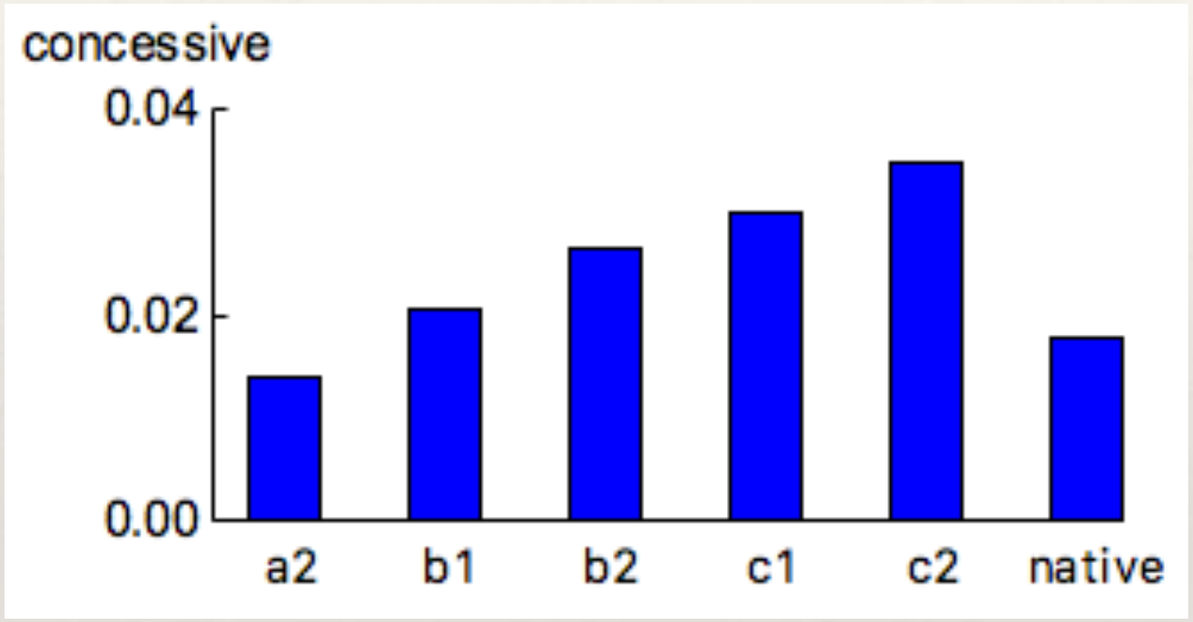


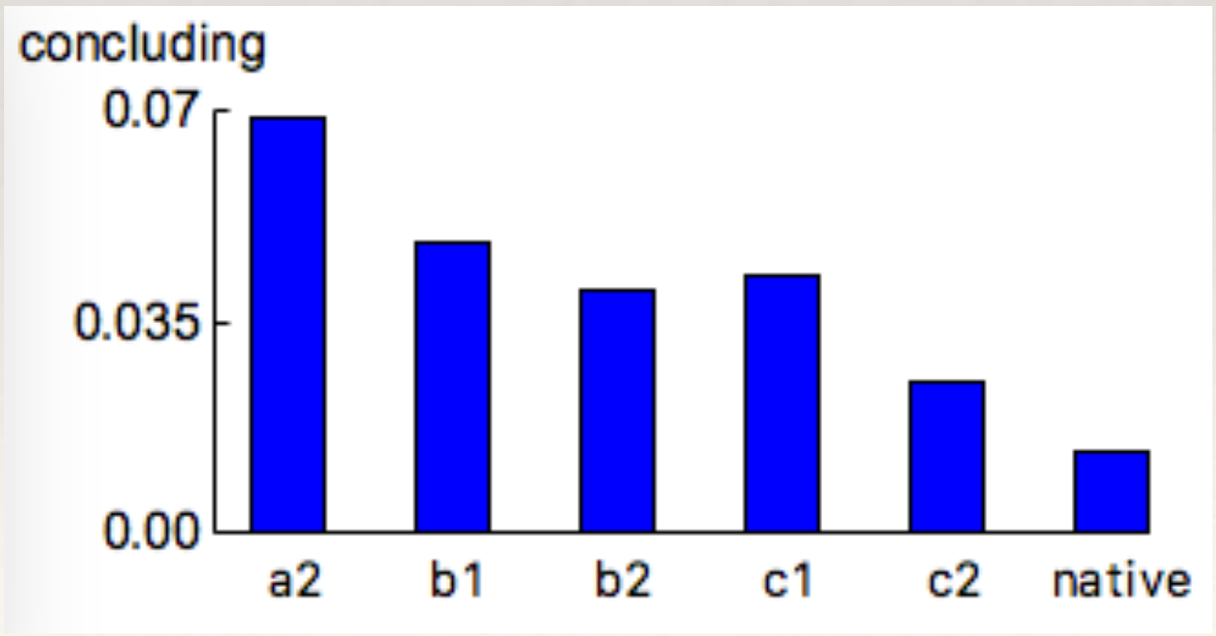




3.3 Theme

- Also in terms of semantic types of textual or interpersonal elements:





3.4 Modality

3.4 Modality

- A layer for automatic annotation of modality (semantics only tagged if unambiguous)

Although some people may think that this investment wouldn't be necessary or could be a waste of money bec
Modal-auxilliary Modal-auxilliary Adjectival-modality Modal-auxilliary

The car sharing is another solution tested in some cities all over the world.

