



UNIVERSITY
of
LIMERICK
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Department of Clinical Therapies

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Final Year Project

Using A Narrative Retell Tool; “Captain Grey and The Greedy Aliens”, what do Typically Developing Children Tell Us About Verb Production at Sentence Level?

Submitted in partial fulfilment of the regulations for the award of the Masters Degree in Speech and Language Therapy, University of Limerick.

Proposed Journal of Submission:

International Journal of Language and Communication Disorders

Word Count: 7,307

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2014

Acknowledgements

I would like to sincerely thank and express my deepest appreciation to Dr. Carol-Anne Murphy who has offered me invaluable support, encouragement and guidance throughout the entirety of this research project. She has been a fantastic supervisor.

I would sincerely like to thank all of the schools and participants involved for so willingly providing your time and making the whole process run as smoothly as possible.

I would like to thank my fellow student researchers.

I would like to thank the friends I have made on the course for their support and friendship throughout the challenges we have faced together over the past two years. You know who you are.

To my family and my best friend Fiona I would like to offer my special thanks for their undivided support throughout my studies. The encouragement and love that you have shown me has gotten me to where I am now. I could not have done any of this without you all.

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Research Report

Using a narrative retell tool, “Captain Grey and the Greedy Aliens”, what do typically developing children tell us about verb production at sentence level?

Sinead O’Brien, Dr. Carol-Anne Murphy

Abstract

Background: Research has found that children with Specific Language Impairment (CwSLI) often have difficulties with verb and verb structure. This research project has been undertaken to support development of a test of sentence production for children with language difficulties. Speech and Language Therapists currently have no comprehensive test of verb use in sentences of children with language impairments. A story retell tool, “Captain Grey and the Greedy Aliens”, was designed which targets a range of semantic-syntactic verb clauses and their associated argument structures.

Aims: To collect and analyse normative data from typically developing children aged 4; 06-12; 00 using a newly developed narrative retell told.

Methods and Procedures: The Test of Verb Knowledge (TOVK) and “Captain Grey and the Greedy Aliens” was administered to 91 typically developing children (TDC) aged 4;10-12;0 years. Statistical analysis was carried out using SPSS v.20. Qualitative analyse was carried out on the verb errors that occurred.

Outcomes and Results: A significant relationship was identified between verb knowledge and sentence level variables. Descriptive data indicated that there was a ceiling effect across the older age bands in the TOVK and sentence level variables. Verb errors were evident across all age bands with the majority of these being in the age bands on low frequency verbs.

Conclusions and Implications: This story retell tool could be a useful assessment in the identification of language impairments. Prior to standardisation a larger sample size should be recruited, in particular the children in the younger age bands.

Keywords: Specific Language Impairment, Normative Data, Verbs, Argument Structure, Story Retell, Standardisation, Verb Knowledge.

What this paper adds

What is already known on the subject? Children presenting with language impairments commonly present with verb knowledge difficulties and problems with verb use and structure.

What this paper adds? The research indicates that there is a significant suggestion that verb knowledge has an impact on the complexity of sentences produced by TDC.

Introduction

Aim of Research:

To collect and analyse normative data for an assessment designed to elicit a range of verbs (transitive, intransitive and optionally transitive) that will be standardised to be used by speech and language therapists in diagnosing language impairments. This data is to be gathered from typically developing children ranging from 4:6-12 years from a range of primary/national schools within Munster.

Introduction

Children with Specific Language Impairment (SLI) have a deficit in language acquisition and language use. Studies have found that children with SLI often have difficulties with verb and verb structure. These difficulties can affect a range of language areas, one of which is verb argument structure (Ebbles et. al, 2007). Speech and Language Therapists currently have no appropriate test of verb use in sentences in children with language impairments. A test of verb use in sentences, “Captain Grey and the Greedy Aliens”, has been developed by Murphy (2013). This review presents the background and rationale for a research project undertaken to support the development of this test of sentence production for children with language difficulties.

The aim of this research is to collect and analyse normative data for the standardisation of the assessment. The test has been designed to elicit a range of verbs and it is hoped that this test will be used by speech and language therapists in diagnosing language impairments. Data will be obtained from typically developing children across varied age ranges. Data gathered will enable clinicians to compare results of verb production in typically developing children to results of children with Specific Language Impairment.

This following section will review literature in reference to the following; verb and sentence production in typically developing (TD) children and children with Specific Language Impairment (SLI), methods of elicitation during assessment, tools for assessment of verb and sentence abilities and the need to gather normative data in order to standardise assessments.

Verb & Sentence Development in TD Children and Children with SLI:

Tomasello's (2003) usage based theory of language development outlines the link between children's initial use of inflections –ed and –in, their relation to verbs and the building of simple sentences. Tomasello believes that initially children treated verbs with inflections as a whole unit and that they cannot be separated. It is later in the child's development of language that they will begin to recognise that those inflections can be treated as a separate unit from the verb. Sentence structure builds around verbs, initially used with other nouns as agents or patients of the verb (eat bikkie; teddy sit) until the child uses a range of verbs in a variety of intransitive, transitive and di-transitive frames.

According to Leonard (1998), it has been estimated the 7% of children are affected by Specific Language Impairment. Children with SLI, from age 7 years and up, have been found to have continued difficulty with the correct use of verb morphology (Bishop et. al, 1994) Verbs are typically expected to be more challenging for children with SLI. Correct usage of verbs requires the child to account for several considerations such as people and objects (Chiat, 2000). Since verbs have a key role in the construction of the sentence structure, children with SLI who have difficulty in mastery of verbs therefore have an increased risk of further far-reaching consequences in relation to language development (Thordardottir & Weismer, 2001).

Thordardottir and Weismer (2002) investigated the spontaneous use of argument structures in typically developing children and children with SLI. This study found that the frequency of verb argument structures used did not substantially differ between groups however the children with SLI were more likely to omit obligatory argument structures and have difficulty using verb alternations.

Grela and Leonard (2000) carried out research in which they elicited sentences from children with SLI. These sentences used simple transitive, ditransitive and intransitive verbs. Sentences were with and without a prepositional phrase. Three groups of children were used in the study; children with SLI, typically developing children and children matched on Mean Length of Utterance (MLU). Analysis of the data obtained revealed that children with SLI and children matched on the MLU more frequently omitted the auxiliary *is* when required to produce sentences that required three arguments compared

to sentences that only required one to two arguments. Therefore by lengthening the sentence by adding a prepositional phrase, the results of the research indicate that it is the number of arguments rather than the length of the sentence that caused the children with SLI to be more likely to omit the auxiliary. The typically developing children reached a ceiling in all conditions of testing and were not affected by the argument structure manipulation. In light of these findings, it is indicated that when children with SLI are compared to typically developing children, that the children with SLI are more affected by syntactic complexity than their typically developing peers. In particular children have been seen to use more general all-purpose verbs in expressive narrative samples (Grela and Leonard, 2000)

Children's use of cognitive state verbs has been widely researched due to the close link between this form of verbs and the abilities of the child in relation to cognition, semantic and syntactic development. Cognitive state verbs convey abstract information about mental states, emotions, perceptions etc. These verbs are abstract at a semantic level and complex at a syntactic level as they typically co-occur with complement clauses (Owen Van Horne et.al, 2011). Through research, they found that children with SLI used fewer different than their typically developing peers. It was also found that children with the typically developing children were more likely to combine low-frequency verbs with a complement clause than the children with SLI. Owen Van Horne et.al believe that this is due to a lexical knowledge limitation rather than a syntactic deficit.

