

Generating Web-based English Preposition Exercises from Real-World Texts

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The WERTi system

Vanessa Metcalf and
Detmar Meurers

Introduction

Pedagogical grounding

The WERTi system

Introduction
WERTi and FLT practice
Progression in WERTi
Example 1: Pronouns
Example 2: Passive
Example 3: Adverb placement
Example 4: Tense and Aspect

Realizing proposal

Creating ex. progression
Current status
WERTi proposition activities
Some challenges

Related approaches

Language Awareness and
Text Generation
Exercise Authoring Tools
Other approaches

Summary

References



1 / 26

Introduction

- ▶ The use of NLP in ICALL has primarily centered on diagnosing learner errors and, more recently, testing and assessment.
- ▶ Idea: Explore how NLP technology can support other aspects of second language learning.
- ▶ Our specific focus: What can NLP contribute to **awareness of language forms and rules**, an important component of adult second language acquisition.
 - ▶ (cf., e.g., Long 1991, 1996; Ellis 1994; Schmidt 1995; Lyster 1998; Lightbown and Spada 1999; Norris and Ortega 2000; Schulz 2002)

The WERTi system

Vanessa Metcalf and
Detmar Meurers

Introduction

Pedagogical grounding

The WERTi system

Introduction
WERTi and FLT practice
Progression in WERTi
Example 1: Pronouns
Example 2: Passive
Example 3: Adverb placement
Example 4: Tense and Aspect

Realizing proposal

Creating ex. progression
Current status
WERTi proposition activities
Some challenges

Related approaches

Language Awareness and
Text Generation
Exercise Authoring Tools
Other approaches

Summary

References



2 / 26

Pedagogical grounding of our research Awareness

Schmidt (1995):

- ▶ Noticing: "conscious registration of an event"
- ▶ Understanding: "recognition of a general principle, rule or pattern"
- ▶ A wide range of linguistic features can be relevant for awareness, incl. morphological, syntactic, semantic, and pragmatic information.
- ▶ Learners have to be exposed to linguistic features to acquire them, and learners have to notice those.

For our work, this means that

- ▶ tools presenting such linguistic features in a contextualized way, allowing for student interaction, can be helpful.

The WERTi System

Vanessa Metcalf and
Detmar Meurers

Introduction

Pedagogical grounding

The WERTi system

Introduction
WERTi and FLT practice
Progression in WERTi
Example 1: Pronouns
Example 2: Passive
Example 3: Adverb placement
Example 4: Tense and Aspect

Realizing proposal

Creating ex. progression
Current status
WERTi proposition activities
Some challenges

Related approaches

Language Awareness and
Text Generation
Exercise Authoring Tools
Other approaches

Summary

References



3 / 26

Pedagogical grounding of our research Conveying linguistic information

Linguistic information can be conveyed to the learner

- ▶ using **explicit** linguistic terminology/representations, e.g.:
 - ▶ parts of speech
 - ▶ verbal tense, mood and aspect
 - ▶ sentence classification
 - ▶ syntactic analyses (shown as trees or sentence diagrams)
- ▶ using **implicit** presentation, e.g.
 - ▶ coloring, underlining, moving, etc
 - ▶ pointing to correct or incorrect uses

⇒ Awareness activities can include both implicit and explicit presentation of linguistic features.

The WERTi System

Vanessa Metcalf and
Detmar Meurers

Introduction

Pedagogical grounding

The WERTi system

Introduction
WERTi and FLT practice
Progression in WERTi
Example 1: Pronouns
Example 2: Passive
Example 3: Adverb placement
Example 4: Tense and Aspect

Realizing proposal

Creating ex. progression
Current status
WERTi proposition activities
Some challenges

Related approaches

Language Awareness and
Text Generation
Exercise Authoring Tools
Other approaches

Summary

References



4 / 26

The WERTi system

Working with English Real-Texts: An Intelligent Workbook

- ▶ Research in our OSU ICALL research group includes
 - ▶ TAGARELA, a project integrating an intelligent workbook into the individualized instruction of Portuguese at OSU (Amaral and Meurers 2005, 2006),
 - ▶ English Language Practice (Bailey and Meurers 2006), a system exploring content matching methodologies.
 - ▶ WERTi, a web-based ESL system incorporating:
 - ▶ automatic diagnosis of word order errors in written exercise input (Metcalfe and Meurers 2006)
 - ▶ automatically generated language awareness activities
- ▶ This talk focuses on the automatic generation of language awareness activities, exemplified by exercises targeting prepositions.