Some people argue that this kind of transport is a nuisance because the driver surely will have to get up earlier than
Adverbial-modality Modal-auxilliary Semi-modal

However, in my view this method could possibly be a great solution for the traffic problems as car sharing implies that the car
Modal-auxilliary Adverbial-modality

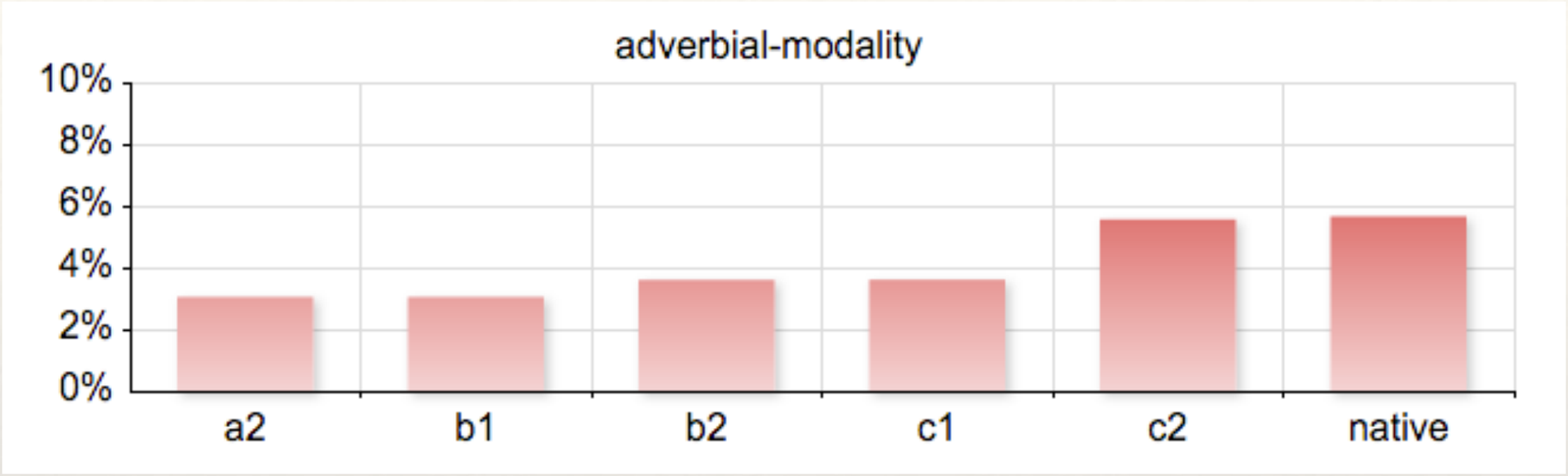
Moreover, the driver and the car can be changed frequently from time to time so nearly everyone will be the driver who ge
Modal-auxilliary Modal-auxilliary

