Executive Functioning in Children with Specific Language Impairment

This paper mainly aimed to look at whether the developmental delay of children with specific language impairment (SLI) entirely limits to language difficulties or to general cognitive abilities, Executive Functions (EFs). For this purpose, 160 children were recruited and divided into three groups – a group of children with SLI, a group with low language functioning (LLF), and a group with typically developing children (Typical). The main statistical focus was on comparing task performance on EFs tasks among those three groups to see if group differences were significant when age and verbal/nonverbal abilities were controlled for. In doing so, two rounds of hierarchical regression analysis were performed with two steps in each round. Firstly, at Step1, children's age and verbal IQ were controlled for, and, at Step 2, two further dummy coded variables were controlled for in regression analysis, which showed that Step 2 regression model explained more of R squared than Step 1 model (as shown in Table 2 in the original paper). The same analysis procedure was repeated for the second regression analysis as shown in Table 3 except that an additional predictor of non-verbal IQ was added and controlled for.

In an attempt to replicate those processes, I tried to obtain as close results to the authors' as possible. In the process of regression assumption checking, some of deviations were solved out by either transforming data to log/squared rooted data or removing outliers. However, one coefficient value in Table 2 and three coefficients values in Table 3 have been found to deviate from the authors' results. By deviation I mean the values that are replicated different in their significance levels and, therefore, exert influence on the interpretation of research results. Specifically, in Table 2, the coefficient of nonverbal IQ for the planning nonverbal task was replicated as significant in the .01 level, whereas it was significant in the .5 level in the original paper. In Table 3, the coefficient of age for the planning verbal task was replicated as significant in the .001 level, where as it was so in the .01 level in the paper. Also, the coefficient of verbal IQ was significant in the .05 level while it was insignificant in the paper. Finally, there was no difference between Step1 and Step 2 model for the planning nonverbal task in terms of their explanation of R squared, whereas they were significantly

different in the .5 level in the original paper. These deviations in 4 values might be due to the outliers the authors might have removed, which was difficult to detect which outliers they had removed without any information about it in the original paper.

Another important consideration that should be taken into account when performing multiple regression analysis is the sample size because it affects the power and effect size. If the model is to have a moderate effect size (.15) and 80% statistical power at the .05 significance level, at least 86 participants are needed. In the paper, the total of 160 children was recruited. However they were divided unequally into three subgroups: 41 for SLI group, 31 for LLF, and 88 for Typical group (SLI was less than half size that of Typical group). This seems to be due to some practical reasons that children with SLI are hard to recruit than typical children. With 160 participants the study has 98% power, but it is assumed that the regression model has less power than that because unbalanced groups decrease statistical power. The three groups are also different in their age (the age mean of SLI is 11.53, LLF is 10.56, and Typical group is 9.83). The two rounds of multiple regression analysis might have been done using samples falling in the same age range, as the authors did for Table 4, by selecting such children from Typical group. The model still has 92 % power even with 120 participants if 40 participants are removed from Typical group in order to make the sample size equal between SLI and Typical groups. Young children's performances on EFs tasks have been found to strongly relate to their age along with their verbal abilities. In this respect, if regression analysis had been done using participants in the same age range, the research results might have more generalizability.