Ebbels et.al (2012) as cited in Ebbels (2007) has found that children require detailed semantic representation of verbs in order to produce accurate verb argument structures. Research carried out by Andreu et. al (2013) has found CwSLI have limitations and deficits in the semantic representations of verbs. Loeb et. al (1998) state that during the language acquisition process children are required to learn the semantic and syntactic features of verbs. Ebbels (2005) found that children with SLI aged 11; 0-14; 11 omitted more obligatory arguments for verbs that required three arguments. Incorrect syntactic positioning of the verb was linked to change of state verbs such as "fill" and "cover". Ebbels (2005) has also found that less errors occurred with change-of-location verbs such as "pour" and "put". Genter (1978) found that change-of-state verbs are more susceptible

to errors in the semantic representation learning process as there are less salient than other types of verbs.

Methods of Elicitation

“Captain Grey and the Greedy Aliens” is a story retell elicitation assessment developed by Murphy (2013) The story is accompanied by pictures that have been especially designed to reflect the story. Dodwell and Bavin (2008) found that children with SLI have a limited working memory capacity and that narrative abilities are linked to working memory. Dodwell and Bavin suggest the use of pictorial aids when eliciting a narrative sample with children who have SLI as a narrative retell supported by pictorial aids could possibly counteract poor memory which is characteristic of children with SLI.

Bishop and Donlan (2005) also advise inclusion of pictures for story recall. They believe that pictorial aids to the story facilitate better encoding of information and thus allow for increased quality of recall.

Norbury and Bishop (2003) believe that a narrative assessment allows the clinician to obtain a narrative sample that is indicative of the child’s everyday language. Hesketh (2004) believes that assessment of a child’s language sample that has been elicited in a spontaneous speech sample may not be a true indication of the child’s capabilities as spontaneous speech samples tend to be more syntactically simpler. Therefore, the sample obtained during spontaneous elicitation may not demonstrate the child’s true sentence production abilities.

According to Hesketh (2004) there are advantages to using a story re-tell narrative assessment with children with suspected language disorders. This method of elicitation is most likely to encourage unconfident children with language impairments to produce a response. As the specific target structures are being modelled in the story this should facilitate the child’s production of the target if it is within the child’s capacity.

Merritt et.al (1989) indicated that they preferred story re-tell assessments rather than generated narrative samples and story re-tell data was typically a more reliable method of scoring. They also found that re-told narratives produced a larger amount of clauses than generated narratives in children with and without language disorders. Language

samples obtained from generated stories had significantly increased errors, failures of word retrieval and a larger amount of irrelevant details. With supported narrative elicitation formats children with language disorders typically produce longer or more complex sentences. (Merritt et,al, 1989)

Assessments of Verb Knowledge

The assessments currently available such as in the Clinical Evaluation of Language Fundamentals 4 (CELF 4) have limited scope for comprehensive assessment of assessment of verb related production and there is a lack of comprehensive assessments available to elicit a range of verb types. The Verb and Sentence Test (VAST) (Bastiaanse et.al, 2002) is an adult verb assessment however similar tests are not available for the childhood population.

“Captain Grey and the Greedy Aliens”, developed by Murphy (2013) has 42 target verbs encompassing a range of verb syntactic and semantic classes and allowing for production of a variety of simple and complex sentence structures. Specially illustrated picture scenes were designed for each event in the story. To date the tool has been used with a small group of children with SLI as a baseline in an intervention study.

Standardisation

Standardised assessments are widely used in the clinical setting. They are a vital tool for objectively identifying and diagnosing Speech and Language Impairments. (Paul, 2007)

They included normative data that allows comparison with a clinical population of the same age as the child and discrepancies in this comparison can indicate impairment. (Dodd et al. 2009). In order to effectively plan therapy for children with language disorders, it is imperative that comprehensive information is required regarding the child’s language production. Language sample analyses can be effective in the language assessment and intervention planning process (Paul, 2007).

Conclusion

Research has shown that SLI is a heterogeneous impairment and the language profile of the children with SLI can and will change over time. This paper has highlighted the effect

SLI can have an impact on verb development and use and the link between verb deficits and sentence production. It is therefore imperative that a comprehensive assessment tool be standardised in order to fully assess verb production and use and to allow speech and language therapists to diagnose language impairments and compare data obtained with normative data. By appropriate interventions can be put in place. "Captain Grey and the Greedy Aliens" provides a comprehensive assessment of verb use in sentence production and if standardised could be a valuable assessment for clinicians in identifying deficits of verb use in children with and without language disorders.

Aims of Research

The aims of this study were:

- Using the story retell tool; "Captain Grey and the Greedy Aliens" normative data will be gathered from children aged between 4; 06-12 years on the production of verbs and their argument structure and mean sentence complexity (MSC).
- To assess the sensitivity of the tool across the age range (4; 06-12; 0)
- To investigate the relationship between verb knowledge (using TOVK) and sentence production and accuracy.
- To investigate which verbs the participants of this study have most difficulty with.
- To investigate the usefulness of "Captain Grey and the Greedy Aliens" as a clinical tool.

Methods

Study Design

This study is a cross sectional design.

Ethical Approval

This study was carried out following full ethical approval from the Education and Health Sciences Research Ethics Committee at the University of Limerick.

Participants and Recruitment

The data were collected by student Speech and Language Therapy students from the University of Limerick. Four schools were recruited in order to fulfil the data collection requirements of the study. Two of the schools recruited were known to the research supervisor. The other two schools were the former primary schools of two of the student researchers. The schools involved were in Clare and Cork. The principals of all schools involved were willing to partake in the research and permission was given for data collection to take place. The student researchers involved liaised with the schools throughout the data collection process. Information packs were sent to each school and were distributed by the principal to students in the school. These information packs contained information for both parents and children. If a parent expressed interest in having their child partake in the study, consent forms were then distributed accordingly. Parental consent was obtained prior to data collection commencing.

