



## COMPOST

Identification of indicators for **competence**  
assessment **of students'** essays:

**How do Textual Indicators Evolve?**

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## ↗ I Introduction

↗ Purpose, aims and examples

## ↗ II Data

## ↗ III Methodology

## ↗ IV Results and implications

## ↗ V Work in Progress

## ↗ VI Future Work

## ↗ VII Conclusion

## ↗ Aim:

- ↗ find (new/interesting) indicators for language quality in essays
- ↗ Measure how the indicators evolve over time

### ↗ Purpose:

↗ Identify pupils with special needs in language training

### ↗ Side effects

↗ Data for developing or improving competence models

- Essay corpus – collected during the longitudinal study KESS (Kompetenzen und Einstellungen von Schülerinnen und Schülern – competences and attitudes of pupils)
- Programme for student assessment KESS: complete survey of a year of pupils in Hamburg
- Grades 4, 7, 8, 10 (and 12) in years 2003, 2006, 2007, 2009 (and 2011).

## II Data – Compost Essay Corpus - Overview

<b>Essays N available</b>	<b>digitalised [1] N</b>	<b>rated [2]</b>	<b>Test results for validation</b>
KESS4 – 2003 (1 topic)	839	ca. 8000	KFT
KESS7 – 2006 (2 topics)	126 (of appr. 1500)	63 and 63	Reading comprehension
KESS8 - 2007 (13 topics)	1705	1705	C-test, grammar, vocabulary, spelling, reading comprehension
KESS10 - 2009 (6 topics)	1189	Not yet rated, 1189	C-test, spelling, reading comprehension

### Der geheimnisvolle Koffer



Die  
Kinder  
haben  
einen  
Koffer  
gefunden.

- Example: task from grade 4
- Texts are digitized (typed manually)
- Interpretation begins when texts are digitalised
- That is decisions at this point affect results

Wie geht die Geschichte weiter?

Der Koffer war mit Kleidung gepackt, jemand  
musste ihn unterwegs verloren haben. Die Kinder  
suchten nach einem Postmann oder einer Karte,  
damit sie herausfinden, wem der Koffer gehört  
aber sie haben nichts gefunden. Sie gingen durch  
die Stadt um den zu finden, wem der Koffer  
gehört. Endlich kamen sie am letzten Haus in  
der Stadt an. Sie klopfen an die Tür. Die Tür  
ging auf. Im Haus war es unheimlich.  
Überall in den Ecken waren Finnenetze.  
Da kam ein Mann vom Dachboden und sagte:  
„Wo ist mein Koffer!“ „Hier ist der Koffer“,  
sagten die Kinder im Chor. Der Mann wurde  
wütend und seine Augen wurden rot wie eine  
Feuer-Lampe. „Ihr habt meinen Koffer gestohlen.“  
„Kein wir haben ihn gefunden“, sagten die Kinder.  
„Oh“, sagte der Mann und beruhigte sich. Der Koffer

### ↗ Annotation

↗ Operationalise features that shall be determined

↗ automatic annotation

↗ Operationalisation which can be applied automatically. How can features be identified?

↗ Check quality of annotations

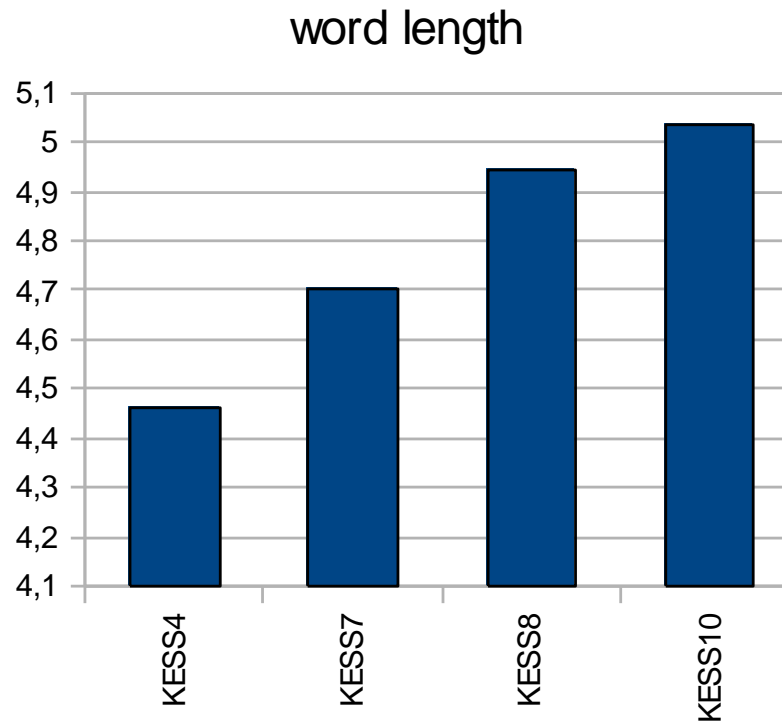
↗ Determine frequencies



### III Methodology: Annotation is interpretation

- ↗ Only what is annotated can be counted
- ↗ Interpretation is continued
- ↗ Errors can be inserted during annotation

