Master thesis

Exploring the relationship between native language skills and foreign language learning in children with language impairments

Student: I. Zoutenbier
Studentnummer: 3949168
Cursus: Afstudeeronderzoek
Status: Definitieve versie
Datum: 03-07-2015
Studie: Logopediewetenschap, Klinische Gezondheidswetenschappen, Universiteit Utrecht
Begeleider: dr. R. Zwitserlood
Docent: dr. L. van Ewijk
Stage instelling: Koninklijke Auris Groep, Gouda
Beoogd tijdschrift: Journal of Learning Disabilities
Eisen tijdschrift: *Lengte:* 20-30 typewritten, double-spaced pages (including tables and figures)
Referentiestijl: Vancouver
Aantal woorden artikel: 3769
Criteria transparante rapportage: STROBE
Aantal woorden samenvatting: 297
Aantal woorden abstract: 295

ENGLISH ABSTRACT

Title: Exploring the relationship between native language skills and foreign language learning in children with language impairments.

Background: Dutch children with language impairments (LI) in primary education are obliged to learn English as a foreign language (FL). These children experience difficulties learning English as a FL. Factors related to the school, child (native language difficulties) and differences in languages (Dutch versus English) might influence FL learning. Almost no literature on LI and FL learning exists.

Aim: To investigate if there is a relationship between native language proficiency and learning English as a FL in Dutch children with LI.

Method: A cross-sectional study was conducted in the eighth grade of four primary schools specifically for children with LI. Fifty-nine children participated in this study, native speakers of English were excluded. Auditory and written English language skills were measured with a test used as a standard in the Netherlands to assess English proficiency. Oral and written Dutch language skills were assessed with two standardised language tests and a Dutch word decoding test.

Results: Significant and positively weak relationships were found between morphosyntactic skills in Dutch and English listening skills, as well as English written vocabulary. A significant and positively moderately strong correlation was also found between morphosyntactic skills in Dutch and English reading skills, and between Dutch word decoding skills and English written vocabulary.

Conclusion: Significant relationships were found between Dutch- and English language skills. It is possible that children with LI are not capable of learning a FL on an acceptable level, because of their poor Dutch word decoding skills and morphosyntactic skills.

Recommendations: More possible predictors of success in FL learning, such as non-verbal intelligence, motivation and exposure to the English language need to be investigated.

Keywords: correlation, foreign language proficiency, language impairments.

NEDERLANDSE SAMENVATTING

Titel: Een explorerend onderzoek naar het leren van Engels bij kinderen met een taalontwikkelingsstoornis.

Inleiding: Sinds 2012, moeten Nederlandse kinderen met een primaire en secundaire taalontwikkelingsstoornis (TOS) in het (speciaal) basisonderwijs Engels leren als een vreemde taal. Deze kinderen met een TOS ervaren problemen met het leren van de Engelse taal op school. Factoren gerelateerd aan de school, het kind (problemen met moedertaalvaardigheden) en taalverschillen (Nederlands vs. Engels) beïnvloeden mogelijk het leren van een vreemde taal. Er bestaat bijna geen literatuur over TOS en het leren van een vreemde taal.

Doel: Het doel van deze studie is het onderzoeken van een mogelijke correlatie tussen de moedertaalvaardigheden en het leren van Engels bij Nederlandse kinderen met een TOS.

Methode: Een cross-sectioneel onderzoek was uitgevoerd in groep 8 van vier cluster-2 scholen. Negenenvijftig kinderen deden mee aan het onderzoek. Kinderen met een Engelse moedertaal werden geëxcludeerd. De Engelse auditieve en schriftelijke taalvaardigheden zijn gemeten met een Nederlandse gestandaardiseerde Engelse toets en de Nederlandse taalvaardigheden met twee gestandaardiseerde logopedische taaltesten en een test voor technische leesvaardigheid.

Resultaten: Significante positieve zwakke relaties zijn aangetoond tussen de Nederlandse morfosyntaxis en Engelse luistervaardigheden en Engelse schriftelijke woordenschat. Significante positieve gemiddeld sterke relaties zijn aangetoond tussen de Nederlandse morfosyntaxis en Engelse leesvaardigheden en tussen de Nederlandse technische leesvaardigheid en de Engelse schriftelijke woordenschat.