The participants of the study comprised of 91 typically developing children (TDC) who were all in primary school. Participants were students from junior infants to sixth class inclusive. The participants varied in age from 4; 06 – 12; 0. Inclusionary and exclusionary criteria for the TDC participating were: (1) that they were within the age range of the study, (b) had English as their first language, (c) did not have any known speech or language difficulties (i.e. normal speech and language development), (d) had hearing within normal limits.

Prior to recruitment it was aimed that a larger sample size would be obtained and an even spread of ages would be recruited; however this was not the case. Participants were

recruited in each age band however there were less children in the younger age bands, in particular age band 4;06-5;05. The following table is a breakdown of the age bands and the number of children in each:

1.1 Age Bands and Children in Each

Age Band	N
4;06-5;05	7
5;06-6;05	17
6;06-7;05	17
7;06-8;05	9
8;06-9;05	9
9;06-10;05	12
10; 06-12; 0	20

Design and Materials

“Captain Grey and the Greedy Aliens” was designed by Murphy (2013) and it involves a story retell elicitation method that assess a child verb production at sentence level. The narrative is accompanied by pictures that were specifically designed to elicit the target verbs. The story was designed to have a simple plot. This was originally trialled with four TD children aged between 6 and 9 years. When this test was being designed, a main aim of the designer was to include a wide range of verbs. While there are 53 verbs used in this story, only 42 of these are target verbs. These target verbs are in a variety of simple and complex sentence structures and are from different verb classes; syntactic and semantic.

The Test of Verb Knowledge (TOVK) was used to assess verb comprehension. Each target verb is accompanied by four pictures with one of these pictures being the target. In total

there are 36 target verbs, with 3 trial items that the clinical must administer prior to commencing the assessment.

Procedure

The student researchers worked in pairs during data collection. The TOVK was administered first. The participant was instructed to listen to the target verb and point to the accompanying picture. The trial items were administered first and if the participant presented with any difficulties then further instructions and (or) modelling was then provided.

The narrative that accompanies “Captain Grey and the Greedy Aliens” was read aloud to the participant. The child was instructed to listen carefully. Prior to telling the story, the child was advised that he/she would have to retell the story to the student researchers. The children were assured that they would have the pictorial aids to assist them in the retell. The student research pointed the scene that accompanied the narrative. This accompanying scene contained the target verb(s). The child’s attention was therefore directed to the appropriate scene. When the student researcher had finished the story, the child was asked to retell it. Some children needed encouragement to begin the story. The student research turned the page when the child had indicated that they were ready to move on to the next scene. It is important to note that the student researcher waited until the end of each page so as not to interrupt the child. One student researcher was marking the score sheet if and when the target verb was used by the participant. For any verbs that were not used gradual prompting was implemented. For the first prompt the student researcher directed the child’s attention to the relevant scene and asked them to talk about it again. Prompting then moved on to asking the child was asked to formulate a sentence with the target verb: “Can you make a sentence about the picture using the word “ clear?”. The younger children often required modelling of a sentence as it was found that they had confusion as to the meaning of a sentence and difficulty was therefore experienced in formulating a sentence correctly.

Voice recordings were used to transcribe data post administration of the assessment. The data was entered into the score sheet and scoring was then carried out. The transcripts were divided into utterances/sentences. Linguistic analysis was carried out on the

following: (a) verb argument structure accuracy (VAS), (b) length of utterance/mean sentence complexity (MSC).

The TOVK was scored at the time of administration.

Analysis (VAS)

If the verb argument structure of the target verb was accurate then the child obtained a score of 1. The maximum possible score for VAS was 1. In the case where the child omitted an obligatory argument or where the argument structure was incorrect then the child did not obtain any score and this was marked as a score of 0. The total number of verbs with correct argument structure produced was calculated as a percentage of the total verbs elicited. The following are examples of common VAS errors that were identified during analysis of the data and which were scored as incorrect (score of 0) ;

- “He poured bottles with magic juice” (argument structure mapping error)
- “He chased from Bog to Space” (obligatory argument missing)

Analysis (Length/MSC)

A complexity score was computed for length. If a sentence contained the target verb then it was scored based on the complexity and length of the sentence. The minimum score given was 1 and the maximum score given was 6. When calculating a score for length, the student researcher must score a sentence as just one regardless of the number of target verbs included. In this instance a score is given for the whole sentence. There were a number of different scoring rules for this section. The score was based on the following: (a) number of arguments and adjuncts, (b) co-ordination and embedding, (c) degree of complexity. There were also a number of exclusionary criteria for scoring, they are as follows: (a) a substitute of the target verb, (b) using the target verb as a noun, (c) an off-target response, (d) no response.

The following table outlines examples of sentences taken from the data and respective scores;

1.2 Examples of Scoring

Example	Type	Score
Captain Grey yawned	1 argument	1
He stayed there	2 arguments	2
The lady's picking the strawberry off the plant	2 arguments + 1 adjunct	3
He leaned his gun on the rock	3 arguments	3
They crawled over to the rocks and got sick	Coordination	4
The alien is crawling to the rocks to get sick	Infinitive	4
He said I bet you don't want to eat the sandwiches	Infinitive different subject	5
He ran to his wife's house and told her that he needed sandwiches	Coordination and embedding	6
Captain Grey didn't have petrol so he pushed it to his mother's house and told her that they needed food for the mission.	Multiple embedding	6

As can be seen from the table above, if a child produced the target verb with the correct obligatory arguments they could obtain a score of 1, 2 or 3. This score would depend on the inclusion of all obligatory arguments and where included adjuncts as an adjunct was given a score of 1. The maximum score that can be awarded for a sentence that contains the target verbs and required arguments is 3. A child who created a complex sentence had the possibility of scoring between 4 and 6. A sentence that contains a simple infinitive and evidence of conjoining received a score of four. A sentence that showed evidence of embedding/subordination received a score of 5. A child who produced a

sentence with multiple embedding obtained a score of 6. The MSC score was calculated by dividing the total length score obtained by the number of sentences.

Statistical Analysis

SPSS, v.20 was used to analysis the data. Basis statistics were obtained for the dependent variables; TOVK, Verb Argument Structure % correct (VAS %) and MSC (Mean Sentence Complexity). Scatter plots and correlational analysis were used to examine the relationship between age and the dependent variables. Partial correlational analysis was carried out to assess the between the TOVK (verb knowledge) and VAS% and the TOVK and MSC while controlling for age. Percentile ranks were obtained for TOVK, VAS% and MSC as a means of test standardisation. Grammatical verb errors were examined qualitatively.

Reliability

The student researchers consulted with the principal researcher, Dr. Carol-Anne Murphy regarding Inter-Rater Reliability. To ensure reliability of the scoring and analysis methods of each of the 5 student researchers, 20% of the sample was selected (10% of participants < 8years and 10% of participants >8 years). The sample was divided randomly and was scored in pairs independently. The following table outlines the percentage inter-rater agreement for each variable within the study:

1.3 Inter-Rate Reliability for Variables

Variable	Inter-Rater Reliability < 8 years
MSC	96.85%
VAS%	97.17%
TOVK	100%

Inter-Rater Reliability for Participants < 8 years.

