Relationship between non word repetition (nwr) and dyslexia

Rationale for research: The journal article relates to the ability of non-word repetition (NWR) among children suffering from dyslexia (at-risk) and specific language impairment (SLI). NWR is considered as a marker in language impairment (Bishop, North, & Donlan, 1996; Conti-Ramsden, Botting, & Faragher, 2001). Research in the past relates to the poor language abilities in the patients suffering from these disorders. Investigations focussed on deficiency of Phonological processing tasks like perception, encoding and storage of verbal information in these kinds of patients (e. g. Kamhi et al., 1988; Roodenrys & Stokes, 2001). As a part of research, the present study aims to study if NWR is evident before advent of the disorder and serve as a diagnostic tool in diagnosis of dyslexia.

Research aims: The objectives of the study included the following:

To study if the phonological disorder is observed only in the affected at-risk group or in both affected and unaffected at-risk group. The study was intended to be observed in at-risk children of transparent orthography like Dutch unlike previous studies pertaining to opaque orthographies.

To analyse if the NWR is observed both in patients suffering with risk of dyslexia and children suffering from specific language impairment. These results aimed at distinguishing relationship frameworks between dyslexia and SLI.

Key Research hypotheses: The hypotheses accounting for the investigations in the study include:

Single source hypothesis stating that dyslexia and SLI are treated as similar disorders of which dyslexia is observed to be less severe when compared to severe form, SLI (Kamhi & Catts, 1986; Tallal, Allard, Miller, & Curtiss, 1997).

Qualitative hypothesis stating that phonological processing could be underlying determinant for both dyslexia and SLI however with varying linguistic abilities (Bishop and Snowling, 2004).

Comorbidity hypothesis stating that dyslexia and SLI are two distinct disorders arising due to different causes (Catts, Adlof, Hogan, & Ellis Weismer, 2005).

2. EVALUATION OF CHOSEN RESEARCH METHODOLOGY

The research investigation was done basing on the following individuals:

30 children of mean age group 3-5 who did not have a history of language and literacy difficulties who served as control group of population.

57 children of mean age 4-7 who had a past history of reading difficulty in at least one of the parents. This group constituted patients at risk of dyslexia.

22 children with the mean age of 4-7 who suffer from SLI and exhibit history of the disorder in one of the parents.

The following date represents the number of participants followed up in the later stage of investigation

24 of 30 children at mean age 8 and SD 2. 9 months from control group.

46 of 57 children at mean age 8 and SD 3. 9 months at-risk patients.

17 of 22 children at mean age 8 and SD 5. 6 months SLI patients.

At the later stages of investigation pertaining to the same patients at 8, the literacy abilities were tested and recorded for 23 control patients, 38 at risk and 15 SLI children.

The parent's history of the at-risk disorder in the initial stages was analysed using standard reading and phonological measures like non-word spelling task, technical reading tasks by use of timed and untimed words, NWR task, naming rapidly and verbal competence. The parents showing poor performance in all these tasks except the verbal competence were proved source of child at-risk (Kuijpers et al., 2003). On the other hand children with SLI were selected through speech therapists and special schools of children where extensive assessment relating to speech and hearing were performed at time of admission.

Speech language laboratory of Utrecht institute of Linguistics was used for test purposes of patients at the age groups 4 and 8. The tests performed are listed below:

Een Minuut Test (EMT, Brus & Voeten, 1972): In this task, words have to be read correctly within the available time period of one minute.

De Klepel (Van den Bos, Lutje Spelberg, Scheepstra, & de Vries, 1994): This test is reading test with time limit of 2 minutes.

Analyse van Individualiseringsvormen (AVI, Visser, van Laarhoven, & ter Beek, 1994): In this task, the accuracy and speed of reading the text scriptures is measured.

Schaal Vorderingen in Spellingvaardigheid, SVS taken from CITO (van den Bosch, Gilijns, Krom, Moelands, & Verhoeven, 1993): In this spelling test, children were made to spell 38 words from the sentence heard and at the end, the target word was made to spell. Score of the test was based on the number of words spelt correctly.

Orthografie 3 keuzes (Horsley, 2005): In this spelling test, the correct spelling of the word was made to be identified by the correct spelling was to be identified for series of 70 words and the score was based on the number of correct answers.

Dutch version of NWR was used to test children at age 4 to analyse the ability of children in relation to transparent orthographies. This test was based on Dollaghan and Campbell (1998) which is based on measuring correct phonemes (PPC). This test was similar to Dollaghan and Campbell's task in design but varied in the count. In this test, 16 test items were used with syllables ranging from 2 to 5.

The research findings from the tests were then carefully analysed to draw the results.

3. EVALUATION OF RESEARCH FINDINGS:

The experimental procedures were used to evaluate research findings by the use of statistical procedures like ANNOVA.

Analysis 1: With PPC as a dependent variable. Three groups were analysed in terms of control, At-risk and SLI. The study recorded significant figure (F (2, 75) = 28. 9, P <0. 01). The control group showed highest mean score of 81% and the lowest score was recorded as 56% by the SLI group.

Analysis 2: With literacy measures as dependant variable. The study recorded significant figure (F (10, 138) = 2. 407. P= 0. 033, Pillai's trace= 0. 248). All the performed tasks were also analysed for results and individual scores include (EMT: F (2, 75) = 4. 576, P= 0. 013, AVI F (2, 75)= 6. 250, P= 0. 003, SVS F (2, 75)= 3. 705, P= 0. 029), O3C(F(2, 75)= 8. 909, P <0. 001), excepting the non-word reading task (F(2, 75)= 2. 636, P= 0. 078).