Conclusie: Significante correlaties zijn aangetoond tussen de Nederlandse en Engelse taalvaardigheden bij kinderen met een TOS. Het is mogelijk dat kinderen met een TOS een vreemde taal niet op een adequaat niveau kunnen leren ten gevolge van slechte Nederlandse technische leesvaardigheden en morfosyntaxis.

Aanbevelingen: Meer succes factoren die het leren van een vreemde taal mogelijk beïnvloeden, zoals non-verbale intelligentie, motivatie en blootstelling aan de Engelse taal binnen en buiten school moeten worden onderzocht.

Trefwoorden: correlatie, vreemde taal leren, taalontwikkelingsstoornis.

1. INTRODUCTION

Specific language impairment (SLI) is a common difficulty in childhood, with an overall prevalence rate of 7,4% (1). Children with SLI display difficulties with the form of language (phonology, morphology, syntax), the content of language (semantics), and/or the function of language in communication (pragmatics) (2). Their language problems cannot be attributed to hearing loss, neurological damage, or poor cognitive functioning (3). In the Netherlands, schools for children with special education needs exist for children with (S)LIs and language disorders due to comorbidities, such as Autism Spectrum Disorder (ASD) or hearing impairments. Multilingual children with (S)LI are well represented in these schools. Dutch children with specific and nonspecific language impairments (LI) in (special) education have been obliged to learn English as a foreign language (FL) since 2012 (4). According to Ganschow et al. (5), being proficient in English is regarded as a necessary competence in an increasingly multilingual society and in a global economy.

The Dutch primary education system is divided into several categories: mainstream schools for normally-developing children; special education for children with a low level of intelligence and learning disabilities; and the aforementioned special education setting for children with special educational needs, such as children with LI. The literature about FL learning in the different education settings is sparse, but English skill levels of children in mainstream and special education are tested; the most normally-developing children achieved a minimum skill level in English as a FL in vocabulary, reading and listening. An adequate level in English vocabulary and reading skills was obtained in 50% of the mainstream students, and for English listening skills, this rose to 66% (4). According to Geurts et al. (6), the majority of Dutch children with learning disabilities achieve a skill level in English as an FL in reading, listening, speaking and written vocabulary that is comparable with the lowest 10-percentile of children in mainstream schools. No significant difference exists in English language skills between mono- and multilingual children with learning disabilities.

However, to date, almost no literature on LI and FL learning exists. One of the few studies showed that Dutch children with LI experience difficulties learning English as a FL at school (7). Questions arise about the capabilities of children with LI to master English as a FL on an adequate level. This study explores which factors might impede FL learning.

Research has shown that mainstream students' FL learning difficulties are related to their problems with native language learning (5,8,9), In particular, difficulties with phonology and morphosyntax (5,8). Other factors seem to have an impact on FL learning, for instance, cognition and general (verbal) intelligence could be regarded as predictors of success in FL learning in mainstream students (9). Moreover, affective, personality and demographic variables influence the motivation of students to learn a FL; these variables predicted FL achievement (10). Motivation refers to a student's attitude towards, interest in, and effort invested in learning an FL (11). A survey by the Dutch Central Institute for Educational Testing (Centraal Instituut voor Toetsontwikkeling; Cito) showed that eighth grade students of mainstream schools and special education had a positive attitude towards English (6). It also demonstrated that informal learning of English is common outside of school contexts, due to an abundance of English in television programmes, computer games, movies, music and social media.

Furthermore, several school-related factors may influence learning English as a FL, such as the frequency and duration of the English lessons and the teaching method used. These factors tend to vary greatly amongst schools (4,6). Some schools do not use specific teaching methods, but only self-developed teaching materials. The start and the teaching time of the English lessons is not clearly defined (4) and varies between schools. Most mainstream schools and special education settings for children with LI provide English lessons in the seventh and eighth grades. However, there is a tendency in mainstream schools to start earlier(4). Teachers in secondary education attribute the huge variation in English proficiency of mainstream students to different approaches in different schools (12).

