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Avoiding the Comparative Fallacy in the Annotation of Learner Corpora

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Dept. of Linguistics, Indiana University
SLRF 2010; College Park, MD; October 16, 2010

Introduction & Motivation

Searching for relevant linguistic properties

For many questions in second language research, one can search a corpus for specific words to find relevant examples

- ▶ e.g., How are modal verbs used by L2 learners? (cf., e.g., Aijmer 2002)

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But consider a search for syntactic patterns, such as examining *wh*-movement (e.g., Juffs 2005; Schachter 1989)

- ▶ What kind of search involving specific words addresses questions about the function of *whom* in this sentence?

(1) I want to be a person **whom** my wife and children would be proud **of**

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- ▶ What kind of search involving specific words addresses questions about the function of *whom* in this sentence?

(1) I want to be a person **whom** my wife and children would be proud **of**

- ▶ How do we know this is subject or object extraction?
How do we know the depth of embedding? ...

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Corpora for SLA

Corpora containing data of second language learners provide data for investigating SLA questions

- ▶ But how does one search for abstract properties?

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- ▶ But how does one search for abstract properties?
 - ▶ different realizations of negation (e.g., Tomaselli and Schwartz 1990)
 - ▶ definiteness or indefiniteness (or lack thereof) (cf., e.g., Ionin et al. 2004)
 - ▶ (headless) relative clauses (e.g., O'Grady et al. 2003)
 - ▶ ...

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- ▶ Currently, these must be searched for by hand

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 - ▶ ...
- ▶ Currently, these must be searched for by hand

To investigate such issues, we need the data marked up with grammatical properties (see, e.g., Meurers and Müller 2009)

- ▶ Otherwise: relevant instances won't be found & many non-relevant instances will have to be sorted through

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Annotation of Learner Corpora

By providing *annotation* of relevant learner properties, we can provide for better investigation of SLA issues

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But what should linguistic, or grammatical, annotation of learner language look like?

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But what should linguistic, or grammatical, annotation of learner language look like?

- ▶ *How* do we define annotation which supports the investigation of learner language?
- ▶ This is a useful question in its own right:
 - ▶ We are forced to precise about the linguistic properties of learner language

Annotation of Learner Corpora

By providing *annotation* of relevant learner properties, we can provide for better investigation of SLA issues

But what should linguistic, or grammatical, annotation of learner language look like?

- ▶ *How* do we define annotation which supports the investigation of learner language?
- ▶ This is a useful question in its own right:
 - ▶ We are forced to precise about the linguistic properties of learner language

Goal: Work on defining an annotation scheme appropriate for learner language

- ▶ There is only little research on this topic (Díaz-Negrillo et al. 2010; Dickinson and Ragheb 2009)

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Outline of talk:

- ▶ Existing annotation schemes
 - ▶ Annotation for learner corpora
 - ▶ Linguistic annotation for other corpora
 - ▶ The comparative fallacy
 - ▶ Annotating learner language
 - ▶ Annotate all words
 - ▶ Rely on linguistic evidence
 - ▶ Describe separate properties of the language (multi-layered annotation)
- ⇒ Avoid the comparative fallacy
- ▶ Summary & Outlook

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For corpora of language of second language learners

- ▶ The most common form of annotation focuses on errors
 - ▶ Suri and McCoy (1993); Lüdeling et al. (2005); Boyd (2010); Rozovskaya and Roth (2010), ...

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 - ▶ Example of annotation from Granger (2003):

(2) Ces gens <G><NBR><VSC> #pensent\$
pense </VSC></NBR></G> aussi que ...

- ▶ Error tags:
 - ▶ <G> = Grammar error (Error domain)
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- ▶ Annotation of part of speech (POS) for errors:
 - ▶ <VSC> = Finite simple verb (Word category)
- ▶ Target form: #pensesent\$

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Error annotation does not allow for searching of linguistic properties, e.g., finding different types of question formation

- ▶ Annotating target forms often encodes some notion of distance from the L2

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Error annotation does not allow for searching of linguistic properties, e.g., finding different types of question formation

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Need to annotate linguistic properties of learner language

- ▶ i.e., annotate observable surface properties, not ones based on forms & meanings learner intended to use



A range of corpus annotation

Outside of learner language, this issue of annotating linguistic properties is not a new one ...

