Building Learner English Proficiency Profiles using Automatic Syntactic Analysis

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Contents

1. The TREACLE Project

- Project: TREACLE

  Teaching
  Resource
  Extraction from an
  Annotated
  Corpus of
  Learner
  English

- A cooperation between Universidad Autonoma de Madrid and University Politecnica de Valencia (Penny McDonald, Keith Stuart, Maria Boquera)
- Funded by Ministerio de Ciencia e Innovación 2010-2012 (FFI2009-14436/FILO)

2. Goals of Project

- To produce a syntactically analyzed learner corpora of English, with error annotations.
- Use this corpus to produce profiles of each proficiency level (A1, A2, B1, etc.)
- Use these profiles to redesign the teaching curriculum: determining which grammatical features need to be taught, in what order, and with what degree of emphasis.
- Extract teaching examples and exercises from the corpus.
- Provide a web-based language learning system which dynamically adapts the materials and exercises presented to the student by reference to the students current performance and the proficiency profiles derived above.

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3. The Corpus

- The project involves two corpora:

  The **WriCLE** corpus (UAM) - Written Corpus of Learner English. 700 essays of ~1000 words each, written by Spanish learners of English at University level. Compiled by Paul Rollinson and Amaya Mendikoetxea.

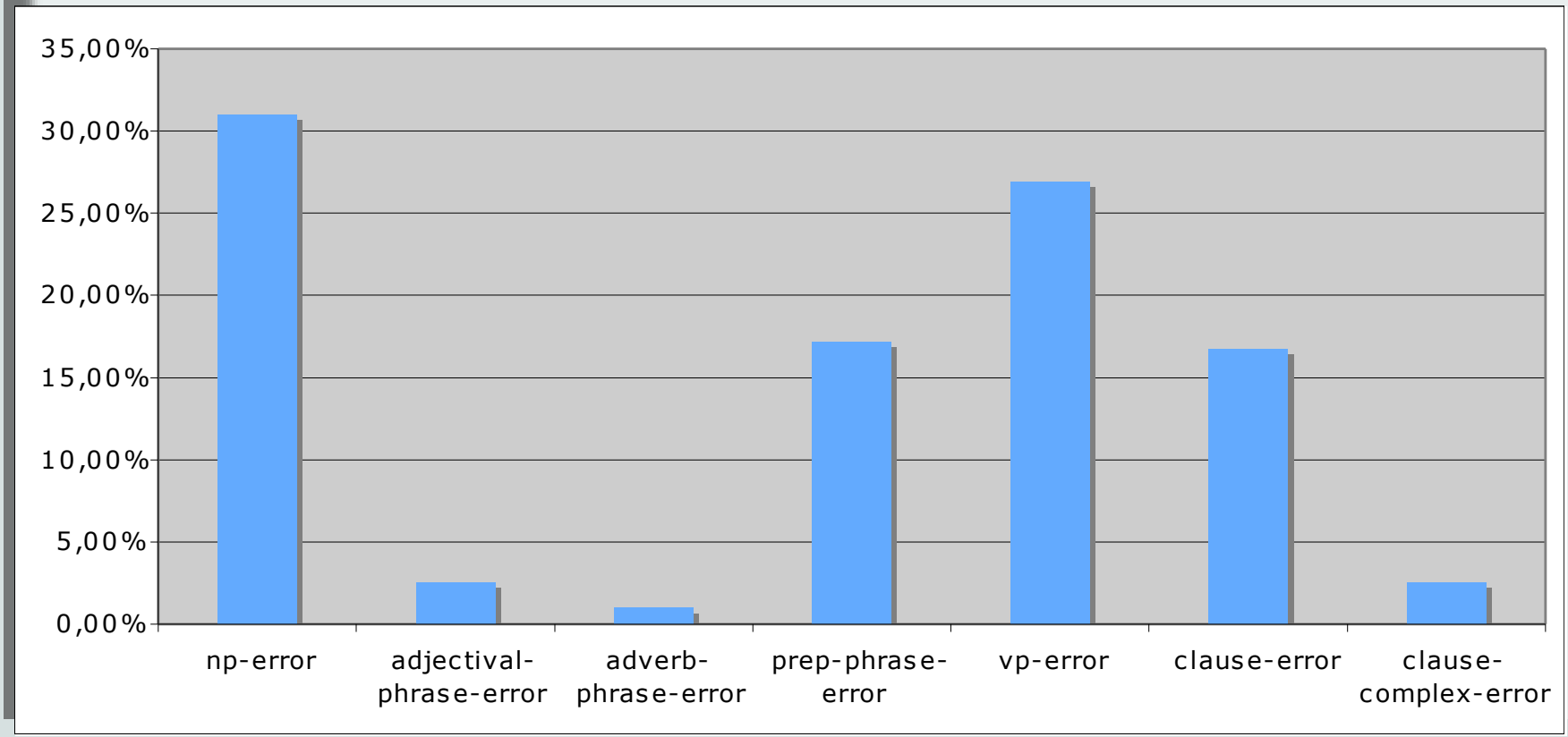
  The **UPV Learner Corpus** (UPV) containing 150,000 words of shorter texts by ESP students.

- Only the WriCLE corpus is involved in the study reported here.
- A 500,00 word subcorpus was used.