Variable	Inter-Rater Reliability > 8 years
MSC	95.76%

VAS%	96.89%
TOVK	100%

Results indicate that the reliability for the participants < 8 years and > 8 years that reliability was above 95% for each variable. When it occurred that the student researchers were unsure as to how to correctly score an aspect of the test or did not agree on a given score, then the Principal Researcher was consulted to ensure consistent scoring across the set.

Results

Findings for Key Measures

Each of the variables was entered and descriptive statistics of the whole data set was obtained along with descriptive statistics of each age group (4;06-5;05, 5;06-6;05, 6;06-7;05, 7;06-8;05, 8;06-9;05, 9;06-10;05, 10;06-12;0).

1.4 Overall Group Performance on Key Variables.

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		5% Trimmed Mean	Confidence Interval 95%	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Lower	Upper
Agemont hs	91	58	144	98.96	25.493	.215	.254	98.40	7.424 9	8.307 4
TOVK	91	21	36	29.36	3.423	-.680	.254	29.50	28.64	30.06
VASraw	91	13	49	44.74	5.155	-3.578	.254	45.44	43.59	45.75
VASperc	91	27.08	100.00	92.3647	10.63645	-3.409	.254	93.73	89.99	94.44
LengthTo tal	91	56	145	121.61	17.133	-1.262	.254	122.63	117.7 5	124.9 3
LengthN Utts	91	36	49	43.08	2.691	-.201	.254	43.07	42.45	43.59
MSC	91	1.33	3.61	2.8333	.42671	-.726	.254	2.84	2.74	2.91
Preprom pt	91	5	36	20.84	6.142	.178	.254	20.81	3.80	4.66

1.5 Individual Group Performances on Variable TOVK

Age Band	N	Minimum	Maximum	Mean	Standard Deviation	Skewness	
						Statistic	Std.Error
4;06-5;05	7	21	30	24.43	3.047	.765	.794
5;06-6;05	17	22	31	26.18	2.877	.228	.550
6;06-7;05	17	22	33	28.71	2.801	-.857	.550
7;06-8;05	9	28	33	31.11	1.691	-.420	.717
8;06-9;05	9	28	36	30.78	2.489	1.013	.717
9;06-10;05	12	28	34	31.08	1.929	-.049	.637
10; 06-12; 0	20	28	34	31.85	1.785	-.860	.512

1.6 Individual Group Performances on Variable VASper Correct

Age Band	N	Minimum	Maximum	Mean	Standard Deviation	Skewness	
						Statistic	Std.Error
4;06-5;05	7	27.08	95.74	74.1457	24.67830	-1.324	.794
5;06-6;05	17	62.50	100.00	87.6518	9.24869	-1.357	.550
6;06-7;05	17	78.72	100.00	92.1965	7.52833	-.623	.550
7;06-	9	91.11	100.00	95.5133	3.60737	.002	.717

8;05							
8;06- 9;05	9	83.33	100.00	95.5944	5.14877	- 2.070	.717
9;06- 10;05	1 2	88.63	100.00	97.6508	3.24479	- 2.175	.637
10; 06- 12; 0	2 0	86.95	100.00	96.1885	4.40721	- 1.080	.512

1.7 Individual Group Performances on Variable MSC

Age Band	N	Minimum	Maximum	Mean	Standard Deviation	Skewness	
						Statistic	Std.Error
4;06- 5;05	7	1.33	3.13	2.2786	.61039	-.132	.794
5;06- 6;05	1 7	2.00	3.02	2.4971	.27825	.087	.550
6;06- 7;05	1 7	1.91	3.29	2.6688	.30812	-.420	.550
7;06- 8;05	9	2.47	3.41	2.9656	.41494	-.155	.717
8;06- 9;05	9	2.83	3.61	3.2444	.26154	-.286	.717
9;06- 10;05	1 2	2.60	3.29	3.0392	.23937	-.879	.637
10; 06-	2 0	2.59	3.45	3.0710	.21572	-.396	.512

12; 0							
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1.8 Normality of Dependent Variables

	Shapiro-Wilk		
	Statistic	df	Sig.
Ageyears	.919	91	.000
TOVK	.942	91	.001
VASperc	.672	91	.000
MeanSenComp	.964	91	.012

For the variable age of the whole group of participants we have data from 91 children (n=91). The age range of the participants (n=91) was from 58 months (4; 10) to 144 months (12; 0). The lowest score on the TOVK was 21 and a ceiling score of 36 was obtained. Analysis of VAS% shows that 100% accuracy was obtained, with scores ranging from 13 (27.08%) to 49 (100%).

Further breakdown of scores obtained can be seen in the table below. The skewness value for each variable was obtained. For all of the variables bar age and preprompt, the data appears to be negatively skewed; i.e. the distribution of the data is not symmetrical.

By comparing each group's descriptive data the following information can be taken:

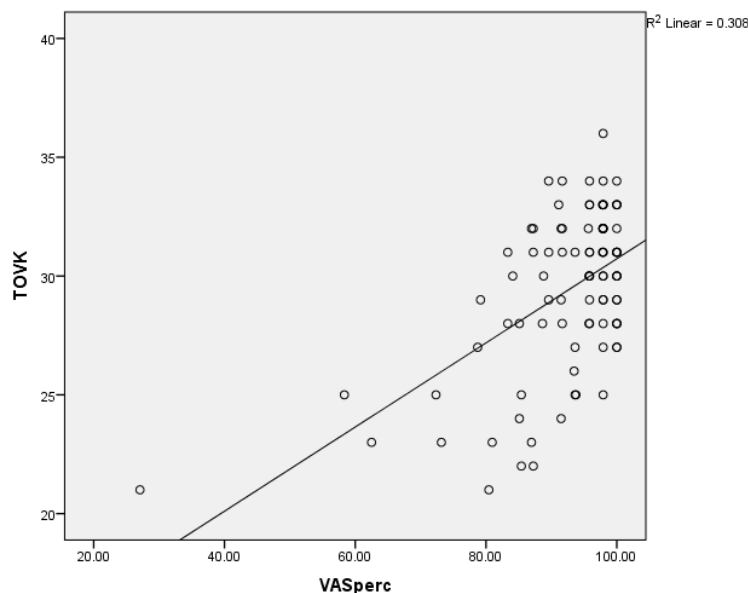
- There was an uneven spread of ages with fewer children in the youngest age band.
- The lowest score (21/36) on the TOVK was in the 4; 06-5; 05 age group. The highest score (36/36) was in the age group of 8; 06-9; 05.

