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Non-word repetition in young school-age children with language impairment and/or neuropsychiatric disorder

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ABSTRACT

We wanted to test the hypothesis that neuropsychiatric disorder (NPD) with language impairment (LI) is a more severe variant of NPD than NPD without LI, and that this variant can be easily picked up by a non-word repetition (NWR) task. We therefore tested 56 (mean 7.6, range 6.1–9.5 years) children divided into three subgroups: one with LI only ($n = 8$), one with NPD only ($n = 16$) and one with a combination of LI and NPD ($n = 32$). We used a Swedish NWR test, a real word repetition test, the Verbal Comprehension and Freedom from Distractibility factor of the WISC-III. All three subgroups had difficulties with NWR and real word repetition compared to the norm, but the within-subgroup variations were considerable. The subgroup with NPD only performed best on both NWR and real word repetitions, but remarkably poorly given that they had never been noted for having language problems. NPD with LI consistently had the lowest scores. Of the three subgroups, only NPD with LI scored lower than the normal range on Verbal Comprehension and Freedom from Distractibility. Significant correlations were found between NWR on the one hand, and Freedom from Distractibility and Verbal Comprehension, on the other, indicating that poor results on a NWR test is probably not a “clean” measure of speech and language impairment, but also taps into other neuropsychological constructs, including executive dysfunction. In conclusion, the study confirmed

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the hypothesis that NPD with LI constitutes a more severe variant of NPD, and that this variant can easily be picked up by a quick and easy NWR screening test.

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1. Introduction

Several researchers have shown that phonological short-term memory is important for language development, and especially for lexical development (Baddeley, Gathercole, & Papagno, 1998; Baddeley, Papagno, & Vallar, 1988). There is a strong correlation between phonological short-term memory (STM) and vocabulary (e.g. Baddeley et al., 1998) and preschool children who performed well on tests of STM (e.g. non-word repetition (NWR) and digit span) were shown to have good vocabulary. The correlation between the NWR test and vocabulary was stronger than that between digit span and vocabulary. Thus, NWR is seen as reflecting both phonological short-term memory and the ability to decode incoming phonological material (Bishop, 1997; Montgomery, 2003). NWR tests have been used to target language deficits in a number of populations, i.e. children with articulation disorders, reading difficulties, specific language impairment (SLI), Williams syndrome, Down syndrome, high levels of lead exposure, cochlear implants, fluency disorders, and adults with acquired aphasia (Coady & Evans, 2008).

The phonological NWR test is now accepted as a powerful and very quick test of language impairment (LI) (Coady & Evans, 2008), and previous studies have suggested that 75% of children with SLI have considerable problems with NWR repetition (Conti-Ramsden, Botting, & Faragher, 2001). The NWR task can be completed within minutes both in children from unselected populations and children with varying degrees of clinically diagnosed LI. Some researchers have suggested that deficits in NWR could be taken as a psycholinguistic marker for the SLI phenotype (e.g. Bishop, North, & Donlan, 1996). Furthermore, it has been established that deficient NWR is strongly associated with both impairment of spoken language and reading (e.g. Bishop et al., 1996; Reuterskiöld Wagner, Sahlén, & Nyman, 2005; Sahlén, Reuterskiöld Wagner, Nettelblatt, & Radeborg, 1999; Stackhouse, 2000) also in children whose language impairment (LI) has resolved (Bishop et al., 1996).

Autismspectrum conditions (ASCs) – also referred to as pervasive developmental disorders (PDDs) – and attention-deficit/hyperactivity disorder (ADHD) are common neuropsychiatric disorders (NPDs) of childhood, together affecting several per cent of school-age children (Gillberg, 1999). Previously believed to be distinct and easily separable disorders, it is now agreed that there is substantial overlap, and that the two conditions quite often co-occur in the same individual (Danielsson, 2009; Gillberg, 1999; Kadesjö & Gillberg, 2001; Mulligan et al., 2009).

A few studies have shown impairment of NWR/phonological awareness in ASC (e.g. Kjelgaard & Tager-Flusberg, 2001; Whitehouse, Barry, & Bishop, 2008), and ADHD (Javorsky, 1996; Norrelgen, Lacerda, & Forssberg, 1999). The question arises whether ASC/ADHD with LI (as targeted by impaired NWR) constitutes a clinically valid subtype of NPD. Only one study relating to this issue has been published to date (Whitehouse et al., 2008), presenting suggestive evidence that “autism with SLI” is *not* an etiologically distinct autism subtype.

In the present study we wanted to explore the possibility that NPD (in this context = ASC and/or ADHD) with LI constitutes a meaningful subtype of NPD. In particular, we wanted to test the hypothesis that NPD with LI constitutes a clinically much more severe variant of NPD, and that this variant can be easily picked up by using a NWR task in children clinically diagnosed with ASC and/or ADHD. To this end, we included three groups of 7-year-old children, one with NPD only, one with LI only and one with the combination of the two. We exposed these groups to a NWR task, a real word repetition task and the Verbal Comprehension and Freedom from Distractibility, subcomponents of the WISC-III (Wechsler, 1999). The latter two being used as measures of receptive language ability and attention skills. To the best of our knowledge, no previous study of this kind has been performed.

The following hypotheses were explored: (1) children with LI, NPD, or a combination of LI + NPD all have problems at school age with non-word and real word repetition compared to the age norms; (2) children with NPD + LI have significant more NWR problems than those with NPD only and those with

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