Concept Learning Data Analysis

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Introduction

Here, we present the preliminary analysis of the concept learning data collected April 30 - May 2, 2018. Before we delve into our analysis, we summurize the stimuli and concepts utilized in this experiment.

The stimuli have four axes of variablity, each with three possible values – allowing for 81 unique critters. 50 critters were used in training and 31 were held out for test. Teachers and Listeners, who were paired together, were provided the same critters during the test set.

The four axes of variability were as follows:

- Critter Type (Bug, Fish, Bird)
- Primary Color (Blue, Green, Orange)
- Secondary Color (Red, Yellow, Purple)
- Size (Small, Medium, Large)

We intentionally ommitted rules that relied on size. Unlike the other three properties, size is used described in relativeterms, e.g. "small", "medium", "large". Without visual grounding, it's unclear whether a listener would immediately understand what these terms refer to, when presented the test set. We will address this issue in later iterations of thise experiment.

We ran 5 concepts:

- 1 Single Feature Concept
- 2 Logical Conjunctions
- 2 Logical Disjunctions

For each concept, there were two lists. Each list comprised of the same stimuli, with different test / train splits and orderings of stimuli. We ran two lists to make sure that learning at similar rates was possible for a concept irrespective of the specific ordering of stimuli.

The 5 Concepts were:

- Primary Color == Orange
- Critter Type == Fish && Primary Color == Blue
- Primary Color == Orange && Secondary Color == Purple
- Critter Type == Bug || Secondary Color == Yellow
- Critter Type == Bird || Primary Color == Green

Data Processing

```
library(purrr)
library(jsonlite)
```

```
##
## Attaching package: 'jsonlite'

## The following object is masked from 'package:purrr':
##
##     flatten
```

```
library(tidyr)
library(dplyr)
```

```
##
## Attaching package: 'dplyr'

## The following objects are masked from 'package:stats':
##
##     filter, lag

## The following objects are masked from 'package:base':
##
##     intersect, setdiff, setequal, union
```

```
# Load Player Responses
temp <- list.files("../../mturk/mp-game-3/experiment_1/results-cleaned/data", pattern="*.json", full.nar

# Load Stimuli

# Load Chat Messages
```

Dataset Composition

Analysis: Accuracy

Analysis: Hits/Misses and Correct Rejections/False Alarms

Analysis: Rational Rules

Posterior Predictives

Rule Selection

Analysis: Hold One Out Predictions