**Assignment 1 – part 2**

Prose answers

**Exercise 1) Preliminary Data Exploration**

Describe the participant samples in the dataset (e.g. by diagnosis, age, etc.). Do you think the two groups are well balanced? If not, what do you think was the reason?

**Answer 1)**

Most of the variables were well-balanced in accordance with diagnosis, however, when making the model where Age is predicted by Diagnosis, we saw that the mean age of children with ASD was significantly different from the mean age of children who are typically developing. On average children with ASD were 12.67 months older than TD children.

However, since the focus of the experiment is that of language development, age is of less importance. It’s more important that child MLU is more well-balanced across the two groups than age is in order to compare the two groups’ language development.

The model, in which MLU is the outcome and diagnosis is the predictor, is not significant. This means that the MLU across the two groups does not differ significantly. Therefore, the two groups are well-balanced on this variable.

**Exercise 2) Children learning language: the effects of time and ASD**

Describe linguistic development in TD and ASD children in terms of Mean Length of Utterance (MLU)?

**Answer 2)**

Time had a significantly positive effect on child MLU, (ß = 0.234, se = 0.245, t-value = 9.516, p < .05). However, diagnosis did not significantly affect child MLU, (X2(1) = 2.018, p = .156).

This means that over time the MLU of children increases no matter the diagnosis.

The full model accounted for 80.3% of the variance in the outcome, while the fixed effects accounted for 21.9% of the variance.

**Exercise 3) Child directed speech as a moving target**

Describe how parental use of language changes over time in terms of MLU. What do you think is going on?

**Answer 3)**

Time had a significantly positive effect on parental MLU, (ß = 0.12, se = 0.018, t-value = 6.595, p < .05). Diagnosis also had a significantly positive effect on parental MLU, (ß = 0.502, se = 0.113, t-value = 4.429, p < .05). Diagnosis affected parental MLU, (X2(1) = 16.728, p < .05), increasing MLU by 0.502 ± 0.133 se.

In other words, over time parental MLU increases for both ASD and TD children, however, parental MLU differs significantly depending on the diagnosis. That is, parents of TD children have a higher MLU than parents of ASD children. The full model accounted for 67.6% of the variance in the outcome, while the fixed effects accounted for 23% of the variance.

**Exercise 4) Looking into "individual differences" (demographic, clinical or cognitive profiles)**

The dataset contains some additional variables characterizing the kids’ cognitive and clinical profile: ADOS (autism severity), MSEL EL (Expressive Language, that is, verbal IQ, or linguistic skills at first visit as assessed by a psychologist using Mullen Scales of Early Learning), MSEL VR (Visual Reception, used as a proxy for non verbal IQ at first visit), Age, Gender, Ethnicity. Would it make sense to add any of them to your model of linguistic trajectories? Create the best possible model (the one that best explain the data, with MLU as outcome). Next time your model will be tested on new participants, and we will proclaim a winner. Describe your strategy to select the best models (how did you choose the variables to include?) and send the code to Riccardo and Celine.

**Answer 4)**

We have decided to add 3 more fixed effects to the model and remove one - diagnosis. We decided to keep visit, since it explained a lot in the previous models. Diagnosis, however, did not, which is why we discarded it. Then we decided to add verbalIQ. It seems important because it indicates the linguistic skills of the first visit of the child. We chose to add MOT\_MLU because we expect the parental MLU to have an influence on the child's MLU. That is, a larger parental MLU will likely lead to a larger child MLU. Lastly, we added types\_CHI, which is the use of unique words of the child. We expect that children who use many unique words will be more likely to have better linguistics skills and therefore longer utterances.