- The lowest VASperc (27.08%) was obtained in age group 4; 06-5; 05. The highest VASperc (91.11%) was obtained in the age group 7; 06-8; 05.
- For MSC the lowest (1.33) was obtained in the youngest age group 4; 06-5; 05 while the highest (3.61) was obtained in age group 8; 06-9; 05.
- From analysis of the Shapiro Wilk test of normality, it appears that MSC is the only variable that does not violate the assumption of normality.

Relationship between Age and Dependent Variables

Correlational analysis was carried out to determine the strength and significance of the relationship between key variables. Spearman Rank Order Correlation (ρ) was utilised for this reason. Spearman's correlation coefficient measures the strength of association between two ranked variables. Scatterplots were used to explore the relationship between two variables. Pallant (2013) recommends generating scatterplots before calculating correlations. The following scatter plots and correlations were obtained: (1) TOVK & VASperc (2) TOVK & MSC, (3) Age & VASperc, (4) Age & MSC (5) Age & TOVK

1.9 TOVK and VASperc



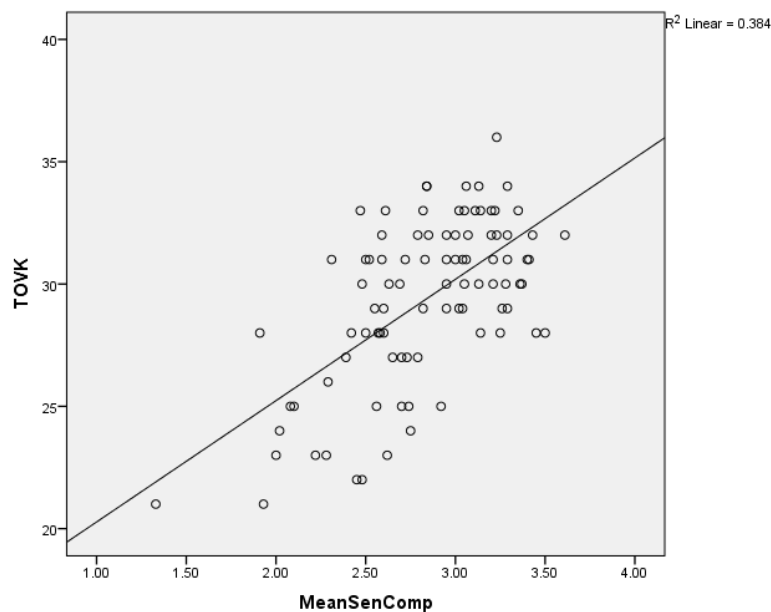
2.0 Correlation between TOVK and Vasperc

			TOVK	VASperc
Spearman's rho		Correlation Coefficient	1.000	.385**
	TOVK	Sig. (2-tailed)	.	.000
		N	91	91
		Correlation Coefficient	.385**	1.000
	VASperc	Sig. (2-tailed)	.000	.
		N	91	91

** . Correlation is significant at the 0.01 level (2-tailed).

The relationship between TOVK and VASperc was investigated using Spearman's Rho. There was a weak positive correlation between the two variables, $r = .385^{**}$, $n=91$, $p < .001$.

2.1 TOVK and MSC



This scatter plots indicates that there are outliers. From visual analysis of this scatterplot we can determine that there is some positive correlation between TOVK and MSC.

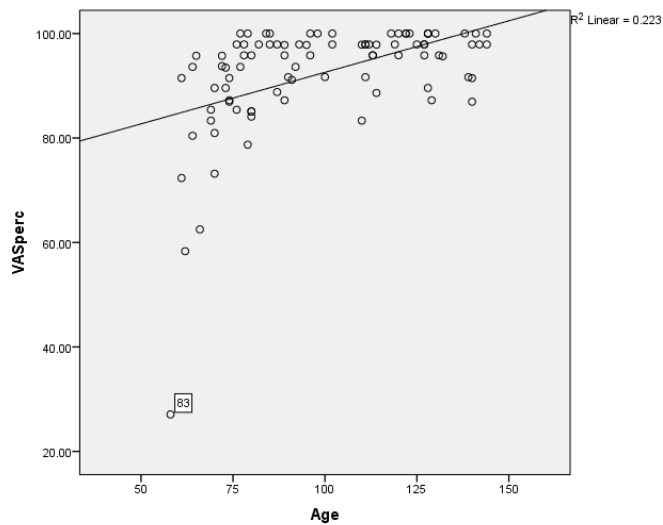
2.2 Correlation between TOVK and MSC

		TOVK	MeanSenComp
Spearman's rho	Correlation Coefficient	1.000	.528**
	Sig. (2-tailed)	.	.000
	N	91	91
	Correlation Coefficient	.528**	1.000
MeanSenComp	Sig. (2-tailed)	.000	.
	N	91	91

** . Correlation is significant at the 0.01 level (2-tailed).

The relationship between TOVK and MSC was investigated. There was a moderate positive correlation between the two variables, $r = .528^{**}$, $n=91$, $p < .001$, with age being associated with MSC

2.3 Age and VASperc



This scatter plot indicates that there are numerous outliers. This indicates that there is some correlation between VASperc and Age.

2.4 Correlation between VASperc and Age

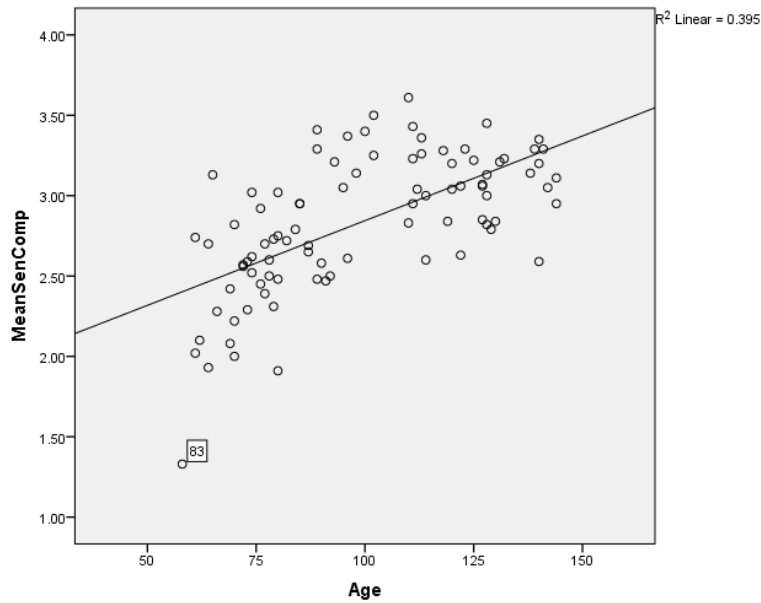
		Agemonths	VASperc
Spearman's rho	Agemonths		
	Correlation Coefficient	1.000	.524**
	Sig. (2-tailed)	.	.000
	N	90	90
VASperc	VASperc		
	Correlation Coefficient	.524**	1.000
	Sig. (2-tailed)	.000	.
	N	90	90

** . Correlation is significant at the 0.01 level (2-tailed).

The relationship between AGE and VASperc was investigated using Spearman's Rho.