The WERTi System

Vanessa Metcalfe and
Detlev Meurers

Introduction

Pedagogical grounding

The WERTi system

WERTi and FLT practice

Progression in WERTi

Example 1: Pronouns

Example 2: Passive

Example 3: Adverb placement

Example 4: Tenses and Aspect

Realizing proposal

Creating an progression

Current status

WERTi preparation activities

Some challenges

Related approaches

Language Awareness and
Text Generation

Exercise Authoring Tools

Other approaches

Summary

References



5 / 26

WERTi and FLT practice

- ▶ A common pedagogical practice in FLT moves from target language presentation, to practice, on to production.
- ▶ Proposal: Create sequences of linguistic awareness activities following the initial stages of such a progression:
 - I. Receptive presentation
 - II. Productive presentation
 - III. Controlled practice
- ▶ What makes this idea interesting?
 - ▶ NLP technology can identify certain relevant linguistic categories and forms in real-life texts.
 - ▶ The contents of these texts can be selected by the learners based on their interests.
 - ▶ The sentences turned into exercises can remain fully contextualized as part of the text selected by learner.
 - ▶ Automatic feedback for the activities is feasible since the original text is known.

The WERTi System

Vanessa Metcalfe and
Detlev Meurers

Introduction

Pedagogical grounding

The WERTi system

WERTi and FLT practice

Progression in WERTi

Example 1: Pronouns

Example 2: Passive

Example 3: Adverb placement

Example 4: Tenses and Aspect

Realizing proposal

Creating an progression

Current status

WERTi preparation activities

Some challenges

Related approaches

Language Awareness and
Text Generation

Exercise Authoring Tools

Other approaches

Summary

References



6 / 26

The activity progression in WERTi

Using real world web-based texts (such as news articles) we provide a progression of activities:

Step 1. Receptive presentation

Ex. The system **colors** examples of targeted items.

Step 2. Productive presentation

Ex. The learner is asked to **find and mouse-click** all tokens of the targeted category. The system shows correct picks in green, incorrect ones in red.

Step 3. Controlled practice

Ex. The learner is asked to

- ▶ **reorder** words/phrases given (scrambled) list
- ▶ complete **fill-in-the-blank** (FIB) slots
- ▶ created for tokens of targeted category
- ▶ given some information, where needed (e.g., stems)

The WERTi System

Vanessa Metcalfe and
Detlev Meurers

Introduction

Pedagogical grounding

The WERTi system

WERTi and FLT practice

Progression in WERTi

Example 1: Pronouns

Example 2: Passive

Example 3: Adverb placement

Example 4: Tenses and Aspect

Realizing proposal

Creating an progression

Current status

WERTi preparation activities

Some challenges

Related approaches

Language Awareness and
Text Generation

Exercise Authoring Tools

Other approaches

Summary

References



7 / 26

Example for an activity progression

1. Pronouns

Step 1. Receptive presentation

Ex. System colors different pronoun types.

(1) *Someone told me that he accidentally hit himself in the face with his car keys.*

Step 2. Productive presentation

Ex. Click on examples of a particular type of pronoun.

Step 3. Controlled practice

Ex. Fill in all pronouns in a text.

