Executing Instructions in Situated Collaborative Interactions

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**Goal:** select sets of three cards with distinct colors, shapes, and counts

**Leader view**
- Plans which cards to collect
- Moves and collects cards
- Delegates tasks using natural language
- Has full observability of the game board

**Follower view**
- Follows the leader's instructions
- Moves and collects cards
- Has more steps per turn than the leader
- Only observes a first-person view

**Leader**

```
Okay, pick up yellow hearts and run past me toward the bush sticking out, on the opposite side is 3 green stars
```

**Follower**

```
Goal cards
Path to cards
Cards to avoid
Obstacles
```

**Data**

<table>
<thead>
<tr>
<th></th>
<th>Median</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Score</td>
<td>9.0</td>
<td>19</td>
</tr>
<tr>
<td>Instructions per game</td>
<td>24.0</td>
<td>40</td>
</tr>
<tr>
<td>Instruction length</td>
<td>13.0</td>
<td>55</td>
</tr>
<tr>
<td>Follower actions per instruction</td>
<td>8.0</td>
<td>50</td>
</tr>
</tbody>
</table>

**Evaluation**

A new protocol for sequential instruction evaluation

**Instruction-level metrics**
- don't measure effects of error propagation

**Interaction-level metrics**
- poorly utilize data to measure error propagation due to failures early in the interaction

**Solution:** evaluate the model's performance when starting in each instruction in each interaction until the end of the interaction.

**Training**

Learning to recover from errors

- **Problem:** human-human interactions don't provide signal about agent error recovery
- **Solution:** create and add such examples to training set during learning

- **Instruction 1:** Go to the left of the tree
- **Instruction 2:** Get the card straight ahead
- **Trained agent makes a mistake**
- **New training example showing error recovery**

**Plan distributions**

- Goal cards
- Path to cards
- Cards to avoid
- Obstacles

**Plan distributions**

- 1
- 2
- 3
- 4

**Impossible**

- ✔
- ✘

**New evaluation examples**

- Instruction 1: Go to the left of the tree
- Instruction 2: Get the card straight ahead

**Code, demos, and videos at:**

[111.nlp.cornell.edu/cerealbar](http://111.nlp.cornell.edu/cerealbar)