4. Automatic Analysis: motivation

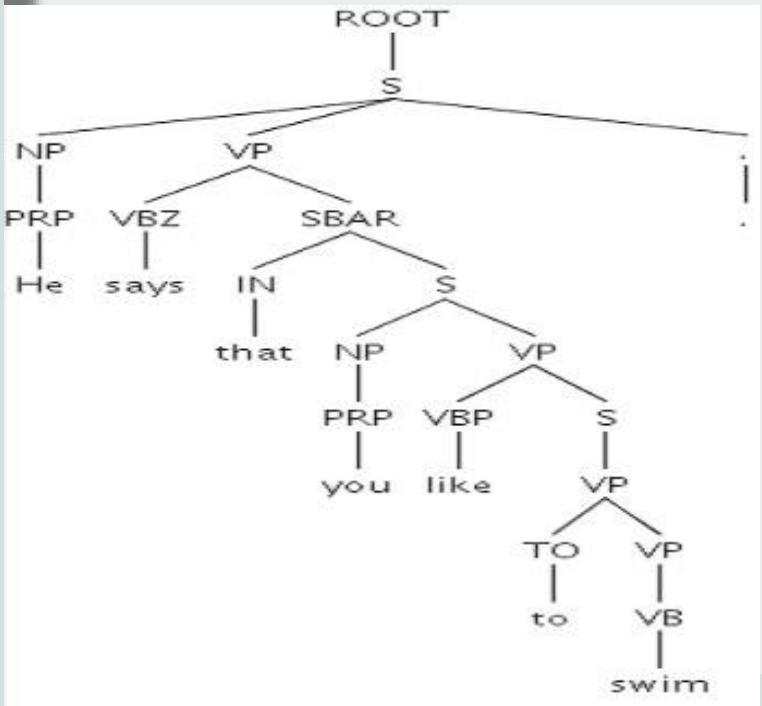
- Error analysis is one way to explore the grammatical competence of students at each level (e.g. Dagneaux et al 1998).
- However, some students make few errors, because they avoid structures they are not sure about
- More adventurous students take risks and thus make more errors.
- We thus take a two-pronged approach:
  - Automatic syntactic tagging of corpus to see what structures students are attempting;
  - Manual error analysis to see what they do wrong.
- Only both together give the full picture.

- By examining the types of errors made at each proficiency level, we can determine how much teaching time to spend on each area.



4. Automatic Analysis: Annotation Software

- The Stanford parser produces phrase structure trees
- For ESL research traditional grammar categories are more appropriate (Subj/Pred/Obj, active/passive, relative-clause, etc.)
- UAM CorpusTool thus transforms PSG trees into traditional grammar



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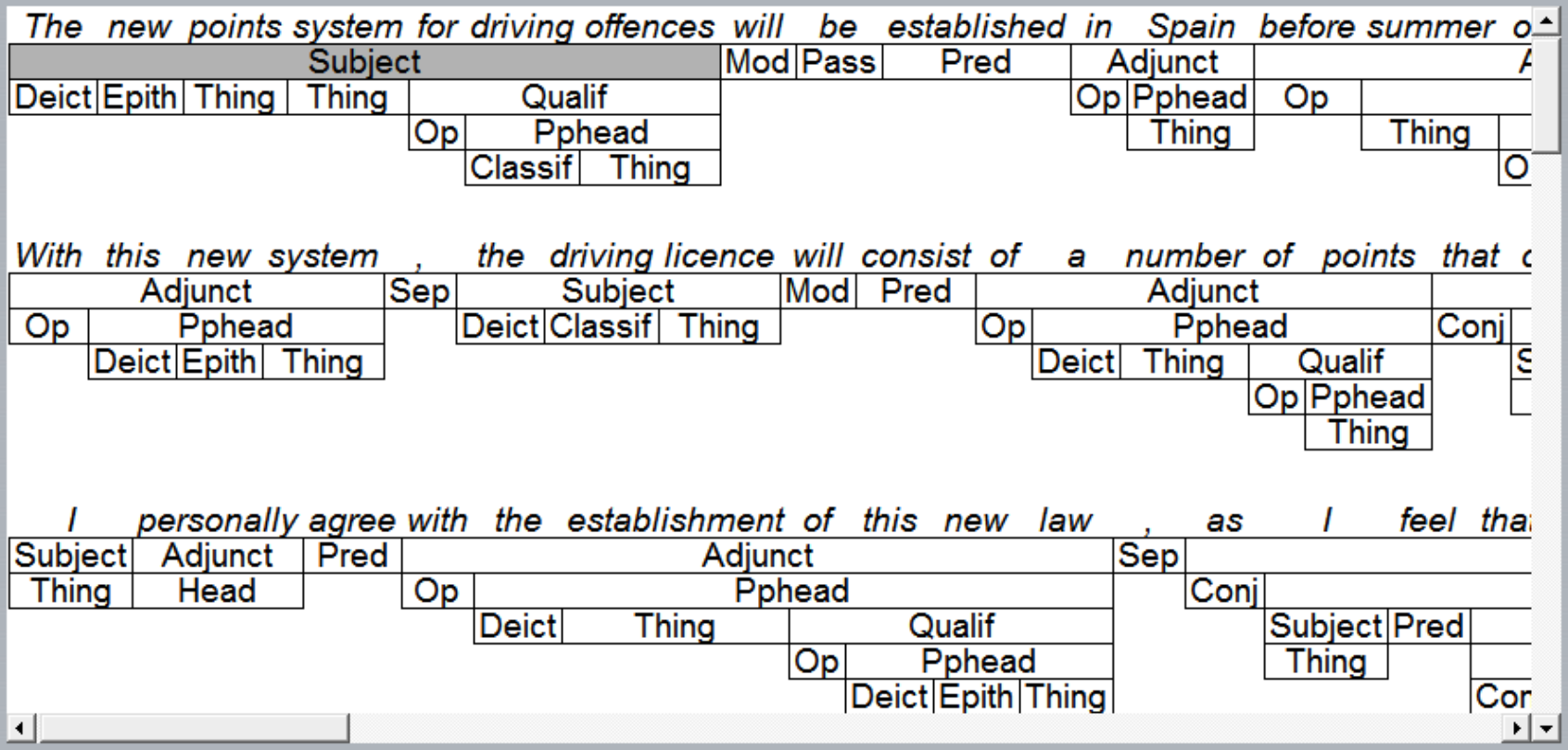
He	*says*	*that you like to swim*
Subj	Pred	Obj