Ex. Find and correct incorrect pronoun choices in text.
E.g.: *That's him car.* → *That's his car.*

The WERTi System

Vanessa Metcalfe and
Detlev Meurers

Introduction

Pedagogical grounding

The WERTi system

WERTi and FLT practice

Progression in WERTi

Example 1: Pronouns

Example 2: Passive

Example 3: Adverb placement

Example 4: Tenses and Aspect

Realizing proposal

Creating an progression

Current status

WERTi preparation activities

Some challenges

Related approaches

Language Awareness and
Text Generation

Exercise Authoring Tools

Other approaches

Summary

References



8 / 26

Example for an activity progression

2. Passive

Step 1. Receptive presentation

Ex. System colors passive verb forms.

(2) *Her purse was taken while she wasn't looking.*

Step 2. Productive presentation

Ex. Click on passive sentences

Step 3. Controlled practice

Ex. Given the main verb stem, fill in the passive verb string (i.e., the correct form of *be* and the past participle form of the main verb).

Ex. Given an active sentence, transform the sentence to a passive using a combination of click and drag, and FIB.

The WERTi system

Veronica Metcalf and
Detlev Meurers

Introduction

Pedagogical grounding

The WERTi system

Introduction

WERTi and FLT practice

Progression in WERTi

Example 1: Pronouns

Example 2: Passive

Example 3: Adverb placement

Example 4: Tense and Aspect

Realizing proposal

Creating an progression

Current status

WERTi preparation activities

Some challenges

Related approaches

Language Awareness and
Text Generation

Exercise Authoring Tools

Other approaches

Summary

References



9 / 26

Example for an activity progression

3. Adverb placement

Step 1. Receptive presentation

Ex. System colors verbs and verb-modifying adverbs.

(3) *The house had already been damaged.*

Step 2. Productive presentation

Ex. Click on adverbs in a particular position:

- ▶ at the beginning of a sentence
- ▶ between a main verb and a prepositional phrase
- ▶ before an auxiliary verb

Step 3. Controlled practice

Ex. Given constituent chunks and an adverb, with instructions on where this adverb should go, put the sentence together.

The WERTi system

Veronica Metcalf and
Detlev Meurers

Introduction

Pedagogical grounding

The WERTi system

Introduction

WERTi and FLT practice

Progression in WERTi

Example 1: Pronouns

Example 2: Passive

Example 3: Adverb placement

Example 4: Tense and Aspect

Realizing proposal

Creating an progression

Current status

WERTi preparation activities

Some challenges

Related approaches

Language Awareness and
Text Generation

Exercise Authoring Tools

Other approaches

Summary

References



10 / 26

Example for an activity progression

4. Tense and Aspect

Step 1. Receptive presentation

Ex. System colors examples of different aspectual meanings together with relevant contextual cues.

(4) a. *We are going to New York tomorrow.*
b. *We usually go to the grocery store on Fridays.*

Note: While the effect is semantic, the cues are lexical.

Step 2. Productive presentation

Ex. Click on sentences expressing a particular kind of meaning with the targeted verb forms, e.g., expressing future plans using present tense.

Step 3. Controlled practice

Ex. Given a main verb stem, provide the appropriate verb string using cues from context.

The WERTi System

Veronica Metcalf and
Detlev Meurers

Introduction

Pedagogical grounding

The WERTi system

Introduction

WERTi and FLT practice

Progression in WERTi

Example 1: Pronouns

Example 2: Passive

Example 3: Adverb placement

Example 4: Tense and Aspect

Realizing proposal

Creating an progression

Current status

WERTi preparation activities

Some challenges

Related approaches

Language Awareness and
Text Generation

Exercise Authoring Tools

Other approaches

Summary

References



11 / 26

What is involved in realizing such an approach?

- ▶ Two components can be distinguished:

1. Obtaining and selecting appropriate texts:

- ▶ Texts obtained through web search using terms provided by the language learner
 - restrict web to news sites (e.g., Reuters)
 - alternative: specific corpora
- ▶ Texts could be filtered for a specific learner level (cf., e.g., REAP project, Brown et al. 2005).

2. Identifying the targets in the selected texts and creating

- ▶ receptive and productive presentations, and
- ▶ controlled practice exercises using the texts.

- ▶ We illustrate the approach, focusing on the second component, by showcasing an activity progression targeting prepositions.

