When are grammatical structures best taught? Using learner corpora to discover the critical proficiency levels for each grammatical structure

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1. The TREACLE Project
2. Goal: proficiency profiling via automatic analysis
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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 exercises presented to the student by reference to the students current performance and the proficiency profiles derived above.
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2. Project Goals

• 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.
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. (Rollinson and Mendikoetxea 2008)
  
  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 500,000 word subcorpus was used.

- Oxford Quick Placement test given at same time to measure proficiency
4. Error Analysis

- Our error analysis still in an early phase (only 1800 errors coded, 28 texts)
- Currently we are performing a series of inter-coder reliability studies to refine the error scheme and coding criteria document.
- However, current results give us some indications…
4. Error Analysis

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

Contrasting 1st and 3rd year students
Within NP Errors

- Determiner errors most common (inserted-not-required, absent-but-required)
- All vocab choice errors which are not syntactically incorrect coded as lexical-selection-error
5. Syntactic Analysis

- The Stanford parser produces phrase structure trees (Klein and Manning 2003)
- 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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<table>
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<th>He</th>
<th>says</th>
<th>that you like to swim</th>
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</thead>
<tbody>
<tr>
<td>Subj</td>
<td>Pred</td>
<td>Obj</td>
</tr>
</tbody>
</table>
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He says that you like to swim
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The new points system for driving offences will be established in Spain before summer.

With this new system, the driving licence will consist of a number of points that can be deducted.

I personally agree with the establishment of this new law, as I feel that...
6. Extracting Profiles from the Corpus

- After the parsing process, we have a corpus of 500 texts, 500,000 words, 66,000 clauses, 120,000 NPs.
- Each clause provided with syntactic function and a range of syntactic features.
- So, what do we do with it?

How do we use the corpus to inform us about what students need to learn and when?
6. 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).
6. Extracting profiles (i): simple frequencies

*Increased use of passive with proficiency*
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!!
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.
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:

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</tbody>
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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).
5. Extracting profiles (iii): Onset of Use

- Another Example: Use of Present-participle clauses:
  - “He likes going to the zoo”

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Present participle clauses as % of all clauses

% of Texts with no present participle clauses
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.
6. Limitations

• Measuring “onset of use” of a feature requires a reasonable length of text per student.

• We have approx. 1000 words per essay.

• Fine for structures with native use in over 3% of clauses.

• For rarer structures (e.g., clefting), longer texts (or multiple texts by same student) needed to place critical proficiency level
6. Limitations

- We can determine at which proficiency level particular grammatical structures can most valuably be taught.
- But students in a class will be of mixed proficiency levels.
- Partial answers:
  - Curriculum designers can assume a particular target level for each class (e.g., assumed B1 level at university entrance)
  - Individual students provided with a sheet indicating their personal weaknesses, and where to find study resources on these issues.
  - Online teaching systems can target specific needs of each students based on their proficiency level.