There was a moderate positive correlation between the two variables, $r = .524^{**}$, $n=90$, $p < .001$, with age being associated with VASperc

2.5 Age and MSC



This scatterplot indicates that there is a strong positive correlation between MSC and Age.

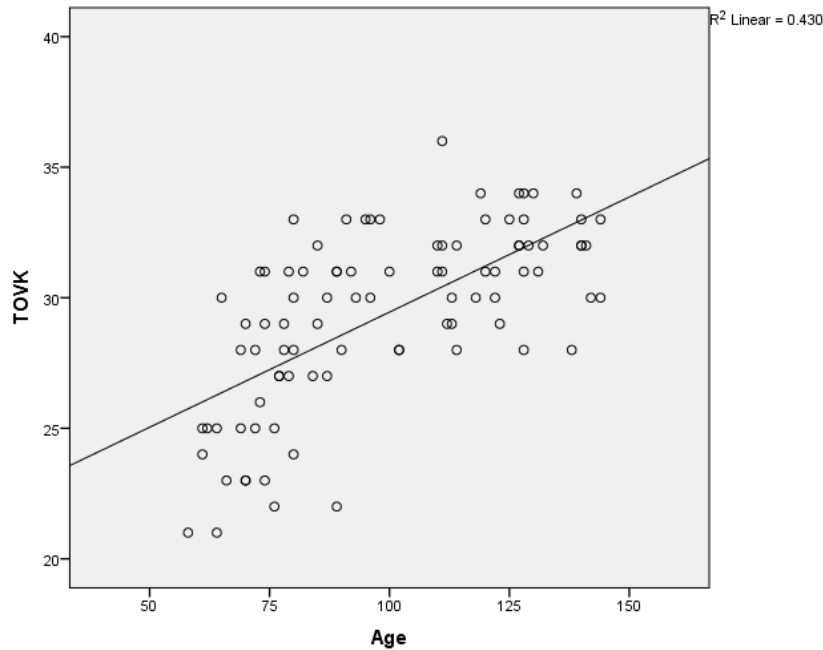
2.6 Correlation between Age and MSC

		MeanSenComp	Agemonths
Spearman's rho	Correlation	1.000	.641**
	MeanSenComp		
	Coefficient		
	p		
	Sig. (2-tailed)	.	.000
	N	90	90
Agemonths	Correlation	.641**	1.000
	Coefficient		
	Sig. (2-tailed)	.000	.
	N	90	90

** . Correlation is significant at the 0.01 level (2-tailed).

The relationship between AGE and MSC was investigated using Spearman's Rho. There was a moderate to strong positive correlation between the two variables, $r = .641^{**}$, $n=90$, $p < .001$, with age being associated with MSC.

2.7 Age and TOVK



Visual analysis of this scatterplot indicates that there is a strong positive correlation between TOVK and Age.

2.8 Correlation between TOVK and Age

		Agemonths	TOVK
Spearman's rho	Agemonths		
	Correlation Coefficient	1.000	.672 ^{**}
	Sig. (2-tailed)	.	.000
	N	90	90
TOVK	TOVK		
	Correlation Coefficient	.672 ^{**}	1.000
	Sig. (2-tailed)	.000	.
	N	90	90

^{**}. Correlation is significant at the 0.01 level (2-tailed).

The relationship between AGE and TOVK was investigated using Spearman’s Rho. There was a moderate to strong statistically strong positive correlation between age and verb comprehension (TOVK), $r = .672^{**}$, $n=90$, $p < .001$.

The following table is a summary of correlations between variables;

2.9 Summary of Correlations Between Variables:

	MSC	VASperc	TOVK	LENGHT
AGE	.641**	.524**	.672**	.644**
TOVK	.528**	.385**		

**** Correlation is significant at the 0.01 level (2 tailed)**

The strongest correlation relationship was evident between Age and TOVK with the weakest correlational relationship being evident between TOVK and VASperc.

Relationship between Dependent Variables When Age is controlled

Partial correlational analysis was carried out to determine the strength and significance of the relationship between verb knowledge (TOVK) and MSC and VASperc correct while controlling for age.

An inspection of the correlation for MSC and TOVK ($r = .528$) suggested that controlling for age had a strong effect on the strength of the relationship between these two variables. Prior to controlling for age $r = .528$ and when age was controlled $r = .353$.

Inspection of the correlation for VASperc and TOVK indicates that controlling for age had very little effect on the strength of the relationship between these two variables as $r = .385$ when not controlled for age and $r = .365$ when age was controlled.

3.0 Relationship between TOVK and Dependent Variables.

	VAS% Correct	MSC

TOVK	.385	.528
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3.1 Relationship Between TOVK and Dependent Variables when Age is controlled.

	VAS% Correct	MSC
TOVK	.365	.353

Percentile Ranks

Measures of relative standing are used to provide information about where a particular score falls in relation to the other scores in a distribution of data. Percentile ranks are a commonly used measure of relative standing. The following percentile ranks were obtained for; TOVK, VASperc and MSC.

3.2 Percentiles for TOVK

Age	Percentiles for TOVK						
	5	10	25	50	75	90	95
4;06-5;05	21	21	21	25	25	-	-
5;06-6;05	22	22.80	23	26	28.50	31	-
6;06-7;05	22	23.60	27	29	31	32.20	-
7;06-8;05	28	28	30	31	33	-	-
8;06-9;05	28	28	28.50	31	32	-	-
9;06-10;05	28	28.30	29.25	31	33	33.70	-
10;06-12;00	28	28.20	31	32	33	34	34