The WERTi System

Veronica Metcalf and
Detlev Meurers

Introduction

Pedagogical grounding

The WERTi system

Introduction

WERTi and FLT practice

Progression in WERTi

Example 1: Pronouns

Example 2: Passive

Example 3: Adverb placement

Example 4: Tense and Aspect

Realizing proposal

Creating an progression

Current status

WERTi preparation activities

Some challenges

Related approaches

Language Awareness and
Text Generation

Exercise Authoring Tools

Other approaches

Summary

References



12 / 26

Realizing the proposal

Creating an activity sequence

- ▶ The system first annotates the web page text using efficient and robust NLP tools performing
 - ▶ tokenization → tokens
 - ▶ lemmatization → word roots
 - ▶ part-of-speech tagging → lexical categories
 - ▶ morphological analysis → morphological properties
 - ▶ shallow parsing → phrasal categories
- ▶ The language items targeted by the activity are identified using regular expression matching of target and contextual items in the annotated text.
- ▶ The nature of the activity determines the complexity of the annotation and the regular expressions required:
 - ▶ Preposition activity: single instances of a lexical category
 - ▶ Tense and aspect: sequences of auxiliaries, inflected forms, and specific lexical items (contextual cues)

The WERTi System

Venessa Metcalf and
Detmer Meurers

Introduction

Pedagogical grounding

The WERTi system

Introduction

WERTi and FLT practice

Progression in WERTi

Example 1: Pronouns

Example 2: Passive

Example 3: Adverb placement

Example 4: Tense and Aspect

Realizing proposal

Creating an progression

Current status

WERTi progression activities

Some challenges

Related approaches

Language Awareness and
Text Generation

Exercise Authoring Tools

Other approaches

Summary

References



13 / 26

Realizing the proposal

Current status

- ▶ Turning from the general project description to the status of the implementation, we have
 - ▶ implemented the system in Python, integrated into the Apache2 webserver using mod_python, including:
 - ▶ searching in the Reuters site providing news webpages
 - ▶ linguistic annotation using current NLP tools (NLTK, Bird and Loper 2004; TreeTagger, Schmid 1994)
 - ▶ The annotated text is mapped into Color, Click, and FIB presentation code (HTML and JavaScript), and integrated in the original web page.
 - ▶ Only a standard web browser is needed to use the system.
- ▶ In the coming year we plan to integrate further linguistic annotation tools, target patterns, and activities.
- ▶ Currently, WERTi performs part-of-speech annotation and token-based matching to generate activities targeting the usage of prepositions. It is available at:

<http://www.purl.org/net/WERTi>

The WERTi System

Venessa Metcalf and
Detmer Meurers

Introduction

Pedagogical grounding

The WERTi system

Introduction

WERTi and FLT practice

Progression in WERTi

Example 1: Pronouns

Example 2: Passive

Example 3: Adverb placement

Example 4: Tense and Aspect

Realizing proposal

Creating an progression

Current status

WERTi progression activities

Some challenges

Related approaches

Language Awareness and
Text Generation

Exercise Authoring Tools

Other approaches

Summary

References



14 / 26

WERTi
Working With English Real Texts:
An Intelligent Workbook for English

Login
Username:
Password:

The WERTi Project
About
People
Acknowledgements

OSU Project Context
CLT research group
Dept. of Linguistics
Humanities Inf. Syst.

WERTi
WORKING WITH
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AN INTELLIGENT
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ENGLISH

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15 / 26

WERTi
Working With English Real Texts:
An Intelligent Workbook for English

WERTi workbook topics
Prepositions
Pronouns
Active/Passive

The WERTi Project
About
People
Acknowledgements

OSU Project Context
CLT research group
Dept. of Linguistics
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Welcome to WERTi!

What is an "intelligent workbook"?

WERTi is a "workbook" because it provides you with activities for a number of grammar topics, and "intelligent" because it makes up those activities when you ask it to, using articles you choose yourself!

How do I use WERTi?