Grammar analysis for: Files/A101-2.txt



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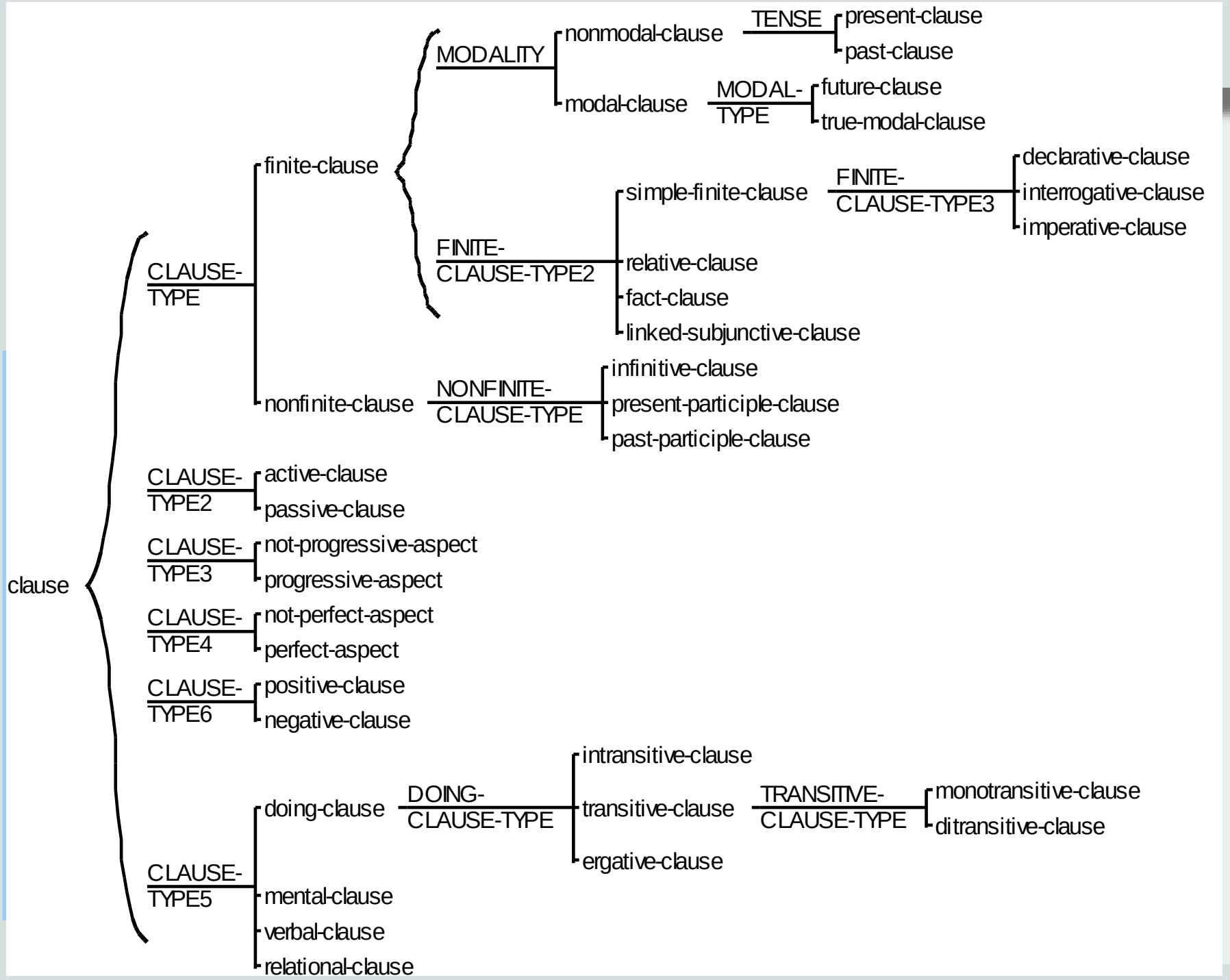
Assigned

grammatical-unit
group
np
common-phrase
singular-phrase
nonwh-noun-phrase

Gloss

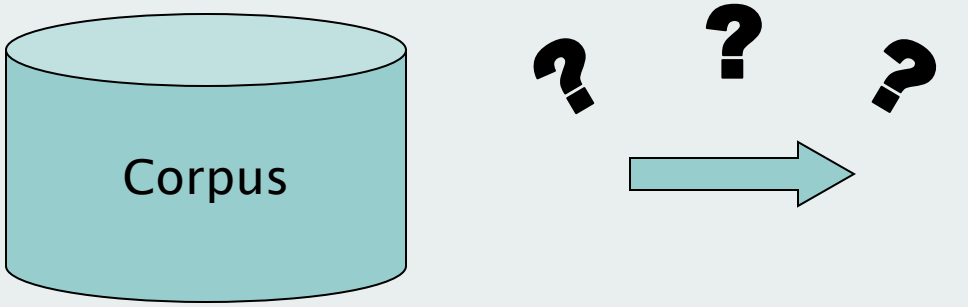
Comment:


clause
CLAUSE-TYPE
finite-clause
MODALITY
nonmodal-clause
TENSE
present-clause
past-clause
modal-clause
MODAL-TYPE
future-clause
true-modal-clause
FINITE-CLAUSE-TYPE2
simple-finite-clause
FINITE-CLAUSE-TYPE3
declarative-clause
interrogative-clause
imperative-clause
relative-clause
fact-clause
linked-subjunctive-clause
nonfinite-clause
NONFINITE-CLAUSE-TYPE
infinitive-clause
present-participle-clause
past-participle-clause
CLAUSE-TYPE2
active-clause
passive-clause
CLAUSE-TYPE3
not-progressive-aspect
progressive-aspect
CLAUSE-TYPE4
not-perfect-aspect
perfect-aspect
CLAUSE-TYPE6
positive-clause
negative-clause
CLAUSE-TYPE5
doing-clause
DOING-CLAUSE-TYPE
intransitive-clause
transitive-clause
TRANSITIVE-CLAUSE-TYPE
monotransitive-clause
ditransitive-clause
ergative-clause
mental-clause
verbal-clause
relational-clause

5. Extracting Profiles from the Corpus

- After the parsing process, we have a corpus of 500 texts, 500,000 words, 64,000 clauses, 92,000 NPs.
- Each clause provided with syntactic function and a range of syntactic features.
- So, what do we do with it?

How do we use it to inform us about what students need to learn and when?

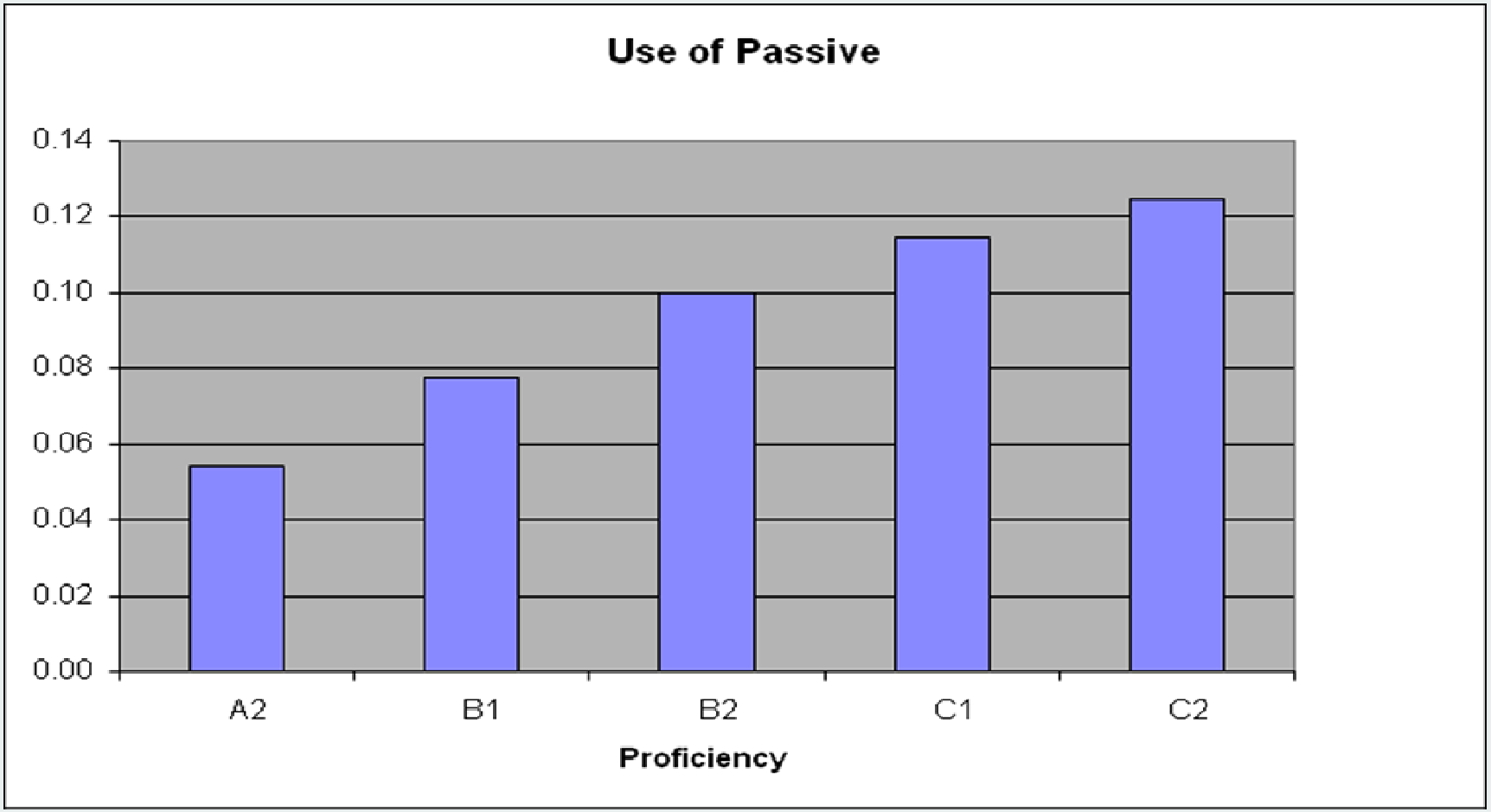


5. Extracting profiles (i): simple frequencies

- Some researchers contrast the learner's degree of usage of a syntactic feature with the degree of usage of natives
- Where students under-use the feature, more emphasis is needed in teaching.
- Over-usage also needs to be corrected (perhaps by teaching alternative lexico-grammatical strategies, or teaching appropriate contexts of use).