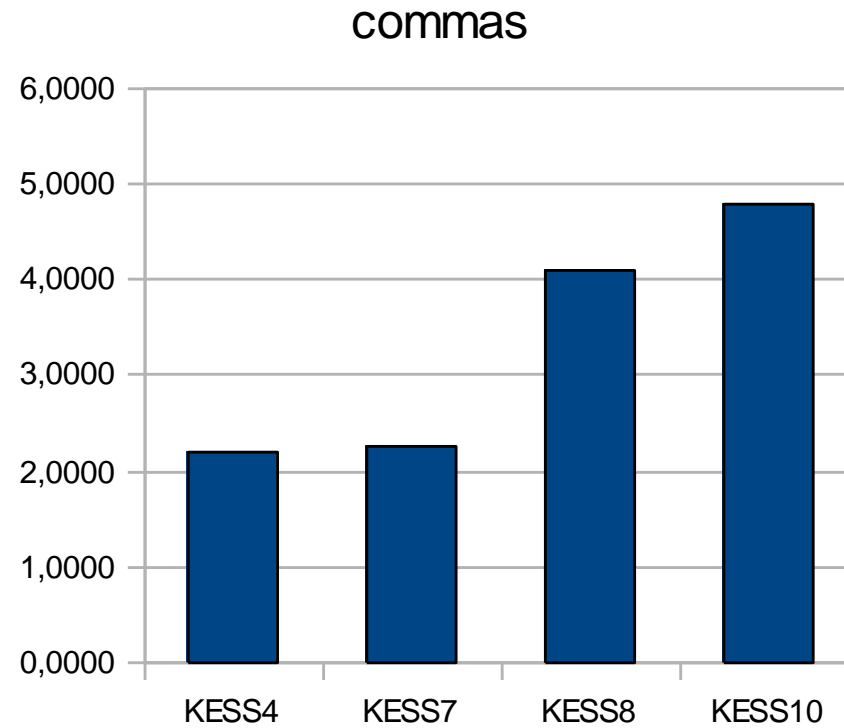
## IV Results: Word length



x: grade

y: letters per word

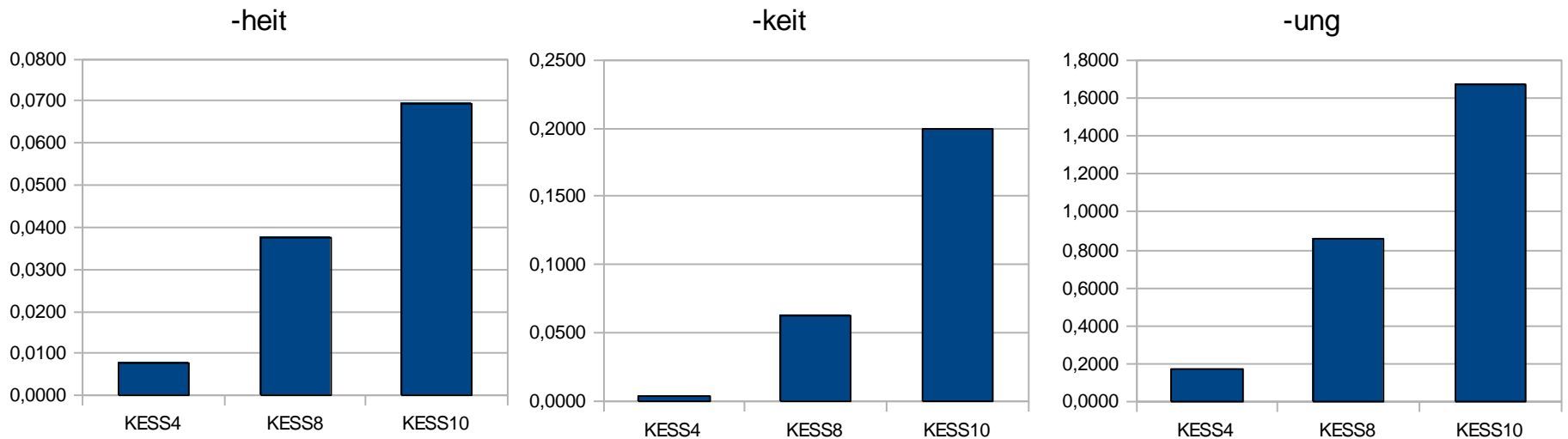
## IV Results: Commas



x: grade

y: commas per 100 words

# IV Results: -heit, -keit, -ung



x: grade

y: -heit, -keit, -ung per 100 words

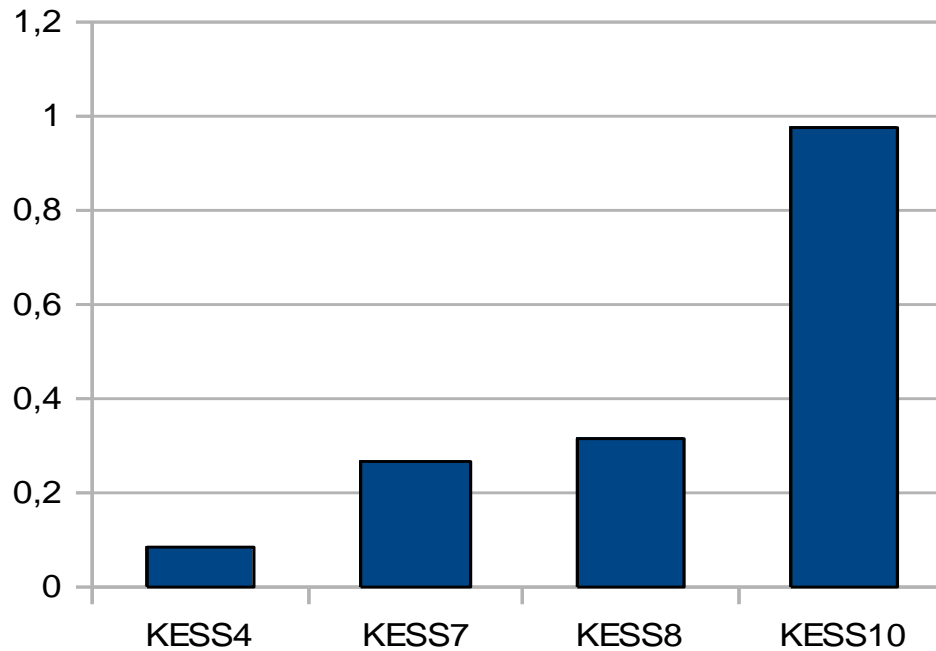
- ↗ Word length is one of the most reliable features
- ↗ Certain suffixes show an evolvment, but not all

- ↗ Good starting point
  - ↗ But, from there we want to go further
- ↗ Word length is a number, cannot be interpreted in terms of content/structure
- ↗ An approach that is motivated more by a linguistic point of view
  - ↗ Analysis of suffixes, problem: choice and data sparseness
- ↗ Combine both → look at structure of words and how that develops over time

- ↗ Skim through tokens with high word length
  - ↗ Look at morphological structure, complexity
- ↗ For simplicity we assume
  - ↗ Prefix, Suffix, Lexemes, Flexives
- ↗ We want to look at combinations
  - ↗ E. g. Prefix + Lexeme + Suffix
  - ↗ Case study with prefix + lexeme + -ung
    - ↗ High number of occurrences
    - ↗ Example: <Auf><frisch><ung>

# V Work in Progress: Preliminary Results

<prefix><lexeme+|prefix\*|suffix\*><ung>



x: grade

y: forms per 100 words



↗ 216 –ung