Posthoc tests including Turkey for equal variances an Games- Howell for unequal variances analysed that the results for control and SLI groups are different (P <0. 05). The text reading tasks and spelling selection tasks which are AVI and O3C respectively recorded different results for control and at-risk groups whereas timed word reading (EMT) and spelling (SVS) tasks proved to record almost similar results. Four of six literacy tasks which are EMT, AVI, SVS and O3C recorded similar results in at-risk and SLI groups (Illustrated in table 1).

Table 1: NWR in children at age 4(SD) and literacy study at age 8.

The Analysis revealed that the NWR performance of SLI was poorer than the performance of at-risk group even though they exhibited similar performance in many literacy measures. This led to another set of analysis based on correlation analyses and composite score of summed literacy

scores. This set of analysis revealed the overall significant positive correlation between NWR and literacy scores (Spearman's rho 0. 354,

P= 0. 002). The correlation for SLI and at-risk group were recorded as (Spearman's rho

_0. 059, P> 0. 05) and (Spearman's rho 0. 177, P> 0. 05). There were no correlations recorded for control group. The analysis revealed that good NWR and literacy scores are associated with at-risk group when compared to SLI on the basis of positive correlation factor. The correlation factor for at-risk group was recorded as (Spearman's rho 0. 321, P= 0. 05).

Another analysis was performed to divide children in to two groups basing on performance. Children performing less than 1 SD below the mean of control group (202. 74, SD 32. 33) on literacy scale were categorised as weak readers. 23% of children in control group, 50% of them in at-risk and 53% of them in SLI were shown as weak readers. This analysis determined the division of good and bad readers. A one way ANOVA analysis was performed with NWR score (PPC) as dependent variable in relation to this study. The between subjects factors were: Control without reading and spelling problems (-RP). Control +RP, At-risk-RP, At-risk+RP, SLI-RP, SLI+RP. The significant effect obtained was (F (2, 84) = 11. 90, P <0. 001). Posthoc turkey HSD tests revealed that (Illustrated in table 2):

Table 2: NWR abilities at age 4

Good readers obtained high percentage phonemes when compared to poor at-risk readers and SLI groups.

The C-RP had no significant difference from C+RP or At-risk RP.

The performance of the control group with difficulty in reading and AT-risk RP group was proved to be better than SLI groups.

There was no much difference observed in At-risk- RP and At-risk+RP. The Similar case was observed between SLI-RP and SLI+RP.

The At-risk+RP showed similar results when compared to SLI-RP group but showed higher correct score on NWR when compared to that of SLI+RP group.

The groups showing poor performance were categorised as affected at-risk group and SLI groups in comparison with control group without literacy difficulties.

4. EVALUATION OF CONCLUSIONS

The study investigated on aims based on the hypotheses proposes. The primary investigation was to check if the NWR at 4 years could be related to literacy score at eight years. Another investigation aimed to check if the performance pattern of at-risk and SLI children were same in terms of NWR and literacy measures.

The analysis of the observations showed positive correlation between NWR and literacy performance in at-risk group indicating that NWR is poor. The affected and unaffected at-risk groups obtained low NMR when compared to control groups aggravating the result further. The results are in coordination with the findings of continuous risk of dyslexia in a family (Pennington and

Lefly, 2001; Snowing et al., 2003). The results of NWR of the SLI group showed deficit of NWR in accordance with the literature. Studies revealed that irrespective of the reading abilities, NWR remained poor. The relationship between the NWR scores and literacy skills seemed to be different for SLI group and at-risk groups. The results obtained suggested that there are numerous causes behind the poor NWR performance and the research findings are in contrary to the single source hypothesis (Kamhi and Catts, 1986; Tallal et al., 1997) and phonological processing hypothesis which hypothesised that NWR is impaired in SLI only in cases of children already having reading problems (Catts t al., 2005). The hypothesis was re stated as the phonological processing difficulties are core deficiencies observed in both dyslexia and SLI with some differences in nature of the disorder (Bishop and Snowling, 2004).

Investigation also revealed that results obtained for transparent orthographies are almost similar in studies focusing on opaque orthographies. The conclusion drawn on this account is that the NWR does not depend on type of language.

There are limited implications of the present study due to numerous factors. These include:

Less number of children used for the study.

Lack of formal tests to diagnose dyslexia.

NWR performance including interacting sources like verbal short term-performance, speech perception and vocabulary need further extensive investigation to draw conclusions.

Lack of testing other non-phonological factors involved in SLI which would enhance the quality of research (Archibald and Gathercole, 2006).

Lack of alignment of the study according to hypothesis framed by Catts et al (2005) who stated that phonological processing associated is associated not only with SLI but also dyslexia. The hypothesis demands extensive study of phonology models in dyslexia and SLI in terms of various languages and literacy which is lacking in the study.

Lack of quantitative and qualitative analyses of acquisition of phonological grammar and various phonological tasks (de Bree, 2007; Gerrits and De Bree, 2009; Marshall et al; Marshall and Vander Lely; Ramus and Szenkovits, 2008).

5. IMPLICATIONS FOR MY THESIS WORK

The investigations of the study pertained to limit the results obtained only to the models assuming that phonological processing is difficult for at-risk group and other language skills would become a decisive factor to learn literacy difficulties in children.

My thesis work would address on many of the limitations of the present study. Focus would be given on preschool language profile of at-risk children rather than transparent orthographies. Further the method of investigation would include formal, qualitative and quantitative research to study

additional factors for NWR processing efficiency in the children. The number of participants would be increased and investigation would focus on other non-phonological concepts observed in SLI to draw conclusions on comparison of SLI with dyslexia.