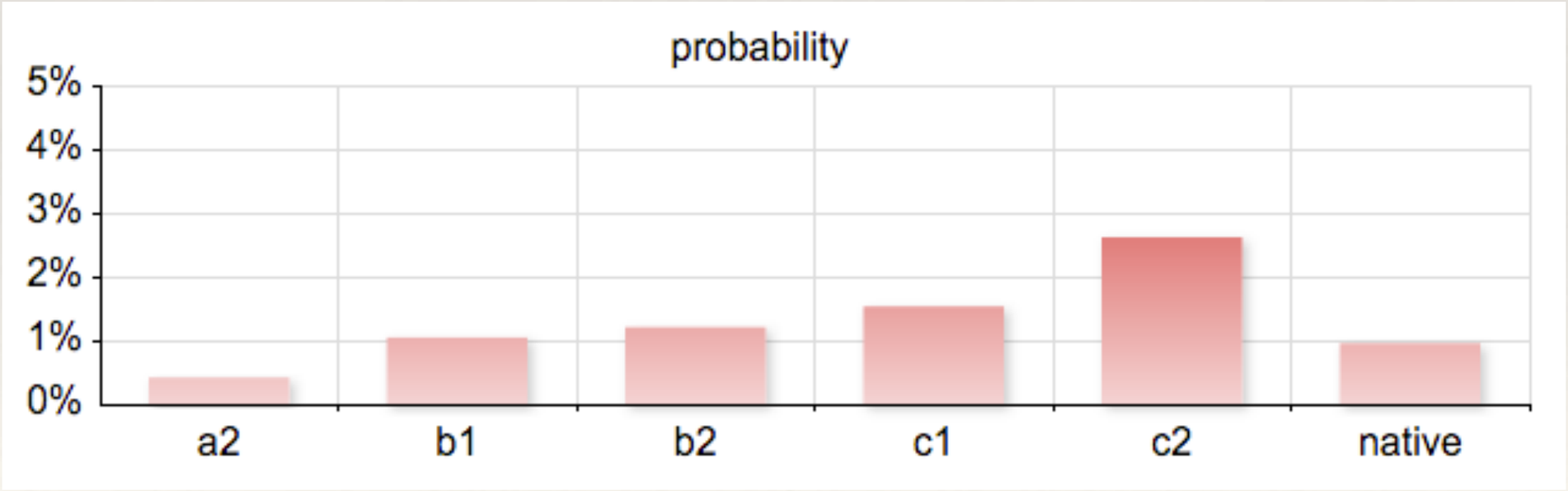
If we calculate in outline, we can easily find that driving four persons in a car means three less cars in the road with only one person i
Modal-auxilliary

To conclude, I have explained some possible solutions that I think could sort out the traffic problems in Madrid wich are to apply a cars
Modal-auxilliary

On the basis of this, I think that Madrid would be probably able to solve its traffic problem if solutions like these o
Modal-auxilliary Adverbial-modality Adjectival-modality

3.4 Modality


adverbial-modality
10%
8%
6%
4%
2%
0%
a2
b1
b2
c1
c2
native


probability
5%
4%
3%
2%
1%
0%
a2
b1
b2
c1
c2
native

Conclusions

- We are in the process of “mining” our learner corpus to provide us with a better understanding of how learners progress from novice language users to near native levels.
- The findings are being turned back onto our teaching materials, telling us WHAT to teach them and WHEN in their degree.

Conclusions (1): Error Analysis

- Very useful to identify critical language problems,
- But more refined analysis of the language concepts behind the errors is needed to tell us WHAT to teach.
- Costly in time, but worth it.

Conclusions (2): Online Quizzes

Use of online quizzes (sentence correctness tests)

- Used to derive relative order of acquisition of the features.
  - Examining only cases where the learner gets one concept right and the other wrong.
- Information used in the online learning system.

Conclusions (3): Automatic Parsing

- A range of automatic functional analyses are produced.
- These allow us to explore the development of the learner's language abilities as they progress in proficiency.
- Patterns are not always clear (e.g., moving away from a linguistic form as they learn alternative ways of making the same meaning).

Availability:

- UAM Corpustool: www.corpustool.com

- The Alegro project: alegro.org.es

- The Treacle project: www.uam.es/proyectosinv/treacle/

Other publications of the author:

- http://www.wagsoft.com/cgi-bin/MicksPublications.cgi?topic
- http://www.wagsoft.com/Presentations/