

# Multimodal Machine Learning Lab

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# Agenda

- ❑ Refactoring Experiment Code
- ❑ Abstracting Tasks

# Introducing Flexibility

- ❑ For the Sender and Retriever components, both human and machine agents should be possible to drop in (i.e., implement the interfaces)
- ❑ The specific terms and symbols that are used in the experiments should be independent of the mechanic of the task and should be interchangeable
- ❑ Separating and harmonizing the task mechanic should allow to easily develop agents (e.g., by providing prompt templates for different types of tasks)

# UI Output

- ❑ Flexible format that allows to display multimodal contents
- ❑ Showing content of the form  $(\text{image}|\text{text})^+$  for every UI position (static and interactive elements)
- ❑ May be implemented via formats such as Markdown or HTML
- ❑ Adaption as agent model input may require some restrictions

# Abstract Types for User Input

- The input types are closely linked to the task mechanic
- Over the alphabet  $\Sigma$ , the following input types would be feasible:
  - Single choice (from  $\Sigma$ )
  - Multiple choice ( $2^\Sigma$ )
  - Words ( $\Sigma^+$ )
  - n-length words ( $\Sigma^n$ )
  - Permutations ( $S_\Sigma$ )
  - Variation (i.e., words) without repetitions of a certain length (e.g., how Duolingo helps to input translations)
  - Drawing free-form images (but this might be difficult as an LLM-generated input)
  - Matching some given items to some given entries (can be modeled as variation or permutation)
- When using LLM agents, each of these input types requires a specific validation method
- Giving multiple instances of the input types described above should also be possible

# Making Tasks Difficult

- We identified 3 components that make the tasks difficult:
  1. The specific terms and symbols used (i.e., the underlying dataset)
  2. The modality used (e.g., enforcing to use images at some point to describe a word)
  3. The task mechanic (e.g., free text vs. multiple choice)