5. Extracting profiles (i): simple frequencies

Increased use of passive with proficiency



5. Extracting profiles (i): simple frequencies

Problems with under/over-usage comparisons:

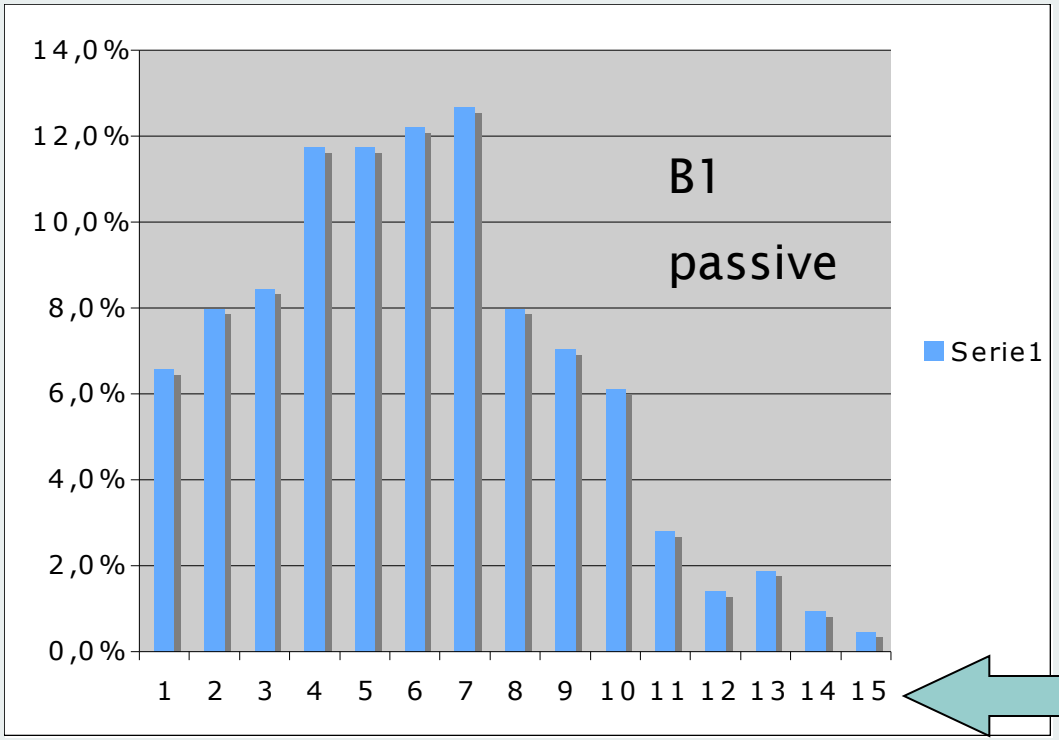
- **When dealing with individual students**: the degree of usage of many features is **register**-dependent, so we cannot really compare with native corpus unless we have a register-matched native corpus.
- **Treating all students in a proficiency band as homogenous**: if we say that average usage of passives at a particular level is 10%, that ignores the fact that some students will over-use passives, and others will not use them at all.

> Any teacher will tell you that the students within a proficiency band can have different strengths and weaknesses.
>
> Taking the average of non-homogenous students is like averaging apples and oranges!!

5. Extracting profiles (ii): Signatures

- Rather than averaging the students in a proficiency band, we could instead look at the distribution of students **within** the band.
- The distribution graph within each band shows us the levels of proficiencies **with this feature** at this proficiency level