3.3 Percentiles for VASperc

Percentiles for VASperc	
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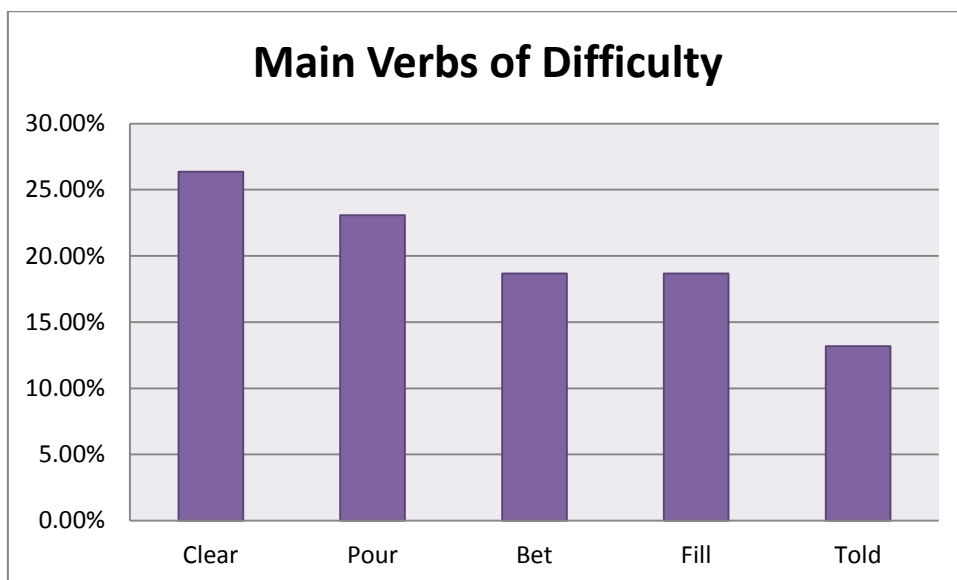
Age	5	10	25	50	75	90	95
4;06-5;05	27.08	27.08	58.33	80.43	93.62	-	-
5;06-6;05	62.50	71.03	84.37	89.58	93.68	98.33	-
6;06-7;05	78.72	79.08	85.10	95.83	97.91	100.00	-
7;06-8;05	91.11	91.11	91.66	95.83	98.96	-	-
8;06-9;05	83.33	83.33	93.74	97.91	97.92	-	-
9;06-10;05	88.63	90.79	96.32	97.91	100.00	100.00	-
10;06-12;00	86.96	87.46	92.65	97.91	100.00	100.00	100.00

3.4 Percentiles for MSC

	Percentiles for MSC						
MSC	5	10	25	50	75	90	95
4;06-5;05	1.33	1.33	1.93	2.1	2.74	-	-
5;06-6;05	2.00	2.06	2.28	2.52	2.66	2.94	-
6;06-7;05	1.91	2.23	2.49	2.69	2.87	3.07	-
7;06-8;05	2.47	2.47	2.54	3.14	3.38	-	-
8;06-9;05	2.83	2.83	2.99	3.25	3.46	-	-
9;06-10;05	2.60	2.60	2.88	3.05	3.25	3.28	-
10;06-12;00	2.60	2.79	2.87	3.09	3.22	3.34	3.44

Qualitative Analysis of Verb Errors

3.4 Histogram Displaying Main Verbs of Difficulty for Participants.



3.5 Examples of Verb Errors

Verb	Frequency of Verb	Transitivity of Verb	Semantic Class	Examples of Verb Errors
Clear	Low Frequency Verb	Ditransitive	Alternating Change of Location	E.g. " The Aliens cleared the food"
Pour	Low Frequency Verb	Transitive	Verb of Creation	"Captain Grey poured the water"
Bet	Low Frequency Verb	Transitive	Cognitive State Verb	" He bet him"
Fill	Low Frequency Verb	Transitive	Change of State Verb	"Captain Grey filled the petrol into the ship"
Told	High Frequency Verb	Transitive	Cognitive State Verb	" Told the solider"

From the above table *3.4 Example of Verb Errors* we can see that the top 5 verbs that caused difficulty are from a range of semantic classes. 4/5 verbs are low frequency verbs with the exception of one which is the verb “told”. 80% of these verbs are transitive.

Discussion

Verb Argument Structure

Upon analysis of the mean scores for the VASperc correct there was an obvious progression of scores as the age bands increased. There was evidence of a high number of outliers across the VASperc correct data as many of the younger participants achieved ceiling or near ceiling scores. This suggests that verb argument structure accuracy is achieved early in TD children. No floor effects were present as all children participated and no scores of zero were given. The age band of children aged 6; 06-7; 05 obtained a mean of 92%. When compared to the youngest age band of children aged 4; 06-5; 05 who obtained a mean of 74% there is an obvious increase in verb argument structure accuracy. This is in accordance with previous research which shows that verb errors decrease in TD children from 7 years on (Conti-Ramsden et. al, 2011)

Mean Sentence Complexity

There was a strong correlation between MSC, TOVK and VASperc correct and age, thus suggesting that correct argument structure and sentence complexity increases with age in TD children. MSC scores appeared to be highest at 8; 06-9; 05 due to the presence of outliers. Scores decreased after this age band, a possible explanation for this is that children may not have felt compelled to create complex sentences.

Verb Comprehension

Analysis of data showed that children in the 8; 06-9; 05 age band achieved ceiling in the TOVK (verb knowledge). There appeared to be a developmental progression of scores of achieved on this test with the lowest score being evident in the youngest age band. A close relationship between verb knowledge and sentence level variables was identified. Ambridge et.al (2008) state that verb knowledge is fundamental in the production of correct verb argument structures for the storage of semantic-syntactic verb classes,

Verb Errors

Qualitative analysis of verb errors indicated that there was a high incidence of verb errors across the age bands on low frequency verbs. As expected, there were more verb errors

noted in the younger age bands when compared to the older children. This indicates that semantic and syntactic classes of verbs follow a developmental progression. However the sample size of the participants is relatively small, so this should just be treated as an indication and warrants further investigation with a larger sample size in order to be representative of the majority of TD children. The verbs that caused most difficulty as outlined in table 3.3 were identified across all age ranges. For the verbs “clear”, “pour” and “fill” the majority of errors occurred as the child omitted the obligatory argument. For the verb “fill” the children often had incorrect mapping of the verb argument structure, with such examples as “Captain Grey filled the petrol into the space ship”. The verb “bet” appeared to cause confusion amongst the participants with many children misinterpreting the meaning of the verb and instead using the verb “to beat”. This may be due to the Hiberno-English pronunciation of the verb. These verbs all required three obligatory arguments and are a variety of semantic and syntactic verb classes. This analysis corresponds to Owen Van Horne et al (2011) theory that these verbs are expected to cause difficulty amongst children.

Test Behaviours

Many children appeared to have difficulty with the length of the assessment and attention levels decreased as the story progressed, this may have had an impact on the abilities of the participants and may warrant further investigation. Some of the younger participants had difficulty understanding the task demands, for example when gradual prompting was used and the children were asked to make a sentence using a target verb, many children misunderstood the meaning of a sentence and instead provided the student researcher with a definition of the verb. The younger children appeared to have higher levels of distractibility when compared to the older children which may have had an impact on the results. Some children appeared very shy and reluctant to retell the story which therefore impelled the student researcher to provide the child with further instructions and encouragement. Some children appeared anxious and expressed concern that they would not be able to remember the entire story. There were incidences of children using the target verb to make up sentences that were unrelated to the story even when modelling was used.