1. First, choose a **workbook topic** from the list on the left, or at the bottom of this page.
2. Once you have chosen a workbook topic, WERTi will ask you to enter a **search topic** you are interested in. It will find articles on that topic. You choose whichever one you like.
3. Finally, choose an **activity**. Activity types are explained next.

What activities can I choose from?

- **Color**
WERTi will find all the examples of your workbook topic in the article and color them blue. If you are interested in prepositions, for example, WERTi will show you all the prepositions in the article.
- **Click**
This time it is your turn to find examples of your workbook topic in the article, and then click on them. If you are looking for prepositions, and you click on one, it will turn green. If you click on something else, it will turn red.
- **Practice**
WERTi will provide you with one or more activities to let you practice using examples of your workbook topic. WERTi will ask you to fill in blanks, or rearrange words by clicking on them and dragging them, or find and fix mistakes.

What workbook topics can I choose from?

- Prepositions
- Pronouns
- Active/Passive

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16 / 26

WERTI *ALIBILI* Working With English Real Texts: An Intelligent Workbook for English

Search Home Logout Help

 Prepositions

Search in [Reuters news](#) to obtain a text you want to work with:

Preposition Activities

- Color**
WERTI shows you all the prepositions in the text in blue.
- Click**
Find the prepositions and click on them.
- Fill-in-the-blanks**
Fill in all the prepositions in the article.

The WERTI System

Venessa Metcalf and
Deziree Mueurs

Introduction

Pedagogical grounding

The WERTI system

Introduction

WERTI and FLT practice

Progression in WERTI

Example 1: Pronoun

Example 2: Passive

Example 3: Adverb placement

Example 4: Tenses and Aspect

Realizing proposal

Creating a progression

Current status

WERTI progression activities

Some challenges

Related approaches

Language Awareness and
Text Generation

Exercise Authoring Tools

Other approaches

Summary


References



17/26

WERTI *ALIBILI* Working With English Real Texts: An Intelligent Workbook for English

Search Home Logout Help

 Prepositions

Select an activity based on the results of your search:

Moove slowly and don't hug cows, hikers told (Wednesday, August 30, 2006 1:01 AM ET)
Evelynje Zaug of the Swiss Hiking Federation said that while there were no precise statistics on incidents involving cows, walkers are reporting more run-ins...

Cows 'moo' with an accent, farmers believe (Thursday, August 24, 2006 2:04 AM ET)
LONDON (Reuters) - Cows have regional accents, a group of British farmers claims, and phonetics experts say the idea is not as far-fetched as it sounds...

US drivers subsidize European pump prices -report (Thursday, August 31, 2006 9:13 AM ET)
average 334 percent. American consumers have become the "cash cows" for the international oil industry, the study said. Unlike US...

Accidental death of bear fuels passions in France (Wednesday, August 30, 2006 5:53 AM ET)
spokesman for ASPAP, a group that represents farmers who have protested against the reintroduction program which they say threatens sheep and that graze...

The WERTI system

Venessa Metcalf and
Deziree Mueurs

Introduction

Pedagogical grounding

The WERTI system

Introduction

WERTI and FLT practice

Progression in WERTI

Example 1: Pronoun

Example 2: Passive

Example 3: Adverb placement

Example 4: Tenses and Aspect

Realizing proposal

Creating a progression

Current status

WERTI progression activities

Some challenges

Related approaches

Language Awareness and
Text Generation

Exercise Authoring Tools

Other approaches

Summary

References



18/26

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Cows 'moo' with an accent, farmers believe

The Aug 24, 2006 8:06 AM ET

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LONDON (Reuters) - Cows have regional accents, a group of British farmers claims, and phonetics experts say the idea is not as far-fetched as it sounds.

Ulyss Owen, from southwest England, was one of a group of farmers who first noticed the phenomenon.

"I spent a lot of time with my Plassens and they definitely 'moo' with a Somerset drawl," he said, referring to the breed of dairy cow he owns.

"I've spoken to the other farmers in the West Country group and they have noticed a similar development in their own herds.

"I think it works the same as with dogs - the closer a farmer's bond is with his animals, the easier it is for them to pick up his accent."