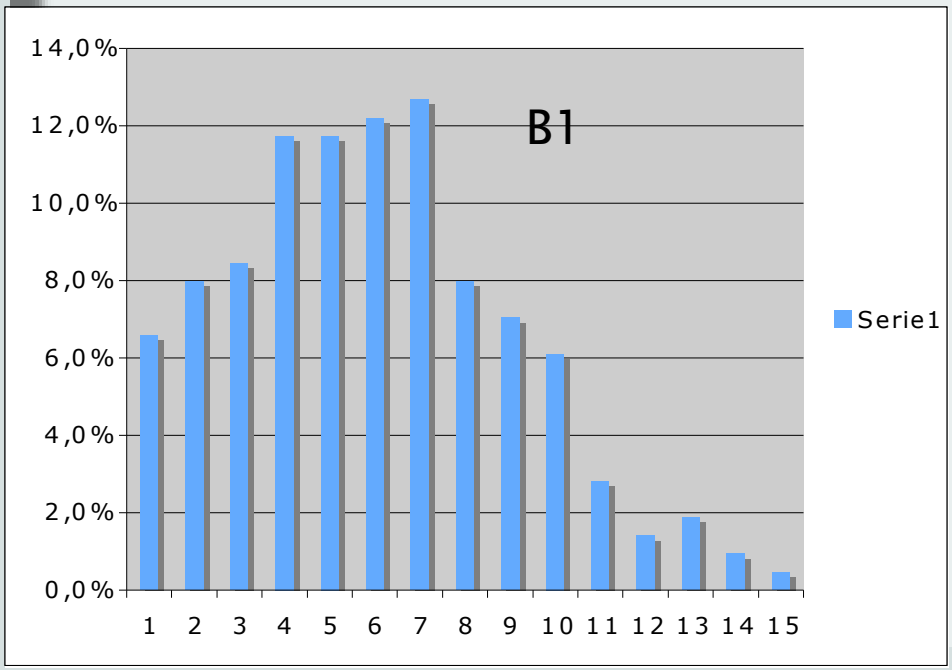
% of texts with this degree of usage

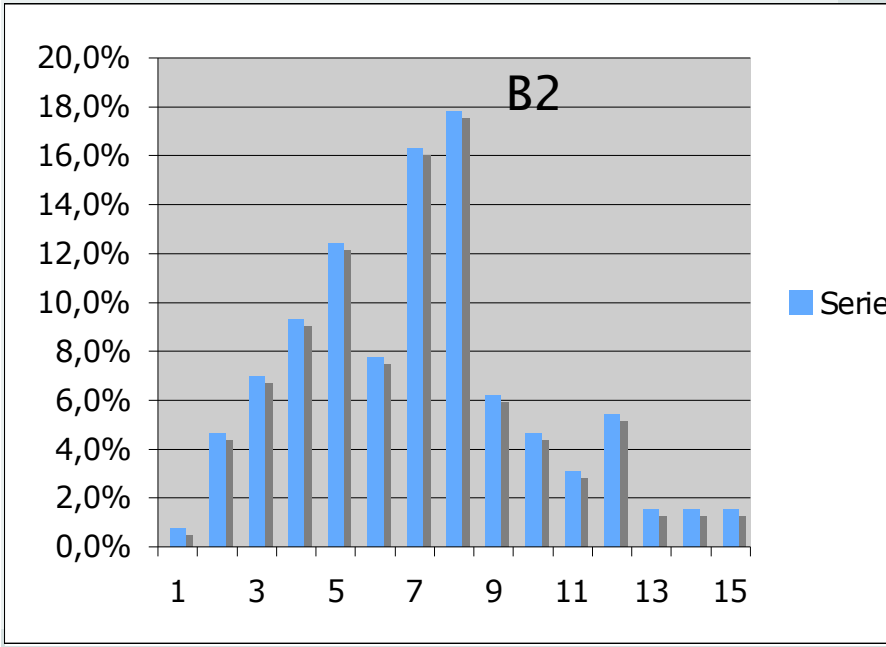


Degree of usage of passive (%)

5. Extracting profiles (ii): Signatures

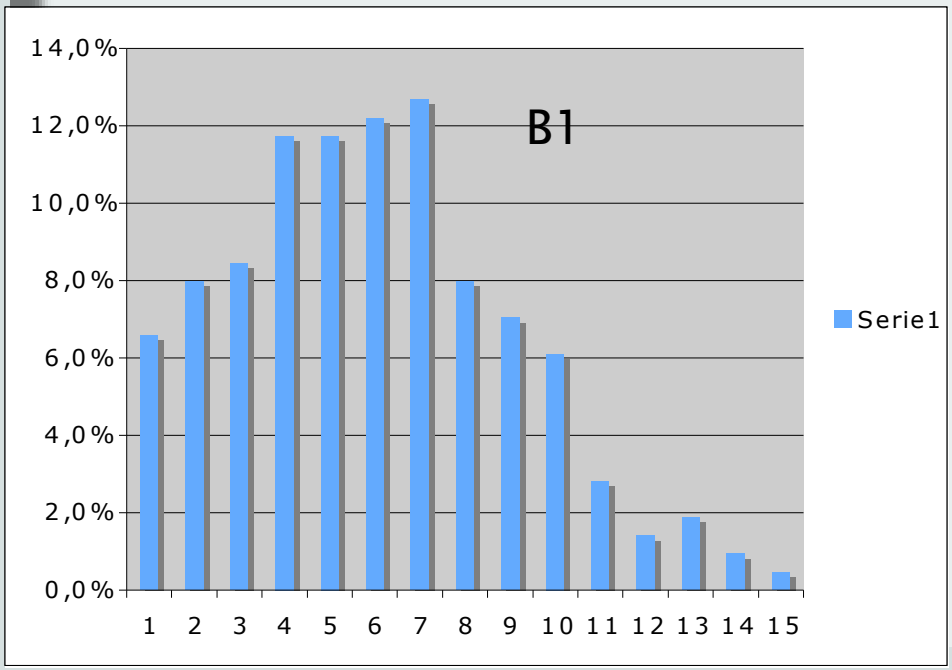
- Main thing the graph reveals to us is that:
  - Students at a given proficiency level do not perform the same in regards to a particular structure.
  - Different proficiency bands have different profiles for this feature, but lots of overlap
  - E.g. Use of passive:

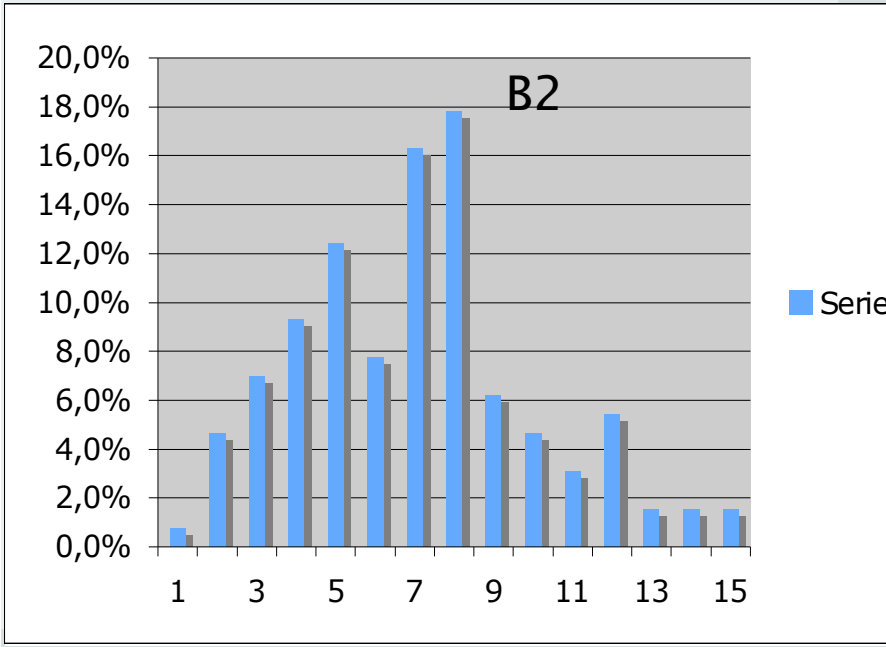




5. Extracting profiles (ii): Signatures

- But: these distribution graphs do not clearly tell us WHEN the teaching of a feature would be most valuable.