Differences between English- and Dutch languages also may influence learning English as a FL on a number of dimensions. Each particular 'dimension' of a FL might introduce specific difficulties for students' FL learning (8). For instance, English orthography is known to be very inconsistent (8). However, the morphosyntactic system of the English language is relatively simple. In contrast, the Dutch language is richer in verb morphology.

In primary education, more language differences exist for multilingual children. English as a FL will be, at least, the third language provided. Research has shown that bilingual, normally-developing children can acquire a third FL more easily than monolingual children do a second FL, due to developed teaching strategies in language learning (4). Furthermore, the ease in FL learning depends on the kinship with the native language (4).

In summary, several factors seem to have an impact on FL learning in general. Children with LI might have an even stronger impediment in learning a FL, because of severe problems in their native language.

However, the research findings from other studies (5,8–10) cannot be generalised to the Dutch situation, because of clear differences in population and educational programs in primary schools. Research into the relationship between native language proficiency and learning English as a FL is necessary, because the English language is used internationally, students with LI have problems with learning English as a FL (7), and teachers in primary special education settings for children with LI have many questions concerning the organisation of English lessons. In the Netherlands, no studies have been conducted to date in children with LI to investigate the relationship between their language skills and the acquisition of English as a FL. This study is a first exploration of this.

2. OBJECTIVES

This study aimed to investigate if a relationship exists between native language proficiency and learning English as a FL in Dutch children with LI.

The primary research question was:
Is there a correlation between oral and written native language proficiency and learning English as a FL in Dutch children with LI in the eighth grade of primary school?

With sub questions:
- What are skill levels in English reading, listening and vocabulary of children in the eighth grade of special education?
- Is there a difference between the oral and written English language skills of mono- and multilingual children with LI in the eighth grade of special education?

3. METHOD

Study design and participants

This cross-sectional study was conducted in four schools of the Royal Dutch Auris Group located in Utrecht, Rotterdam and Alphen aan de Rijn, in the Netherlands, between February and July 2015. Every child in the eighth grade of these primary schools could participate. The study sample consisted of 59 children; one participant, who was a native speaker of English, was excluded from the study. The children started with English lessons in the seventh grade and received 30-45 minutes of lessons per week. The English lessons were different in each school; various methods were used. Two of the four schools gave homework focused on English vocabulary and assessed these assignments.

The mean age of the participants (39 boys, 20 girls) was 12;2 years (SD = 0;5 years, age range 11;2–13;3 years). Most participants (n=40, 68%) were monolingual, 19 children were multilingual (32%). Almost one third of the participants had a diagnosis of ASD (n=18, 31%). Four children had a hearing impairment. Nine children had no identifiable LI, based on the most recent test data on two language tests; the PPVT-III-NL and the CELF-4-NL, which are described under 'Materials'. The quotient scores of these children did not deviate -1 SD or more from the norm data. Of these: five were diagnosed with an ASD, two with a hearing impairment, and the remaining two had technical reading skills that were far below average. Presumably, these nine children were enrolled in special education, based on the results of previous language tests, which were more severe; analysis of spontaneous language samples; poor pragmatic skills; and/or learning disabilities in domains, such as reading.

The Medical Research Ethics Committee concluded on 10th February 2015 that Medical Research Involving Human Subjects Act approval was not required for this study. Parents of the participants provided written informed consent to include their child in the study.

Procedure

In February and March 2015, the children completed the Cito Test in English on two consecutive days in the mornings. Solo-equipment was used in classes with children with hearing impairment. Speech language therapists (SLTs) provided the additional language test results and information about possible multilingualism of the research sample. Missing language test data were obtained in March 2015 at school by the first author, who is qualified as a SLT. The children's teacher or intern supervisor provided information about non-verbal intelligence, Dutch word decoding skills and comorbidity.

Materials

Tests used to assess spoken and written Dutch

<u>CELF-4-NL</u>
The Dutch native language abilities were investigated with the CELF-4-NL (13). The CELF Core Language Score (CLS) was calculated for each participant. The CLS indicates the severity of the language disorder and is a compound score of the results from the following subtests:

- Concepts and following directions - a test for language comprehension. The child is asked to designate a collection of images in a certain order.
- Recalling sentences - tests morphosyntax in expressive form. The child is asked to exactly repeat a sentence of increasing length.
- Formulated sentences - also assesses expressive morphosyntax. The child is presented with an image and is asked to make a sentence with a given word.
- Word classes - tests the receptive and expressive semantics. The child must indicate which pairs of words belong together and explain why. With a receptive and an expressive component; total scores of both were used in this study.