↗ 109 <prefix><lexeme+|prefix\*|suffix\*><ung>

↗ <Ver><mut><ung>

↗ <ent><vern><ung>

↗ <An><leit><ung>

↗ 1511 -ung

↗ 569 <prefix><lexeme+|prefix\*|suffix\*><ung>

↗ <An><leit><ung>, <ver><spät><ung>,  
<Ver><pflicht><ung>

↗ <Vor><wahrn><ung>, <er><kältt><ung>

↗ <Um><satzsteiger><ung>

↗ False positives: <Er><derwärm><ung>

↗ 902 -ung

↗ 457 <prefix><lexeme+|prefix\*|suffix\*><ung>

↗ <Ab><mahn><ung>, <Ver><zweifel><ung>

↗ Type/token ratio –ung bzw.  
<prefix><lexeme+|prefix\*|suffix\*><ung>

- ↗ Focus: How do word structures of students develop?
- ↗ Prefix chains
  - ↗ <un><ent><schied><en>
- ↗ Suffix chains
  - ↗ <Tät><ig><keit>, <Punkt><lich><keit>
- ↗ Combination of several prefixes and suffixes
  - ↗ <prefix><prefix><lexeme><suffix>
    - ↗ <un><be><greif><lich>, <un><ver><kenn><bar>
  - ↗ <prefix><lexeme><suffix><suffix>
  - ↗ <Über><punkt><lich><keit>

- ↗ Evolvment of indicators over time
- ↗ From surface indicator word length and individual affixes to a more linguistically motivated analysis
  - ↗ Word length is not well interpretable but tightly linked to morphological structure
  - ↗ Individual affixes (suffixes)
- ↗ Structure of words
  - ↗ Qualitative analysis meaningful
- ↗ How do students construct words and how does that develop over time?