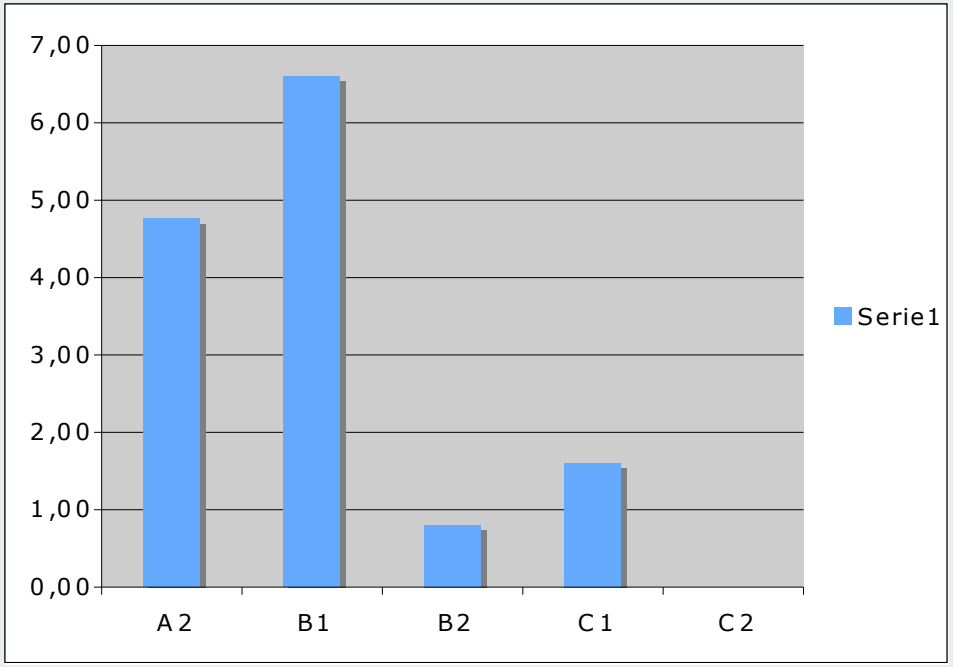




5. Extracting profiles (iii): Onset of Use

- Our belief is that a first concern should be with whether a leaner is capable of producing a structure at all.
- We thus look at each text individually, to see if the structure is present or not.
- We then measure the percentage of texts (~ no. of students) which use the feature **at all** (at each level)
- For this, a reasonably long text is needed (our texts are approx. 1000 words each).

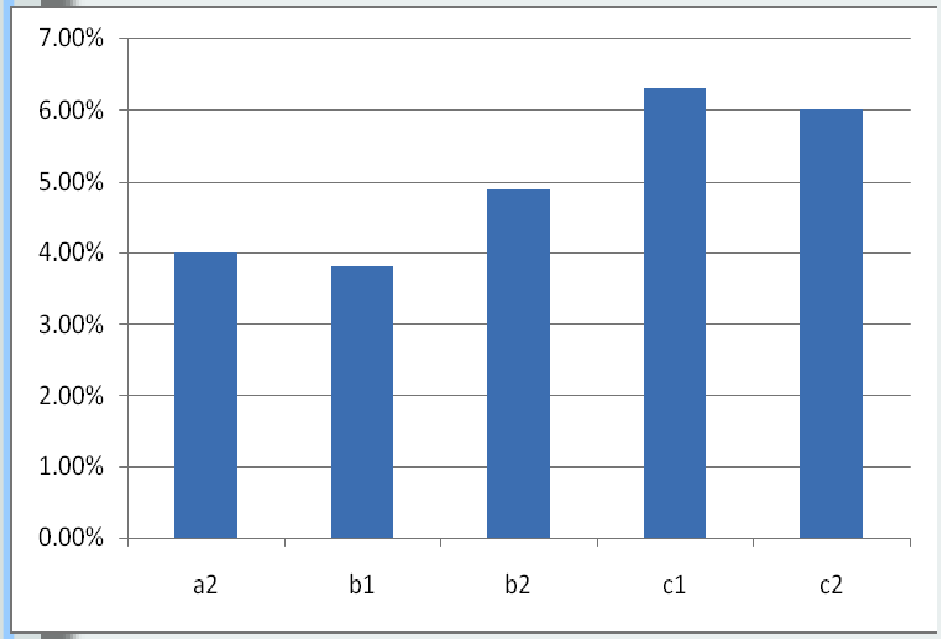
Texts which don't use passive (%)



