**Background**

**Narrative recall**
- Part of cognitive and neuropsychological examination protocols.
- Subject listens to brief story, retells the story to the examiner.
- Score: how many items used from a list of target words and phrases.

**Examples**
- Wechsler Logical Memory: diagnosis of neurodegenerative disorders, e.g., Alzheimer's related dementia [1].
- NEPSY Narrative Memory: one of several tasks assessing neuropsychological development in children [2].

**Issues**
- Examiner must count target phrases in real time: difficult.
- Target list can be quite long: easy to lose track.
- Instructions allow paraphrasing: subjectivity.

**Objectives**
- Enhance reliability of scoring procedure with automated scoring system.
- Search for both targets and their paraphrases generated from aligned parallel corpora.
- Identify difficulties associated with automatic scoring with and without paraphrasing.

---

**NEPSY**
- Series of tests to evaluate neuropsychological development in children.
- Widely used in the clinical community.
- Nominated on a stratified sample of 1,000 children and standardized relative to other measures such as the WISC-IV and Children's Memory Scale.

**NEPSY Narrative Memory**
- Subject listens to and retells a brief narrative.
- Examiner notes which NEPSY targets are used by the subject.
- Score: total number of targets used by the subject during the retelling.

**Subjects and data collection**
- NEPSY administered to 89 children: diagnoses of autism, language impairment, and typical development; 4 to 8 years of age; non-verbal IQ > 70, using WISC-IV PRI [3] and WPSSI PIQ [4].
- NEPSY narrative memory retellings recorded and manually transcribed at the utterance level, then tokenized and downcased.
- Transcribed retellings rescored to identify every item matching a target.

---

**Data Overview**

**NEPSY narrative**
Jim was a boy whose best friend was Pepper. Pepper was a big black dog. Jim liked to walk in the woods and climb the trees. Near Jim's house was a big oak tree with branches so high that he couldn't reach them. One day Jim decided to climb the tree. He got a ladder from home and carried it to the oak tree. When he got to the top, he looked out over his neighborhood. When Jim started to get down, his foot slipped, his shoe fell off, and the ladder fell to the ground. Pepper sat below the tree and barked. Suddenly, Pepper took Jim's shoe in his mouth and ran off. Jim felt sad. Didn't his friend want to stay with him when he was in trouble? Pepper took the shoe to Anna. Jim's sister. He barked and barked. Finally Anna understood that Jim was in trouble. She took a ladder to the tree and rescued Jim. Wasn't Pepper a smart dog?

**Scoring with Exact Match**

**Results**
- Target list expanded to include alternatives with pronouns replacing proper names and with deleted subjects:
  - Jim was sad => he was sad, was sad
- grep locates 230 of the 397 items identified as matches.
- Fails to find phrases with syntactic variation (31%), lexical variation (51%), anaphora (10%), and embellishment/speech errors (8%).

**Scoring with Paraphrases**

**Monolingual paraphrasing**
- Locate target in one English translation of a foreign text, and see how it was translated in another English translation of that text.

**Callison-Burch multilingual paraphrasing**
- Locate target on the English side of an aligned parallel corpus; pivot on the foreign translations to find English paraphrases [8].

---

**Conclusions**

**Why such modest gains?**
- Multilingual-1 (Europarl): huge corpus, but out-of-domain for this task.
- Multilingual and Multilingual-2: in-domain, but very small, and sentences auto-aligned.
- Majority of target phrases not found in any of the three corpora.

**How to improve results?**
- Expand in-domain corpora.
- Improve sentence alignment.
- Approach matching.
- Match partial phrases.
- Match syntactic phrase templates.

**Future work**
- Use paraphrases to align original narrative to retelling: narrative coherence.
- Especially interesting for our population, which includes children with ASD and LI.

---

**References**
[4] Pepper liked barked a ladder Jim or branches
[5] Until one day he slipped and fell, ran out, away he ran, away he ran, away he ran, run out, off he ran, escaped.
[6] Pepper ran for help or went to get help or ran away.
[7] Jim was sad and lonely. He didn't know why his best friend didn't want to be with him when he was in trouble. And meanwhile Pepper the dog was at the house barking at his sister Anna. And it took a long time but Anna understood. And she followed Pepper. And Pepper led Anna out to the oak tree. And Anna put back up the ladder, and she saved Jim.
[8] Scoring with Paraphrases