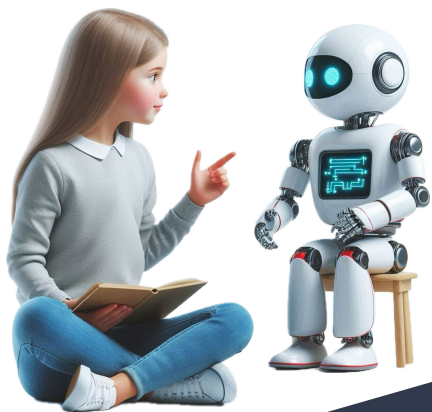


Robots and CALL: Grounding Grammatical Error Detection



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Remember Leolani?

- Communicative Robots @VU Amsterdam:
 - Grounded communication
 - Interesting *Theory of Mind* work (BDI)
 - Shallow Language Models (CFGs/Llama 3)
- Goal: Integrate ZHONG/ERG in Leolani's *brain* – giving it the ability to:
 - Reason over syntax
 - Represent linguistic knowledge of others
 - Teach Mandarin/English in a social and grounded way





Leolani

A proof of concept



Getting closer to the original idea of my PhD

Student:	That dog like the cat happy.
	<p>Hmm... something is wrong with your sentence. Did you mean any of these?</p> <p>A. 那只狗和猫一样高兴。 [That dog, like the cat, is happy.]*</p> <p>B. 那只狗喜欢猫高兴。 [That dog likes the cat happy.]*</p> <p>C. 那只狗喜欢高兴的猫。 [That dog likes the happy cat.]*</p>
Student:	C. 那只狗喜欢高兴的猫。
	<p>Ok! Then I believe you forgot to conjugate the verb 'to like'. Also, remember that an adjective must come before the noun it's modifying. Please try again!</p>

* The English translation is what the system thinks is correct, but it is not shown.

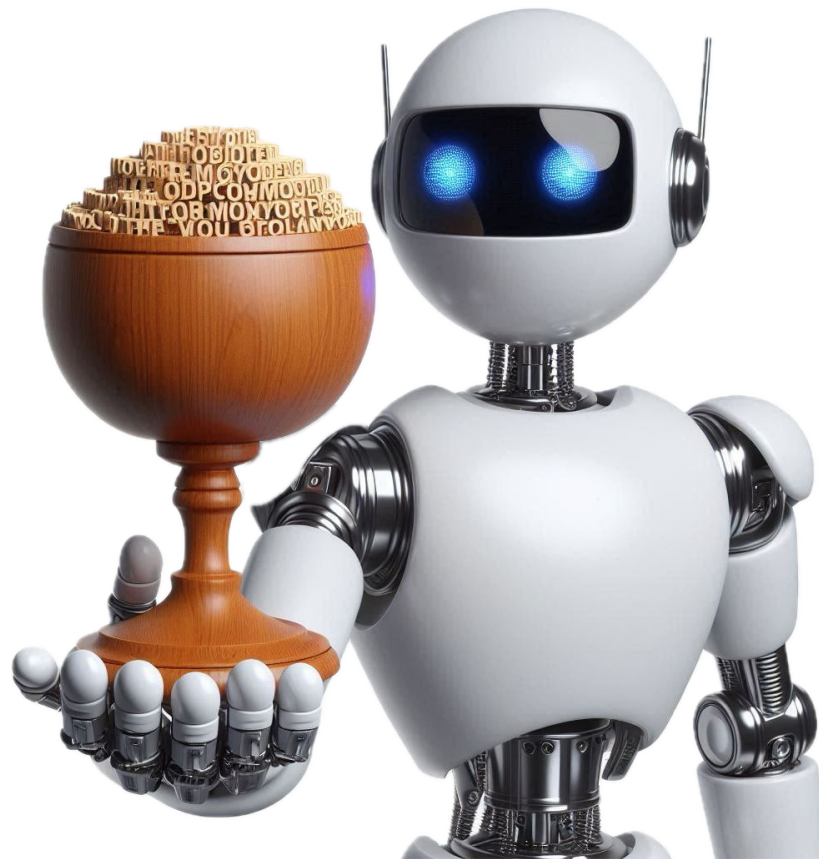
Some Notes/Challenges

- **Not (yet) grounded!**
 - Imposed path through a number of (not necessarily linear) conversation states [suppressing other intentions]
 - At each state the conversation must satisfy both being grammatical and being coherent/relevant (regex, semantics)
- **ASR models are designed to be robust, but also fail miserably**
 - Depending on speed and conviction, ASR models are happy to correct mistakes (e.g. I cycling to work; I likes animals)
 - VAD models also need some tweaking
- **Corrective feedback must be adapted to conversation**
 - We were using previous corrective feedback messages drafted for an English Academic Writing course

Preparing an NWO Project



GRAIL: Grounded Robot-Assisted Intelligent Language Learning



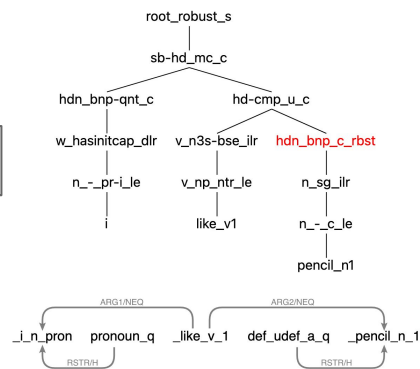
Grounded Grammatical Error Detection

"I like
pencil."



Leolani

Errors were found in this sentence:
(`'hdn_bnp_c_rbst'`, `'pencil.'`)



- "I like pencil" is ungrammatical
 - Currently the ERG offers only one way to correct it (i.e., it makes it single)
 - But we know from the feedback that it is ambiguous

"This sentence has a singular noun (one item of something which can be counted, e.g. 'device') without an article ('a', 'an', 'the'), determiner (e.g. 'each', 'this') or possessive (e.g. 'her', 'its') before it. Please check your sentence carefully, and add an article, determiner or possessive before the singular noun (e.g. 'the device') OR change the it to a plural noun (more than one item, e.g. 'devices')."

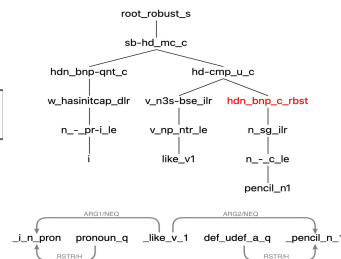
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- The correction can/should depend on world knowledge we have about the world, about the speaker, about the situation, etc.
 - E.g. seeing multiple pencils, recently discussing about buying pencils, etc.
- In the situation above, it's more likely that plural meaning was intended
 - Parse ranking still matters to filter non-plausible corrections
 - N-best corrections can be used and world knowledge / sensors explored to help choose the best alternative

Goals/Ideas

- These ideas are still cooking within – I would welcome pointers, ideas, discussions
- A monolingual project sounds better focused, a bilingual one would be more fun...
- I feel I need to push a bit more mal-rule targeted treebanking and retrain a large model (see SIG for HPC Treebanking)
- CFG/Knowledge Graph-based generation is not usable for education purposes
 - LLM-based vs. MRS-based generation (generation ranking?)
 - I see there is a whole session on generation later
- Student profiling, representing student's linguistic knowledge (old running ideas)
- Interesting links to another collaboration on intelligibility/pronunciation checker
- We need a Dutch grammar!

Thank you!

- **Live demo available on request**
- **@VU Amsterdam is more fun**