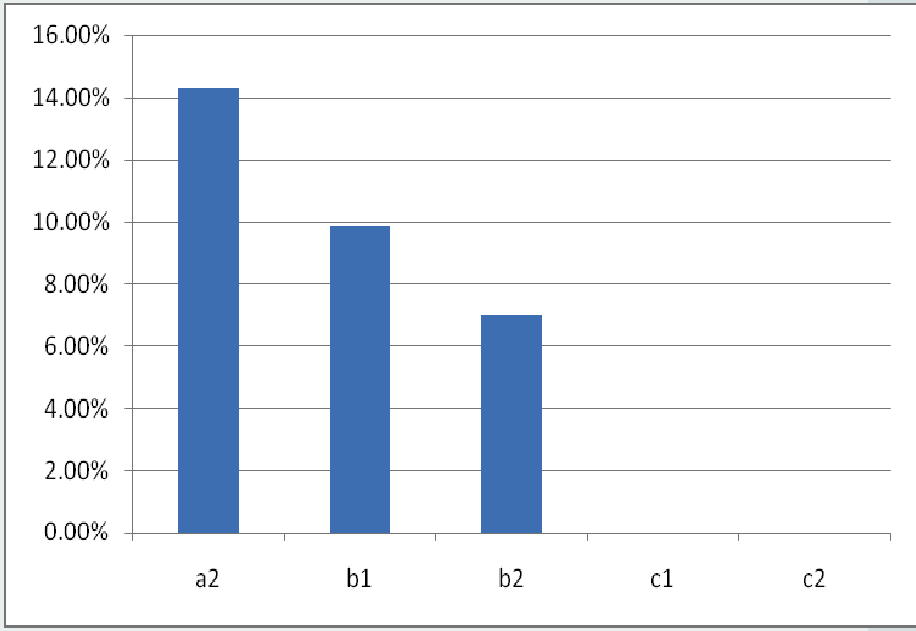
5. Extracting profiles (iii): Onset of Use

- Another Example: Use of Present-participle clauses:
  - *"He likes going to the zoo"*

Present participle clauses as % of all clauses

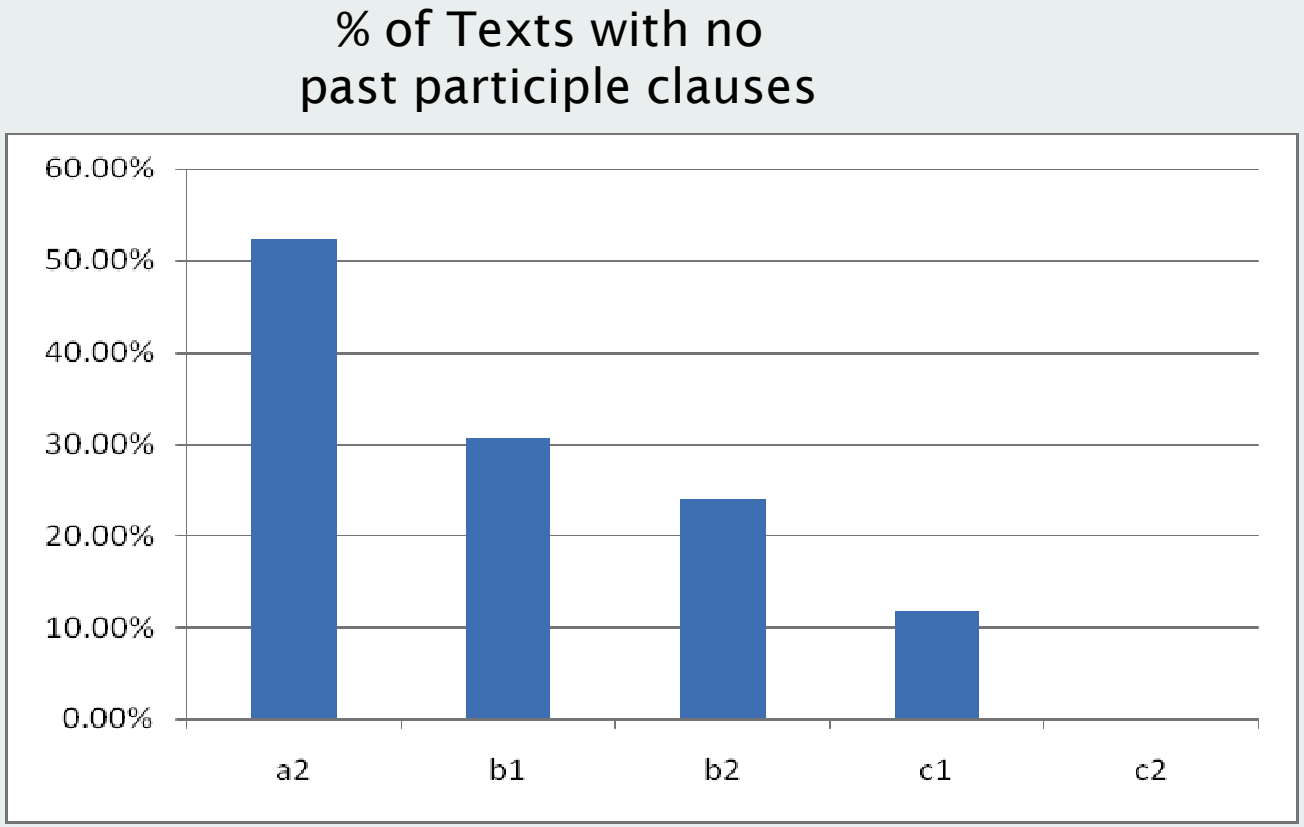


% of Texts with no present participle clauses



5. Extracting profiles (iii): Onset of Use

- Another Example: Use of Past-participle clauses:
  - *The man driven by hunger*
  - *Burnt by the sun, he marched on*



6. Conclusions for Curriculum design

- By analysing the degree of nonusage of each grammatical feature at each proficiency level, we can determine when the feature is most critical to the group as a whole
  - **When** the early adopters have started to use it
  - **Before** the cautious have started to use it
- Exactly where in this range a structure is best taught needs to be decided.
- Some flexibility good, to fit into a structured grammar teaching environment