<u>Peabody Picture Vocabulary Test-III-NL (PPVT-III-NL)</u>
The PPVT-III-NL (14) is a picture-pointing test at word level. The test measures receptive vocabulary, which correlates positively with reading comprehension and is a good predictor of overall language proficiency (14).

<u>Three Minutes Test (Drie Minuten Test (DMT))</u>
The DMT (15) measures the Dutch word decoding skills in children. Decoding skills are necessary for understanding written texts (16). During the DMT, the child must read words within a limited time and an increasing level of difficulty.

Test used to assess spoken and written English

<u>Me2! Cito Test English</u>
FL mastery usually assumes the formation and development of five basic skills: pronunciation, listening, speaking, reading and writing (8). Two (listening and reading) of the five basic skills were tested with the Me2! Cito Test English (17). The Cito Test English (a multiple-choice paper and pencil test) was used as the primary measure of English language proficiency. The test

consists of two sections, each with two subtests. Section one measures listening skills and auditory vocabulary and section two is used to assess reading skills and written vocabulary. In each subtest, the children had to read questions and multiple-choice answers. Subtest listening skills: information must be retrieved from simple, spoken English texts to identify the main idea of a video fragment and indicate the meaning of the key elements. Subtest auditory vocabulary: high frequency English words and phrases based on the English pronunciation must be recognised and understood. Subtest reading skills: information must be retrieved from written English texts to indicate the text topic, the main thought and the meaning of the key elements. Written vocabulary: this subtest contains tasks, such as 'What is the Dutch meaning of the English word?' 'What is the opposite of the underlined word?'. 'To which category does the underlined (English) word belong?' 'Choose the right (English) word to explain the picture'. The Me2! Cito Test English provides norm-referenced test scores. The test score of each student with LI is converted into a percentile range that is compared with students in mainstream schools.

Primary study outcomes
- Significant correlations between the scores on the PPVT-III-NL and the scores on the subtests of the Cito Test English.
- Significant correlations between each CELF subtest and each Me2! subtest.
- Significant correlations between Dutch word decoding skills and the scores on the subtests of the Cito Test English.

Sample size
Convenience sampling was used in this exploratory research.

Statistical methods
Descriptive statistics were used for the whole study sample (59 children) to present participant characteristics and test results.
Analyses of variance were performed to show possible significant differences between the mono- and multilingual groups on their mean scores on the English subtests, and mean scores of the written and oral Dutch language tests. Prior to the analyses of variance, the variables of the same subtest of each group were tested for homogeneity. Based on Levene's Test, a One-Way ANOVA was used in equal population variances ($p > 0.05$) and the Welch Test, when the homogeneity assumption was violated ($p < 0.05$).

Secondly, bivariate correlations analyses were performed in a subgroup with children with LI (50 children), based on standardised language tests to show possible linear relationships between the subtests of the Cito Test English and the subtests of the CELF-4-NL. The same procedure was repeated with the Cito Test English and receptive vocabulary of the PPVT-III-NL, as well as between Dutch word decoding skills measured with the DMT. In the analysis, raw data were used. Data were missing from children that were ill or absent on the test day(s); the analyses were completed on the data that remained.

Prior to the correlation analyses, the variables of the different subsets were tested for normality. Based on the Q-Q plot and the Shapiro-Wilk, the Spearman Correlation Coefficient was used for not normally-distributed variables ($p < 0.05$) and the Pearson Correlation Coefficient for normally-distributed variables ($p > 0.05$) to see if relationships were significant at $p < 0.05$ and positive/negative. The coefficient of determination, r2, gave information about the strength of the association: < 0.10 is a weak correlation; between 0.10 - 0.25 - a moderate to strong relationship; between 0.25 - 0.50 - a strong correlation; and if more than 0.50, variance was explained, as the correlation is very strong.