Linguistic annotation can contain information about:

- ▶ lemmata, morphology, & part-of-speech (POS) (e.g., Leech 1997; Sampson 1995; Schiller et al. 1995)
- ▶ syntactic constituencies & dependencies (e.g., Marcus et al. 1993; Hajič 1998; Skut et al. 1997)
- ▶ semantic roles & word senses (e.g., Kingsbury et al. 2002; Hajičová 1998; Erk et al. 2003)
- ▶ discourse properties (e.g., Allen and Core 1996)

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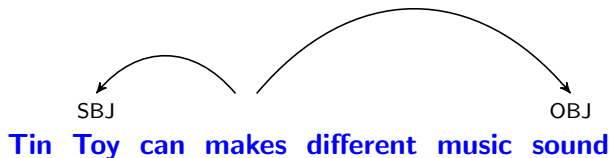
- ▶ lemmata, morphology, & part-of-speech (POS) (e.g., Leech 1997; Sampson 1995; Schiller et al. 1995)
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- ▶ semantic roles & word senses (e.g., Kingsbury et al. 2002; Hajičová 1998; Erk et al. 2003)
- ▶ discourse properties (e.g., Allen and Core 1996)

Question: How can we apply these types of annotation to learner language?

Linguistic properties

When we talk about linguistic properties, we are talking about morphosyntactic & syntactic annotation

- ▶ e.g., Here are two grammatical relations (dependencies) between words (among others)



Where we're coming from

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- ▶ Narratives collected from the 90s (Bardovi-Harlig 1999)
 - ▶ Learners watched a short cartoon (*Tin Toy*) and were asked to discuss what happened
- ▶ Essays from the Intensive English Program (IEP) at Indiana University, used for course placement
 - ▶ Students respond to a prompt such as “What are your plans for life?”

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We have tried to apply linguistic annotation & noticed issues arising related to the comparative fallacy

Annotation & the Comparative Fallacy

Avoiding the
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- ▶ **Comparative fallacy:** ‘mistake of studying the systematic character of one language by comparing it to another’ (Bley-Vroman 1983)

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- ▶ **Comparative fallacy:** ‘mistake of studying the systematic character of one language by comparing it to another’ (Bley-Vroman 1983)
- ▶ Language system constructed by a second language (L2) learner is not a ‘degenerate form’ of target language
 - ▶ Interlanguage is a system in itself that should be studied

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 - ▶ Interlanguage is a system in itself that should be studied
- ▶ Lakshmanan and Selinker (2001) extend this notion:
 - ▶ Comparing with native language (L1) could obscure systematicity in interlanguage

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Error annotation is inherently prone to comparative fallacy:

- ▶ Error interpretation makes learner language seem like a degenerate L2

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We advocate the following for annotating learner language:

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We advocate the following for annotating learner language:

1. Encode linguistic properties for every word, not just 'errors'

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We advocate the following for annotating learner language:

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2. Use linguistic evidence when assigning linguistic properties

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3. Describe the data as it appears, by separating linguistic properties into multiple layers

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With such principles, annotation efforts will be less likely to fall into the comparative fallacy

- ▶ We emphasize annotating observable forms

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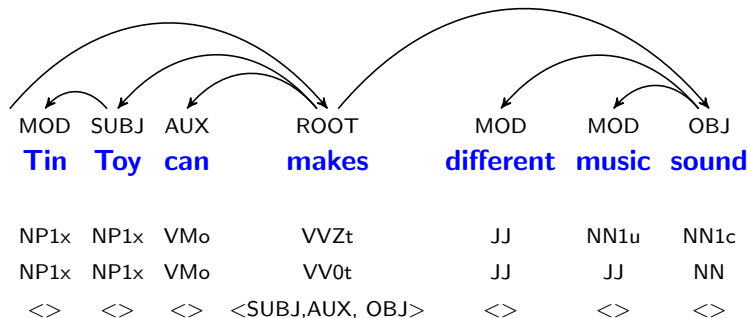
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Encode linguistic properties for every word

Example of what we're aiming for (Dickinson and Ragheb 2009):



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Use linguistic evidence

Rely on *linguistic* evidence to annotate the data

- ▶ Instead of relying on intention, knowledge of L1, SLA theory, etc.

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- ▶ Instead of relying on intention, knowledge of L1, SLA theory, etc.

But this is non-trivial

- ▶ Consider part-of-speech (POS) tags, where POS is defined by both morphological & distributional criteria (e.g., Sampson 1995)
 - ▶ A learner may have evidence pointing different ways:
(4) Tin Toy can **makes** different music sound.

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 - ▶ A learner may have evidence pointing different ways:
 - (4) Tin Toy can **makes** different music sound.
 - ▶ Morphological evidence: 3rd person present tense verb
 - ▶ Distributional evidence: base form verb

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Multi-layered description

Relying on what's observable, i.e., on evidence, leads to multi-layered annotation

- ▶ Encode separate layers for separate pieces of evidence (cf. also Díaz-Negrillo et al. 2010)

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For *can makes*, *makes* can be annotated as:

- ▶ Morphological layer: 3rd person present tense verb
- ▶ Distributional layer: base form verb

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For *can makes*, *makes* can be annotated as:

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This means that each layer can contain a description of a linguistic property

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Putting it all together

Different layers for POS annotation

Tin Toy can makes different music sound

NP1x	NP1x	VMo	VVZt	JJ	NN1u	NN1c
NP1x	NP1x	VMo	VV0t	JJ	JJ	NN

We are using POS tags from SUSANNE tagset (Sampson 1995)

