**Revised Prospectus of PSYC575 Course Project**

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**Description of research question**

The two‐systems account has been conceived to explain human’s theory of mind understanding (Apperly & Butterfill, 2009; Butterfill & Apperly, 2013). The efficient mindreading system which used simple relational attitudes is to track facts relating to agents and objects quickly as well as automatically. The flexible mindreading system supports understanding of belief in an explicit manner. Edwards and Low (2017) measured adults’ reaction time in order to reveal the identity limits in the efficient system. The major research question here is: Whether people would predict other’s beliefs less quickly and accurately in the condition involving bewildering identity?

**Experimental design and data structure**

The research design and data are from the study conducted by Edwards and Low (2017). This study is a 2 (Task: Location, Identity) × 4 (Condition: AD+, AU+, AD−, AU−) within-subjects experimental design. In each trial, participants need to judge whether or not the actor in the video can reach for an object base on the actor’s belief about the object’s location. In Location task, the object was a normal red/blue ball, while in Identity task the object was a dual aspect robot with one red side and one blue side. The differences between conditions were that the actor falsely believes a desired object is present (AD+) or absent (AD−), and an undesired object is present (AU+) or absent (AU−) in the other two conditions (See examples in Appendix A). In short, our main interest is the effect of Task in participants’ reaction time and accuracy.

In the dataset, each subject has experiences 10 trials for each setting and their reaction time and accuracy were measured. Thus, for each subject, there are 160 observations in total (80 for reaction time and 80 for accuracy). In total, there are 3200 observations of reaction time and 3200 observations of accuracy. The first a few rows of the dataset are shown in Appendix B.

**Preliminary plan for statistical analysis**

The study used repeated measures ANOVA originally and the comparison were conducted a few times. Since the data are multilevel and cross level interaction may exist, I plan to perform multilevel modeling (MLM) analysis using R (4.0.2 for Mac). First, descriptive statistics for variables at each level will be analyzed and showed. Data will also be transformed into appropriate formats. Unconditional models will be specified for reaction time and accuracy separately. This is used to calculate the intraclass correlation coefficient (ICC) and design effect. Randomly varying slopes will be included if necessary. After that, I will fit a Bayesian multilevel model to estimate the effect of task and condition on reaction time and accuracy separately. Measures of effect size and other measures of model fit will also be reported. The results will be summarized and visualized using graphs and tables. Verbal details will also be provided to interpret the results.

**Preferred way to report**

Presentation.

**Additional information**

The data analytic scripts and supplemental materials for this project will be available at <https://github.com/QianhuiNi/PSYC575_Project>.

**References**

Apperly, I. A., & Butterfill, S. A. (2009). Do humans have two systems to track beliefs and belief-like states?. *Psychological review*, *116*(4), 953.

Butterfill, S. A., & Apperly, I. A. (2013). How to construct a minimal theory of mind. *Mind & Language*, *28*(5), 606-637.

Edwards, K., & Low, J. (2017). Reaction time profiles of adults’ action prediction reveal two mindreading systems. *Cognition*, *160*, 1-16.

**Appendix A. Examples of Location Task and Identity Task in Condition AD+**

**Diagram

Description automatically generated**

(Edwards & Low, 2017)

**Appendix B. The first a few rows of the dataset**

Table

Description automatically generated