4. RESULTS

Spoken and written Dutch language skills
Descriptions of the scores on standardised Dutch language tests can be found in Table 1. The mean quotient scores of the PPVT-III-NL and of the subtest 'word classes' of the CELF-4-NL were within normal range (SD < -1). The mean quotient score of the subtest 'formulating sentences' was just outside the normal range (SD = -1.1) and the CLS of the CELF-4-NL deviated more than -1.5 SD compared with the norm data. The children performed weakly on the subtest 'recalling sentences' followed by the subtest 'concepts and following directions'.
The mean raw score based on the DMT, test for the Dutch word decoding skills, was far below average compared with the norm data and corresponded with a percentile score in a range from 10-20 compared to students in mainstream schools.
Between the mono- and multilingual groups, only a significant difference ($p < 0.05$) was found on the mean scores of the subtest concepts and following directions; the multilingual group had a mean score of 36.47 and the monolingual group a mean score of 40.93.

<TABLE 1 HERE>

Spoken and written English language skills

The descriptions of the scores on the English language test are presented in Table 2. The children obtained their highest scores on the subtest 'auditory vocabulary'; the mean raw score corresponds with a percentile score in a range from 20-25. The mean raw scores of the subtests 'listening skills', 'written vocabulary' and 'reading skills' correspond with a percentile score in a range from 10-20. The distribution of the different subtests scores per percentile ranges is presented in Figure 1. No significant difference ($p < 0.05$) was found in the mean scores of the different subtests of the Cito Test English between the mono- and multilingual groups.

<TABLE 2 HERE>

<FIGURE 1 HERE>

Spoken and written Dutch and English language skills

As can been seen in Table 3, significant positive correlations were found between formulated sentences of the CELF-4-NL, which measures the morphosyntax of the Dutch language, and the subtests listening skills, reading skills and written vocabulary of the Cito Test English. The relationship was weak between Dutch morphosyntax and English listening skills ($p < 0.05$, $R^2 = .076$), as well as English written vocabulary ($p < 0.05$, $R^2 = .095$). The correlation was moderately strong between Dutch morphosyntax and English reading skills ($p < 0.01$, $R^2 = .166$). Furthermore, a significant and positive moderate to strong relationship was found between Dutch word decoding skills measured with the DMT and written vocabulary of the Cito Test English ($p < 0.01$, $R^2 = .148$).

No significant correlations were found between the receptive vocabulary measured with the PPVT-III-NL, and the subtests of the Cito Test English. Furthermore, no significant correlations were found between the subtests 'concepts and following directions', 'recalling sentences' and 'word classes' of the CELF-4-NL and the subtests of the Cito Test English.

<TABLE 3 HERE>

In summary, the mono- and multilingual children were analysed as one subgroup, because no significant differences were found in spoken- and written English language skills. Only in the Dutch language, the comprehension was significantly better in Dutch monolingual children. Based on the results of the Cito Test English, the English language skills of children with LI are

poor when compared with mainstream children. However, there was differentiation in skill level between the subtests; the children performed best on the Me2! subtest 'auditory vocabulary'. The most significant and positive correlations were found between the morphosyntax of the Dutch language and English language skills.

5. DISCUSSION

The purposes of this study were to determine (a) a relationship between oral and written native language proficiency and learning English as a FL in Dutch-speaking primary school children with LI; (b) skill levels in English reading, listening and vocabulary; and (c) if the English language skills of mono- and multilingual children with LI differ.

This study shows that word decoding skills in Dutch and morphosyntactic skills of the Dutch language are significantly correlated with English skills in Dutch-speaking, 12 year-old children with LI; moderately to strong relationships were found with written English language skills. Out of four tested English language skills, the children in special education performed best on spoken word and phrase comprehension. The mono- and multilingual children with LI have comparable English language skills.

The results of this study are partially comparable with the results of Ganschow et al. (1998); morphosyntactic difficulties in native language have a severe impact on FL learning in normally-developing students. Ganschow et al. also concluded that phonological problems in native language were also of major importance.

