



# IQ Declines through Primary School Years in Children with Developmental Language Disorder

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## BACKGROUND

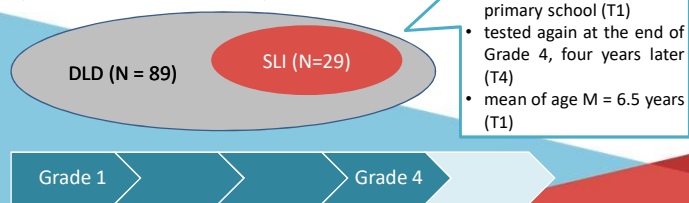
Although intelligence as a psychological construct is seen as a stable personality trait from childhood over a life span, research suggests that non-verbal IQ might change more clearly over time in children with specific language impairment (SLI) than in typically developing children. The non-verbal IQ may fluctuate or drop in groups with SLI (Mawhood, Howlin, & Rutter, 2000; Botting, 2005). In general, the relationship between language abilities and non-verbal IQ is under ongoing discussion. Verbal abilities, executive and cognitive functions develop in a complex and dynamic interaction (Alderson-Day & Fernyhough 2015). On the one hand, in case of Developmental Language Disorder (DLD) cognitive deficits (working memory, executive function) limit language acquisition (Botting, 2005). On the other hand, poor language plays a crucial role in the development of IQ through limited understanding of spoken and written language and possibly through lexical organization and the developmental delay of inner speech (Lidstone, Meins & Fernyhough 2012).

## RESEARCH AIMS

Four research questions are derived from the current state of research:

- Q1** Can the decline in IQ also be observed in individuals with German language-SLI?
- Q2** Does the decline only occur in individuals with SLI or also in individuals with DLD?
- Q3** Is there a correlation between language abilities at the school start and the IQ developed during primary school?
- Q4** How academic achievement is correlated with IQ and language abilities?

## METHODS - SAMPLE

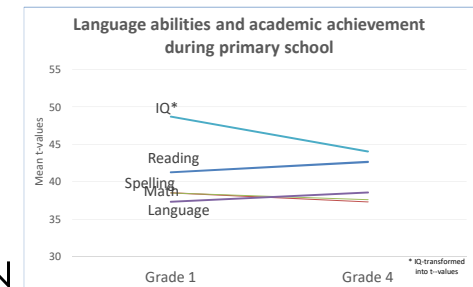
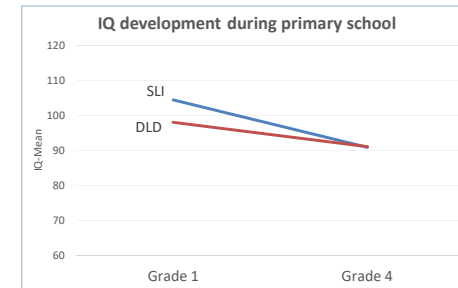


## METHODS - MEASURES:

school achievement: math, word reading and spelling	<b>T1:</b> math (Demat 1+; Krajewski et al., 2002), word reading (WLLP-R, Schneider et al., 2011), spelling (WRT 1+, Birkel 2007) <b>T4:</b> math (Demat 4; Krajewski et al., 2002), word reading (WLLP-R, Schneider et al., 2011), spelling (WRT 4+, Birkel 2007)
Language and memory abilities	<b>T1:</b> Phonological short-term memory at word level: repetition of nonwords (SETK 3-5-PGN; Grimm, 2010); repetition of numbers (K-ABC-ZN; Melchers, & Preuß, 2006); expressive morphology at word level (SETK 3-5-MR); sentence repetition (SETK 3-5-SG); sentence comprehension (Test for Reception of Grammar-German (TROG-D); Fox-Boyer, 2011) <b>T4:</b> Expressive morphology and sentence repetition (P-ITPA; Esser, & Wyszchok, 2010); sentence comprehension (TROG-D; Fox-Boyer, 2011). Language Index: Mean of morphology, sentence repetition, number repetition, reception of grammar in t-values
non-verbal IQ	<b>T1:</b> Culture Fair Test (CFT 1) (Cattell et al., 1997) <b>T4:</b> CFT 20-R (Weiß, 2006)

## RESULTS

<b>Q1</b>	SLI-group: average drop of 13 IQ points	T1 Mean = 104.38, SD = 11.14 T2 Mean = 90.83, SD = 6.60
<b>Q2</b>	DLD-group: average drop of 7 IQ points	T1 Mean = 98.02, SD = 13.49 T4 Mean = 91.06, SD = 12.41
	significant decrease in both samples	SLI-group: T(28) = 5.82 p < .001 DLD-group: T(88) = 4.91 p < .001
	SLI-group: strong effect of time	Cohens d for repeated measures d = 0.89
	DLD-group: moderate effect of time	Cohens d for repeated measures d = 0.54
<b>Q3</b>	in both samples: language ability at T1 is significantly lower than IQ	SLI-group: T(28) = -9.817 p < .001 DLD-group: T(39) = -7.398 p < .001
	language measures at T1 are not correlated with IQ, but T1-sentence repetition is correlated with T4-IQ	T1: correlations n.s. T4: Pearson's r = -.503 p < .010
<b>Q4</b>	School achievement is poor in both samples. For DLD group at T1 and T4 math is correlated with IQ and number repetition while reading and spelling are not correlated	T1 and T4: Pearson's-r = from .242 to .420, p < .050



## DISCUSSION

- A decline of IQ in children with SLI can also be observed in a middle of childhood sample with L1 German. This is consistent with previous findings.
- In terms of diagnostic categories, the decrease of IQ can be found in children of the broader category of DLD but also and in a stronger extent in children with SLI.
- Language abilities affect the cognitive development of children with language disorders during primary school in a much greater extent than cognitive abilities at the start of school do.
- The performance on school achievement tests resembles more the cognitive abilities than the cognitive performance. School achievement is affected by language abilities in greater extent than by cognitive abilities alone.
- This is relevant for SLPs making individual educational plans of students with DLD and counselling the teachers.

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