**Helene and Josephine: Template for your exam idea submission**

**Question(s)**:

- *what is the question you are trying to ask?* Try to be as explicit and concrete as possible (e.g. no: how does altruism evolve? But: does social network structure affect the evolution of altruism?)

Big question (not to be answered but we will investigate a sub question of this): What is the best possible group dynamic, which will give the best outcome of knowledge of the group?

The more specific questions:

Q1: How should the distribution of expertise (how many has low, medium and high expertise) be spread across a group for the group til get the best possible outcome (measured as overall expertise)?

and

Q2: We would like to investigate this with different group sizes (number of agents) to be able to look into the best possible group composition.

and

Q3: How is the individual in the group affected (measured as the average change for each group (low, medium and high in the beginning))?

- why is this important (just bullet points, to remind you that you’ll have to argue for this)

* Teamwork is (almost) ubiquitous
* Especially in education but also for most people later at their works.
* It helps us reach better conclusions than what the individual level could have reached
* Optimizing them will be a benefit for the people in the group
  + But what is the most optimal group dynamic?

**Hypotheses**:

- which hypotheses do you have?

Need more literature to make a specific hypothesis. Will base the weights we create on the word generation experiment (comparing how different people were before and how much they learned from their partner depending on how good their partner was). Moreover, we expect teamwork generally to improve an agent’s level of expertise. Therefore, to stay an expert, an agent would need to keep improving over time (i.e. a first grader expert would have to gain more knowledge to stay an expert as a third grader). In our case we imagine that an agent with higher level of expertise could also improve from teamwork with an agent having a lower level of expertise and thereby stay an expert over time.

We hold the total amount of “expertise points” at a constant level of e.g. 150 points distributed between e.g. 30 agents in a group (the numbers are up for discussion at the moment). So far we have decided to keep time as a constant.

Group level hypothesis (this is not our final hypothesis but a draft, need more information to be able to create the exact hypothesis)

* H1: A group with a high amount of agents with middle level of expertise points (and thus relatively fewer agents with high level points, a normal distribution) would spread expertise more. /
  + or that a group with high amount of agents with high level of expertise points (and thus relatively fewer agents with middle level points, a skewed distribution potentially with two modes) would spread expertise more.
* H2: A smaller group will spread the expertise more than a bigger group.
* H3: We expect that all agents will be affected in a positive direction by the teamwork but the lower your level is before the teamwork the more you will be affected in the positive direction.
* *H4: MAYBE: Depending on the size of our project we would like to investigate how time might affect the spread of expertise in different groups.*

**Operationalization:**

**- What is the experimental/simulation design you are thinking to start answering the question? Again, be as concrete as you can:**

The word generation task:

* Investigate what weights we should used for the interactions between the different groups.
* Done by analyzing the difference between trial 1 and trial 3 and looking into who they worked alongside with in task 2

ABM model:

* Starting with a simple version.
  + Having few parameters. Level of expertise/knowledge/performance.
  + Creating discrete levels (expertise would be on a continuous scale but divided into e.g. 3 levels of expertise (low, medium and high))
  + Each agent has a start level of expertise
  + Each encounter with another agent will affect the start level of expertise according to the level of expertise of the other agent
* *Creating a more complex model, possibilities for further research*
  + *Including a parameter of how likely a person is to follow the others (willingness to learn).*
  + *Including different amount of simulations.*
  + *Difficulty of task could be varying*
  + *Different strategies for the different agents.*
  + *How well two agents know each other in advance*
  + *Training with the same agent over more trials/time*

**- What are the things you are going to measure?**

Our model H1 and H2:

The change over time in average for the specific groups.(e.g. in %) ~  
 The distribution of knowledge/expertise +   
 Group size +   
 (maybe *Time)*

change in average level of expertise ~  
 average level of experts at the start +   
 the spread of the expert levels +   
 group size

* Manipulated predictors:
  + The distribution of knowledge/expertise
    - average level of experts at the start
    - the spread of the expert levels (% of each expertise level)
  + Maybe: The time the simulation runs (how many simulations)
  + Maybe: The group size. (how many agents in the simulation)
* Outcome(s):
  + The change over time in average for the specific groups.(e.g. in %)
    - The change in the distribution of how many agents on different levels of expertise we have in each group/level (number of agents being experts compared to start)

We are still working on how the exact model would look like for H3.

change of expertise level of an individual ~   
 expertise level of the individual at the start +  
 (maybe time) +  
 (1|agent)

**Questions for the reviewer**:

Would we need to create our hypothesis before we analyze the word generation task data for the weights we would like to use in our experiment?

Is there anything which did not make sense? If so, please elaborate :)

Have a good day!

All the best,  
Helene and Josephine