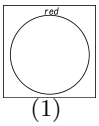
This is the appendix for the experiment described in the paper; Yuri Sato and Koji Mineshima, "Human reasoning with proportional quantifiers and its support by diagrams" presented in Diagrams 2016 conference.

Appendix 2: Instructions used in experiment

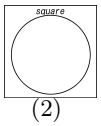
Instructions on the meaning of Euler diagrams

You may use the diagrams in solving reasoning tasks. The meaning of a diagram used in this experiment is defined as follows.

A circle is used to denote the set of objects. Circle (1) denotes the set of red objects and Circle (2) denotes the set of square objects.



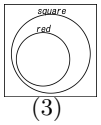
(1)



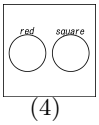
(2)

By combining two circles, we can represent several cases.

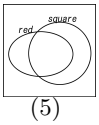
- In Diagram (3), the circle denoting the set of red objects is inside the circle denoting the set of square objects. This means that "All red objects are square".
- In Diagram (4), the circle denoting the set of red objects is outside the circle denoting the set of square objects. This means that there is no object which is red and a square; this mean that "No red objects are square".
- In Diagram (5), the majority of the circle denoting the set of red objects is inside the circle denoting the set of square objects. This means that "Most red objects are square".



(3)



(4)



(5)

Instructions for entailment, contradiction, and consistency (for the Linguistic group)

Example 1: If the following two premises are true, is the hypothesis also true?
Premise 1 All red objects are square.
Premise 2 All square objects are horizontal.

Hypothesis All red objects are horizontal.

This inference consists of two premises and one hypothesis. "All red objects are square" and "All square objects are horizontal" are premises, and "All red objects are horizontal" is the hypothesis. The premises and hypothesis in an inference are divided by a line. There are three ways to answer the inference task, as follows.

1. If the two premises are true, the hypothesis is also true. That is, the premises **entail** the hypothesis.
2. If the two premises are true, the hypothesis is false. That is, the premises **contradict** the hypothesis.
3. Neither 1 nor 2: If the two premises are true, the hypothesis may or may not be true. That is, the premises do not **entail** the hypothesis and do not **contradict** the hypothesis.

In **Example 1**, if the two premises are true, the hypothesis is also true. Thus, the premises **entail** the hypothesis. In other words, there cannot be a situation in which the two premises are true but the hypothesis is false. Therefore, the answer for **Example 1** is "Hypothesis is true".

Example 2: If the following two premises are true, is the hypothesis also true?
Premise 1 Most red objects are square.
Premise 2 All square objects are horizontal.

Hypothesis No red objects are horizontal.

In **Example 2**, if it is accepted that the two premises are true, it must be concluded that the hypothesis is true. That is, the premises **contradict** the hypothesis. In other words, there cannot not be a situation in which the two premises are true and the hypothesis is also true. Therefore, the answer for **Example 2** is "Hypothesis is false".

Example 3: If the following two premises are true, is the hypothesis also true?
Premise 1 No red objects are square.
Premise 2 No square objects are horizontal.

Hypothesis No red objects are horizontal.

In **Example 3**, even if the two premises are true, the hypothesis is not necessarily true. The hypothesis may or may not be true. Thus, neither entailment nor contradiction can be concluded. Therefore, the answer for **Example 3** is "Hypothesis may or may not be true".