The average results from the Cito Test English differ from the results of Geurts et al. (6), who measured the English skill levels of Dutch children with learning disabilities. In this study, children with LI had a percentile score in a range from 10-25, which means that they scored below average, but higher than the 10% lowest scoring students, in contrast with findings by Geurts et al. The difference in test scores between children with LI and children with a low level of intelligence could be explained by the different measurements used; Geurts et al. used self-constructed test assignments (6), and the spoken word and phrase comprehension in English was not tested. In this study, no significant differences in English language skills were found between the mono- and multilingual children with LI; this result is comparable with the results of Geurts et al., who found the same in children with learning disabilities.

Alternative explanations for the correlations between Dutch and English language skills can be the presence of possible covariates, such as a limited non-verbal intelligence and/or motivation (9,10). Unfortunately, the collected, non-verbal, IQ data of the sample could not be included afterwards, due to the variability in test instruments.

A possible explanation for the better scores on the subtest auditory vocabulary is that the English lessons in special education are most oriented to speaking, listening and vocabulary (6) and, as shown, no relationships were found with Dutch language skills.

This study is relevant for schools to better understand LI and the approach of English.

In this study, the only non-method-related English test was used - the me2! Cito Test English, originally designed for children in mainstream schools. It showed that the test was not entirely suitable to assess the English language skills of children with LI, when it is conducted according to the test manual. In each subtest, the children had to read the questions and multiple choice answers; poor decoding skills at word and sentence-level may have influenced the results on the different subtests. Another limitation of the test was the limited time in the two auditory tasks; some children became frustrated from time pressure, and according to Miller et al. (18,19), children with LI have been found to have a slower processing speed than typically developing peers on many tasks, and, therefore, may be disadvantaged on tests that reward rapid responding. Furthermore, the Cito Test English did not measure oral English skills, whilst oral skills are often practiced in English lessons. The Me2! Test would already be better suited for children with LI, when no time constraints exist and more teacher-involvement during the auditory tasks is allowed.

A limitation of the current study is that English oral skills were not measured. Furthermore, because of the exploratory nature of this study, it is still not clear how the English lessons should be organised for effective FL teaching in children with LI; which methods and timing should be used and the effect of early FL education in children with LI.

The strength of the present study is the representativeness of the study population; no children with comorbidities were excluded.

For further research, more possible predictors of success in FL learning, such as non-verbal intelligence, motivation and exposure to English in and outside of school need to be investigated in children with LI. Moreover, longitudinal research with comparable groups is necessary for effect studies.

6. CONCLUSION

Dutch children with language impairment in the eighth grade of primary school have poor oral and written English language skills compared with mainstream children; no differences exist between mono- and multilingual children. In children with LIs, significant and positive relationships were found between morphosyntactic skills in Dutch and English listening skills, reading comprehension at text- and word levels, and between word decoding skills in Dutch and

English written vocabulary. It is possible that children with LI are not capable of learning a FL on an acceptable level, because of their poor word decoding skills in Dutch and morphosyntactic skills.

7. REFERENCES

1.   Nancy L, Zhang X, Brien O. Prevalence of Specific Language Impairment in. J Speech Lang Hear Res. 2014;40(December 1997):1–21.

2.   American Speech-Language-Hearing Association. Definitions of communication disorders and variations [Internet]. 1993. Available from: www.asha.org/policy

3.   Bishop DVM. The Underlying Nature of Specific Language Impairment. J Child Psychol Psychiatry Allied Discip [Internet]. 1992 Jan;33(1):3–66. Available from: 10.1111/1469-7610.ep11373107

4.   Thijs, A., Trimbos, B., Tuin, D., Bodde, M., de Graaff R. English in primary education (Engels in het basisonderwijs) [Internet]. Enschede; 2011. Available from: http://www.slo.nl/downloads/2011/engels-in-het-basisonderwijs-vakdossier.pdf/

5.   Ganschow L, Sparks RL, Javorsky J. Foreign language learning difficulties: an historical perspective. J Learn Disabil [Internet]. 1998;31(3):248–58. Available from: http://www.ncbi.nlm.nih.gov/pubmed/9599957

6.   Geurts, B., Hemker, B., Vrijs W. Balance of the English language at the end of primary special education (Balans van het Engels aan het einde van het speciaal basisonderwijs). Arnhem; 2014.