Dan Lane, spokesman for a group called the West Country Farmhouse Chasseurs to which Owen belongs, said it contacted John Wells, Professor of Phonetics at University College London, who said that a similar phenomenon had been found in India.

"You find distinct clipping accents in the same species around the country. This could also be true of cows," Wells said on the group's Web site (republicans).

According to Lane, accents among cows probably develop in a similar way as among humans, and resulted from spending time with farmers with differing accents.

"Apparently the biggest influence on accents is peer groups - or children in the playground, for example," he said. "Hicks are quite light-ankled communities and do tend to leave the area."

He added that more scientific research was needed to prove what was just an anecdotal theory at this stage.

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The WERTI System

Venessa Metcalf and
Deziree Mueurs

Introduction

Pedagogical grounding

The WERTI system

Introduction

WERTI and FLT practice

Progression in WERTI

Example 1: Pronoun

Example 2: Passive

Example 3: Adverb placement

Example 4: Tenses and Aspect

Realizing proposal

Creating a progression

Current status

WERTI progression activities

Some challenges

Related approaches

Language Awareness and
Text Generation

Exercise Authoring Tools

Other approaches

Summary

References



19/26

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Cows 'moo' with an accent, farmers believe

The Aug 24, 2006 8:06 AM ET

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The WERTI System

Venessa Metcalf and
Deziree Mueurs

Introduction

Pedagogical grounding

The WERTI system

Introduction

WERTI and FLT practice

Progression in WERTI

Example 1: Pronoun

Example 2: Passive

Example 3: Adverb placement

Example 4: Tenses and Aspect

Realizing proposal

Creating a progression

Current status

WERTI progression activities

Some challenges

Related approaches

Language Awareness and
Text Generation

Exercise Authoring Tools

Other approaches

Summary

References



20/26

Cows 'mo' with an accent, farmers believe

The Aug. 26, 2008 9:58am EDT

LONDON (Reuters) - Cows have regional accents, a group of British farmers claims, and phonetics experts say the idea is not as far-fetched as it sounds.

Lloyd Green, from southwest England, was one of a group of farmers who first noticed the phenomenon.

"I spotted a lot of time by my friends and they definitely 'mo' with a Somerset drawl," he said, referring to the breed of dairy cow he owns.

"I've spoken to the other farmers in the West Country and they have noticed a similar development" in their own herds.

"I think it works the same as dogs - the clearer a farmer's bond is with his animals, the easier it is for them to pick up his accent."

Den Laine, spokesman for a group called the West Country Farmhouse Cheesemakers to which Green belongs, said it contacted John Wells, Professor of Phonetics at University College London, who said a similar phenomenon had happened in birds.

"You find distinct singing accents in the same species in the country. This could also be true of cows," Wells said in a group's Web site (reuters.com).

According to Laine, accents in cows probably develop in a similar way to humans, and resulted in different spending time with farmers.

"Apparently the biggest influence on accents is over grass children in the playground, for example," he said. "Herds are quite tight-knit communities and do not tend to leave the area."

He added more scientific research was needed to prove what was just an anecdotal theory.

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The WERTI System

Veraesa Meuland
Detmer Meurers

Introduction

Pedagogical grounding

The WERTI system

Introduction

WERTI and FLT practice

Progression in WERTI

Example 1: Pronouns

Example 2: Passive

Example 3: Adverb placement

Example 4: Tenses and Aspect

Realizing proposal

Creating ex. progression

Current status

WERTI proposition activities

Some challenges

Related approaches

Language Awareness and Test Generation

Exercise Authoring Tools

Other approaches

Summary

References

21 / 26

Realizing the proposal

Some challenges

► Annotation errors:

- Statistical NLP tools are efficient and robust
- Such tools make errors, e.g., 3–5% for POS tagging.
- Errors typically arise in specific problem cases, which are known (cf., e.g., Dickinson and Meurers 2003, 2005)
- Strategies for using NLP tools in ICALL:
 - Avoid basing activities on error-prone distinctions.
 - Develop specialized filters/tools to improve precision on pedagogically important distinctions.