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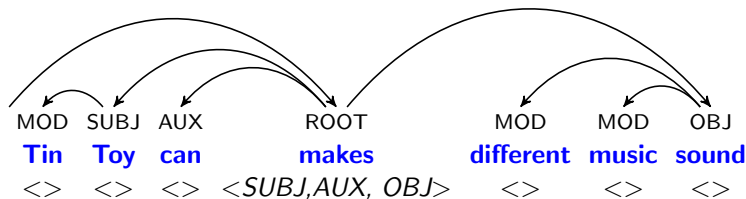
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Putting it all together

Different layers for dependency annotation

Grammatical Relations encoded via surface dependencies & subcategorization frames:



We use the dependency annotation scheme developed for CHILDES data (Sagae et al. 2007, 2004)



L2 reference frame

But wait: We are still defining each layer of annotation in terms of L2 properties

- ▶ The morphology of “3rd person singular present tense” is defined by the presence of -s on a verb
- ▶ The distribution of “base form verb” is defined by appearing directly after an auxiliary verb

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These properties are defined by virtue of how they work in the L2 (English)

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How, then, are we avoiding the comparative fallacy?

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For the example of *makes*

- ▶ What we say:
 - ▶ Morphologically: 3rd singular present tense
 - ▶ Distributionally: base form verb slot

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We only use categories which are closely tied to the data

- ▶ i.e., we avoid combining evidence from different descriptive classes (e.g., a single POS tag)

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Usefulness of the annotation

The encoded information will make it easier to search for specific linguistic properties in the learner corpus

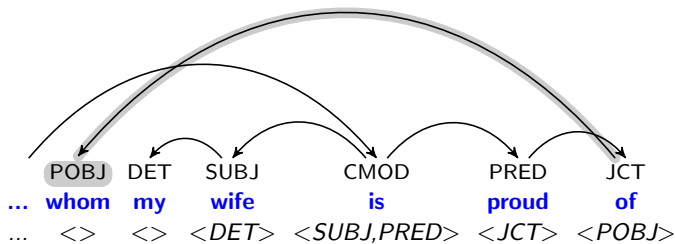
- ▶ We can now talk about things beyond the words, i.e., linguistic classes of surface forms

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Consider *wh*-words again:



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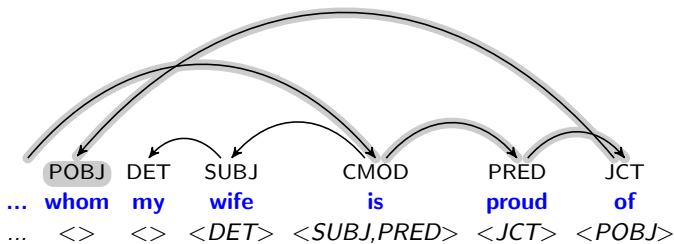


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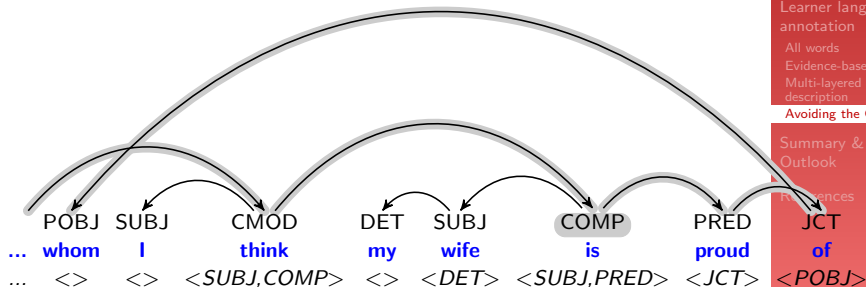
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Consider *wh*-words again:



Usefulness of the annotation (2)

The annotation allows us to determine the depth of embedding:



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Summary and Outlook

We have:

- ▶ discussed designing an annotation scheme for learner language, in a way which avoids the comparative fallacy

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We have:

- ▶ discussed designing an annotation scheme for learner language, in a way which avoids the comparative fallacy
 - ▶ Annotate all words
 - ▶ Use linguistic evidence
 - ▶ Describe different layers of annotation

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We have:

- ▶ discussed designing an annotation scheme for learner language, in a way which avoids the comparative fallacy
 - ▶ Annotate all words
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 - ▶ Describe different layers of annotation
- ▶ Using such annotation will allow for better searching for interlanguage properties

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 - ▶ Describe different layers of annotation
- ▶ Using such annotation will allow for better searching for interlanguage properties

Next steps:

- ▶ Development and refinement of the annotation scheme
- ▶ Collect and annotate learner data that will eventually be made publicly available
 - ▶ This annotation does not answer SLA questions, but it provides a platform for others to answer such questions

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