7.   Algoe S. English vocabulary in secondary special education in students with language impairment (Engelse woordenschat op het voortgezet speciaal onderwijs aan leerlingen met een taalontwikkelingsstoornis) [Internet]. Master thesis Universiteit Utrecht; 2014. Available from: http://dspace.library.uu.nl/handle/1874/301164

8.   Grigorenko E. Individual Differences and Instructed Language Learning. Foreign language acquisition and language-based learning disabilities. Amsterdam: John Benjamins Publishing Company; 2002. p. 95–112.

9.   Sparks RL, Patton J, Ganschow L, Humbach N, Javorsky J. Native language predictors of foreign language proficiency and foreign language aptitude. Ann Dyslexia. 2006;56(1):129–60.

10.   Onwuegbuzie AJ, Bailey P, Daley CE. Cognitive, Affective, Personality, and Demographic Predictors of Foreign-Language Achievement. The Journal of Educational Research. 2000;3–15.

11.   Gardner RC, Tremblay PF, Masgoret A. Towards a full model of second language learning: An empirical investigation. Mod Lang J [Internet]. 1997;81(3):344–62. Available from: http://www.jstor.org/stable/329310?origin=crossref

12.   Herder A, Bot K. Early foreign language learning in an international perspective (Vroeg vreemdetalenonderwijs in internationaal perspectief). Literatuurstudie. Groningen; 2005.

13.   Kort W, Schittekatte M, Compaan E. CELF-4-NL | Test for diagnosis and evaluation of language problems (Test voor diagnose en evaluatie van taalproblemen) [Internet]. 2010 [cited 2014 Oct 14]. Available from: http://www.pearsonclinical.nl/celf-4-nl-test-diagnose-evaluatie-taalproblemen

14.   Dunn L, Dunn L. Peabody Picture Vocabulary Test-III-NL. Nederlandse versie door Liesbeth Schlichting. Amsterdam: Harcourt Assessment B.V.; 2005.

15.   Cito. Cito primary education - Three-Minutes-Test and AVI (Cito Volgsysteem primair onderwijs – Drie-Minuten-Toets en AVI) [Internet]. [cited 2015 Mar 29]. Available from: http://www.cito.nl/onderwijs/primair onderwijs/alle_producten/drie_minuten_toets_en_avi

16.   Krom R, Jongen I, Verhelst N, Kamphuis F, Kleintjes F. Scientific justification DMT and AVI (Wetenschappelijke verantwoording DMT en AVI). 2010;(november):1–111. Available from: http://www.toetswijzer.nl/html/tg/13.pdf

17.   Cito. Me2! for 7th and 8th grade of primary school (Me2 ! Engels voor groep 7 en 8). Arnhem; 2006.

18.   Miller C a, Kail R, Leonard LB, Tomblin JB. Speed of processing in children with specific language impairment. J Speech Lang Hear Res. 2001;44(2):416–33.

19.   Miller C a, Leonard LB, Kail R V, Tomblin JB, Francis DJ. Response time in 14-year olds with Language Impairment. J Speech Lang Hear Res. 2006;49(4):712–48.

TABLES AND FIGURES

Table 1 Means, standard deviations and range of age and DMT, and quotient scores of the CELF-4-NL subtests, and PPVT-III-NL (n=59)

	Mean	SD	Range
Age (months)	146.8	5.9	134-159
DMT - Dutch word decoding skills (raw scores)	239.0	68.6	37-362
Dutch language tests			
CELF Core Language Score	72.1	13.3	55-103
Concepts and following directions	76.5	17.6	55-115
Recalling sentences	70.8	12.8	55-105
Formulated sentences	83.0	13.4	55-105
Word classes	85.3	14.2	55-120
PPVT-III-NL - Receptive vocabulary	86.5	12.3	56-113

Note: the maximum raw score for the DMT is 420.
The quotient scores of the language tests have a mean of 100 and a SD of 15. A quotient > 85 (< -1 SD) is considered average. A quotient score of 55 is the minimum score.