► Real-life texts from the web often have complex structure, mark-up and integrated multimedia (cf., also, Paulussen and Desmet 2005)

- Identifying the actual text on a web page can be difficult.
- System depends on knowledge of the formats used by specific sites (e.g., Reuters, NYT, BBC).

The WERTI System

Veraesa Meuland
Detmer Meurers

Introduction

Pedagogical grounding

The WERTI system

Introduction

WERTI and FLT practice

Progression in WERTI

Example 1: Pronouns

Example 2: Passive

Example 3: Adverb placement

Example 4: Tenses and Aspect

Realizing proposal

Creating ex. progression

Current status

WERTI proposition activities

Some challenges

Related approaches

Language Awareness and Test Generation

Exercise Authoring Tools

Other approaches

Summary

References

22 / 26

Related approaches

Language Awareness and Test Generation

► VISL: Visual Interactive Syntax Learning (Bick 2005a,b)

- Games and visual presentations intended to foster knowledge of syntactic forms and functions.
- KillerFiller automatically creates slot-filler exercises:
 - Annotated corpora used as text base
 - Presents sentences only in isolation
 - General category slots (e.g., prepositions, verbs) determined on the basis of annotation
 - Used as an evaluative tool, not for test awareness

► Automatic generation of multiple choice "cloze tests" (FIB) for language testing and vocabulary drill (cf., e.g. Coniam 1997; Irvine and Kyllonen 2002; Liu et al. 2005a).

The WERTI System

Veraesa Meuland
Detmer Meurers

Introduction

Pedagogical grounding

The WERTI system

Introduction

WERTI and FLT practice

Progression in WERTI

Example 1: Pronouns

Example 2: Passive

Example 3: Adverb placement

Example 4: Tenses and Aspect

Realizing proposal

Creating ex. progression

Current status

WERTI proposition activities

Some challenges

Related approaches

Language Awareness and Test Generation

Exercise Authoring Tools

Other approaches

Summary

References

23 / 26

Related approaches

Exercise Authoring Tools

► The Task Generator for ESL (Toole and Heift 2001)

- Instructor provides texts and specifies "learning objectives" such as plural nouns, or present progressives.
- System filters sentences on the basis of vocabulary appropriateness and targeted categories.
- Exercises generated include gap-filling.
- System can identify complex grammatical patterns.

► The MIRTO project (Antoniadis et al. 2004)

- Aims at creating a general toolbox architecture supporting instructor-determined activity design.
- Emphasizes pedagogical practice and integration, but no explicit mention of language awareness or specific pedagogical progressions or aims.
- Plans to support "gap-filling" and "lexical spotting" exercises in combination with a corpus database.

The WERTI System

Veraesa Meuland
Detmer Meurers

Introduction

Pedagogical grounding

The WERTI system

Introduction

WERTI and FLT practice

Progression in WERTI

Example 1: Pronouns

Example 2: Passive

Example 3: Adverb placement

Example 4: Tenses and Aspect

Realizing proposal

Creating ex. progression

Current status

WERTI proposition activities

Some challenges

Related approaches

Language Awareness and Test Generation

Exercise Authoring Tools

Other approaches

Summary


References

24 / 26

Other related approaches

- ▶ ALFALEX: Automatic or semi-automatic generation of contextualized vocabulary exercises using a tagger and a parser. (Verlinde et al. 2003)
 - ▶ Working system available online
 - ▶ Exercises include preposition gap-filling activities
 - ▶ System integrates extensive lexical information, including the frequency of specific patterns of usage
 - ▶ Includes a learner model featuring a user history and storage of "difficult" examples on request
- ▶ Support tools for reading texts in a foreign language foster awareness by highlighting linguistic features (Glosser, Nerbonne et al. 1998; COMPASS, Breidt & Feldweg 1997)


