

Exercises due on: Wednesday July 6, 10 AM (before class)

## Semantic Theory 2022: Exercise sheet 8

**Note:** You can either do this exercise on paper, or you can use DFS-TOOLS (see <https://github.com/hbrouwer/dfs-tools>; also available on the colli servers in: `/proj/courses/semantics-19/dfs-tools/`). In the latter case, you will have to submit a world-specification file, and a list of commands that you used to obtain the answers to the questions.

Assume that we define a microworld in which there are three people (*mike*, *will* and *elli*), two properties (*ride\_bike* and *sleep*), and one two-place predicate (*tease*).

- 1) Describe the set of all atomic propositions that can be defined for this microworld.
- 2) Create a toy model space  $\mathcal{S}_{\mathcal{M} \times \mathcal{P}}$  (with at most twenty observations) that at least satisfies the following world knowledge constraints:
  - One cannot sleep and ride a bike at the same time
  - Mike likes riding a bike over sleeping
  - Elli likes sleeping over riding a bike
  - Mike teases Will more often than he teases Elli
  - If Will teases somebody, Elli does not tease the same person
- 3) Use the appropriate probability measures to show that the above constraints hold in your model space. Does your model space contain any other interesting inferences?
- 4) Based on your model space from (2), provide the semantics and corresponding meaning vectors for the following sentences:
  - a. Will teases Mike.
  - b. Mike rides a bike and Elli sleeps.
  - c. Everyone makes fun of Will.
  - d. Elli teases Mike or Will.
  - e. A boy is sleeping.
- 5) Use the comprehension score to determine how much the atomic proposition for “Mike sleeps” is understood to be the case from “A boy is sleeping”.