Table 2 Means, standard deviations and range of raw scores of the Me2! Cito Test English subtests

	Mean	SD	Range
English language skills			
Listening skills (n=57)	11.4	3.0	4-17
Auditory vocabulary (n=57)	19.5	6.3	7-36
Reading skills (n=56)	9.2	3.4	2-18
Written vocabulary (n=56)	21.9	6.5	11-37

Note: n=59, two missing values for Listening skills and Auditory vocabulary (total: 57 participants) and three missing values for Reading skills and Written vocabulary (total: 56 participants).
The maximum score for listening skills is 22, for auditory vocabulary 38, for reading skills 20 and for written vocabulary 40.
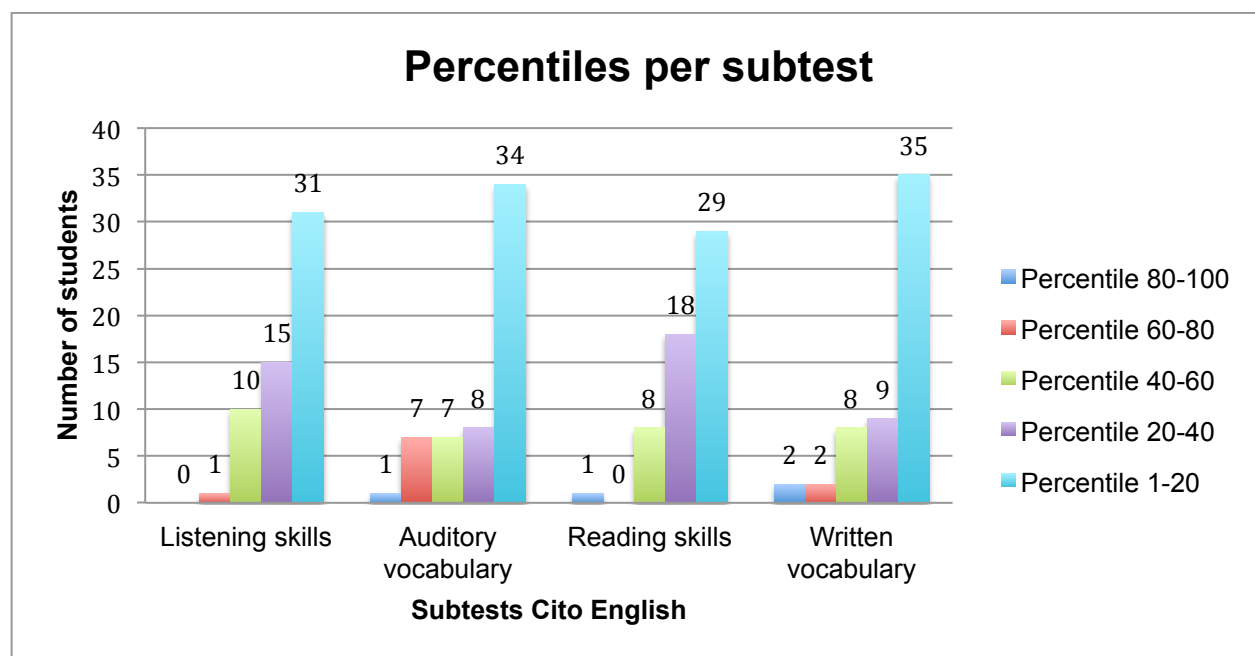

Figure 1 Percentiles per subtest
Note: a percentile score in a range from 40 to 60 indicates an average score compared to students in mainstream schools. When a percentile score in a range from 80 to 100 is achieved, the student belongs to the 20% highest scoring students compared to students in mainstream schools. When a percentile score in a range from 1 to 20 is achieved, the student belongs to the 20% lowest scoring students.

Table 3 Correlations between formulated sentences of the CELF-4-NL and the subtests of the Cito Test English

| English subtests: | N | Mono- and multilingual children with LI | | |
| | | Formulated sentences | | |
		R	R^2	Sig.
Listening skills	49	.275*	.076	.028
Auditory vocabulary	49	.069		.318
Reading skills	48	.407**	.166	.002
Written vocabulary	48	.308*	.095	.017

* Correlation is significant at the 0.05 level (1-tailed) ** Correlation is significant at the 0.01 level (1-tailed)
Spearman correlation was performed for the variables