Summary

Veronica Meisel and Detmar Meurers
Introduction Pedagogical grounding
The WERTi system Introduction WERTi and FLT practice Progression in WERTi Example 1: Pronouns Example 2: Passive Example 3: Adverb placement Example 4: Tenses and Aspect
Realizing proposal Creating an progression Current status WERTi preparation activities Some challenges
Related approaches Language Awareness and Text Generation Exercise Authoring Tools Other approaches
Summary
References

25 / 26

Summary

- ▶ Fostering language awareness is a well-motivated component of FLT.
- ▶ Reusing existing NLP technologies to generate language exercises is a promising approach for ICALL.
- ▶ We are developing the WERTi system, which provides web-based activity progressions based on real-world texts on topics selected by the learner.
- ▶ Our approach adds to existing work by combining
 - ▶ a focus on language awareness and a pedagogically motivated progression of activities
 - ▶ a learner-driven approach, in which learners can
 - ▶ generate as many activities as they want
 - ▶ choose texts that match their interests
 - ▶ activities that remain fully contextualized as whole articles with the original web presentation intact
 - ▶ learner interaction with simple feedback based on the original text and linguistic analysis


Summary

Veronica Meisel and Detmar Meurers
Introduction Pedagogical grounding
The WERTi system Introduction WERTi and FLT practice Progression in WERTi Example 1: Pronouns Example 2: Passive Example 3: Adverb placement Example 4: Tenses and Aspect
Realizing proposal Creating an progression Current status WERTi preparation activities Some challenges
Related approaches Language Awareness and Text Generation Exercise Authoring Tools Other approaches
Summary
References

25 / 26

References


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The WERTi System

Veronica Meisel and Detmar Meurers
Introduction Pedagogical grounding
The WERTi system Introduction WERTi and FLT practice Progression in WERTi Example 1: Pronouns Example 2: Passive Example 3: Adverb placement Example 4: Tenses and Aspect
Realizing proposal Creating an progression Current status WERTi preparation activities Some challenges
Related approaches Language Awareness and Text Generation Exercise Authoring Tools Other approaches
Summary
References

26 / 26

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The WERTi System

Veronica Meisel and Detmar Meurers
Introduction Pedagogical grounding
The WERTi system Introduction WERTi and FLT practice Progression in WERTi Example 1: Pronouns Example 2: Passive Example 3: Adverb placement Example 4: Tenses and Aspect
Realizing proposal Creating an progression Current status WERTi preparation activities Some challenges
Related approaches Language Awareness and Text Generation Exercise Authoring Tools Other approaches
Summary
References

26 / 26

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The WERTI System

Vanessa Metcal and Detmar Meurers

Introduction

Pedagogical grounding

The WERTI system

Introduction

WERTI and FLT practice

Progression in WERTI

Example 1: Pronoun

Example 2: Passive

Example 3: Adverb placement

Example 4: Tense and Aspect

Realizing proposal

Creating ex. progression

Current status

WERTI progression activities

Some challenges

Related approaches

Language Awareness and Test Generation

Exercise Authoring Tools

Other approaches

Summary

References



26 / 26

The WERTI System

Vanessa Metcal and Detmar Meurers

Introduction

Pedagogical grounding

The WERTI system

Introduction

WERTI and FLT practice

Progression in WERTI

Example 1: Pronoun

Example 2: Passive

Example 3: Adverb placement

Example 4: Tense and Aspect

Realizing proposal

Creating ex. progression

Current status

WERTI progression activities

Some challenges

Related approaches

Language Awareness and Test Generation

Exercise Authoring Tools

Other approaches

Summary

References



26 / 26

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The WERTI System

Vanessa Metcal and Detmar Meurers

Introduction

Pedagogical grounding

The WERTI system

Introduction

WERTI and FLT practice

Progression in WERTI

Example 1: Pronoun

Example 2: Passive

Example 3: Adverb placement

Example 4: Tense and Aspect

Realizing proposal

Creating ex. progression

Current status

WERTI progression activities

Some challenges

Related approaches

Language Awareness and Test Generation

Exercise Authoring Tools

Other approaches

Summary

References



26 / 26