Limitations

This study had a relatively small sample size. The number of participants in each age band was uneven with more participants in the older age bands. A small sample of participants can reduce the power of the statistical outcome and also reduces the sensitivity of the tool. Paul and Norbury (2012) recommend that 100 participants per age group be utilised when standardising an assessment.

In order to ensure the reliability of this tool, a large sample size would need to be obtained across more geographical areas. Recruitment of any future participants should include children from the younger age bands.

Inter-rater reliability was carried out by the student researchers, however in order to ensure the reliability of the study, concurrent reliability may be carried out before standardisation is completed.

Recommendations

Based on the test behaviours outlined above, applying certain modifications to the test should be considered before utilising this as a clinical assessment tool. Based on the test behaviours discussed above, further development of graduated prompts may be required as it was unclear at times whether children, especially those in the younger age bands, fully comprehended the prompt instructions. Data was obtained on the number of times a participant required a prompting and this may be utilised in future research in order to obtain further information on the affect prompting had on scores achieved and whether the amount of prompting decreased with age progression as would be hypothesised.

Younger children had difficulty with the length of the story and some participants expressed concern about this. Possible modifications could be made to story length. The story could possibly be divided into sections which may result in less prompting and therefore less administration time. This may also have an impact on scores obtained.

Conclusions

Verb argument structure accuracy increased with age with ceiling effects been seen in children in the older age bands, thus indicating that TD children acquire verb argument structure early. The complexity of sentences that children produced appears to increase with age. Verb knowledge increased with age with many children achieving a ceiling affect in the 8; 06-9; 05 age band. Verb knowledge appears to have a strong relationship with sentence production variables. There appeared to be a high incidence of verb errors across all age bands and in particular with low frequency verbs. “Captain Grey and the Greedy Aliens” appears to be a useful clinical tool for future identification of problematic features of verb type errors in children with SLI. The above recommendations would need to be considered proper to standardisation of the test.

The findings of this study would encourage future exploration and leads the way for standardisation of this tool.

References

- Ambridge, B. & Goldberg, A.E. (2008) "The island state clausal components: evidence in favour of an information structure explanation", *Cognitive Linguistics*, 19(3), 357-389
- Andreu, L., Sanz-Torrent, M., Olmos, J.G. & MacWhinney, B. (2013) "The formulation of argument structure in SLI: an eye-movement study", *Clinical Linguistics and Phonetics*, 27 (2), 111-133
- Bishop, D. V. M. (1994). "Grammatical errors in specific language Impairment: Competence or performance limitations". *Applied Psycholinguistics*.15, 507–550.
- Bishop, D.V.M. & Donlan, C.(2005) "The role of syntax in encoding and recall of pictorial narratives: Evidence from specific language impairment", *British Journal of Developmental Psychology*, 23, 25-46.
- Chiat, S.(2000) *Understanding Children with Language Problems*, Cambridge: Cambridge University Press
- Conti-Ramsden, G., & Jones, M. (1997) "Verb use in specific language impairment" *Journal of Speech, Language and Hearing Research*, 40(6), 1298.
- Dodd, B., McIntosh, B., Leahy, M. and Murphy, N. (2009) 'Atypical Speech in Irish Children: Identification and, differential diagnosis', *Journal of Clinical Speech and Language Studies*. 17 pp. 4-24.
- Dodwell, K. & Bavin, E. (2008) "Children with specific language impairment: an investigation of their narratives and memory", *International Journal of Language and Communication Disorders*, 43(6), 201-218.
- Ebbels, S. H. (2007). "Teaching grammar to school-aged children with Specific Language Impairment using Shape Coding." *Child Language, Teaching and Therapy* 23(1).
- Ebbels, S. H., van der Lely, H.K.J. and Dockrell, J.E. (2007) "Intervention for Verb Argument Structure in Children With Persistent SLI: A Randomized Control Trial", *Journal of Speech, Language, and Hearing Research*, 50(5), 1330-1349.

- Genter, D. (1978) On relational meaning: the acquisition of verb meaning. *Child Development*, 49, 988-998.
- Grela, B.G., & Leonard, L.B. (2000). "The influence of argument-structure complexity on the use of auxillary verbs by children with SLI". *Journal of Speech, Language and Hearing Research*. 43, 1115-1125.
- Hesketh, A., (2004). "Grammatical performances of children with language disorder on structured elicitation and narrative tasks". *Clinical Linguistics and Phonetics* 18(3) 161-182
- Leonard, L. B. (1998). *Children with specific language impairment*. Cambridge, MA: MIT Press.
- Leonard, L., Miller, C., & Gerber, E., (1999) "Grammatical Morphology and the Lexicon in Children with Specific Language Impairment". *Journal of Speech, Language and Hearing Research*. 42(3), 678-689.
- Leonard, L.B., Deevy, P., Kurtz, R., & Chorev, L.K., (2007). "Lexical Aspect and the Use of Verb Morphology by Children With Specific Language Impairment". *Journal of Speech, Language and Hearing Research* 50, 759-777.
- Loeb, D.F., Pye, C., Richardson, L.Z. & Redmond, S. (1998) "Causative Alternations of Children with Specific Language Impairment", *Journal of Speech, Language, and Hearing Research*, 41(5), 1103-14
- Merritt, D.D., & Liles, B.Z., (1989). "Narrative analysis-clinical application of story generation and story retelling. *Journal of Speech, and Hearing Disorders*. 54, 438-447.
- Murphy, C. A. (2013). *Profiles and Characteristics of Sentence Production difficulties in Children with Specific Language Impairment*. PhD Thesis. School of Education, Communication and Language Sciences, Newcastle University.
- Norbury, C., & Bishop, D., (2003) "Narrative skills of children with communication impairments". *International Journal of Language and Communication Disorders*. 38(3), 287-313.

Owen Van Horne, A.J. & Lin, S.(2011). "Cognitive state verbs and complement clauses in children with SLI and their typically developing peers". *Clinical Linguistics & Phonetics* 25(10), 881-889.

Pallant, J. (2010) *SPSS survival manual: a step by step guide to data analysis using SPSS*, 4th ed., Maidenhead: McGraw-Hill

Paul, R. (2007). *Language disorders from infancy through adolescence*. St Louis, MO: Mosby

Paul, R. & Norbury, C. (2012) *Language Disorders from Infancy through Adolescence: Listening, Speaking, Reading, Writing and Communication*, 4th ed., Missouri: Elsevier Mosby.

Thordardottir, E. (2008). "Language-specific effects of task demands on the manifestation of specific language impairment: A comparison of English and Icelandic". *Journal of Speech, Language, and Icelandic*. 51, 922-937.

Thordardottir, E. T. and S. E. Ellis-Weismer (2001). "High frequency verbs and verb diversity in the spontaneous speech of school-age children with specific language impairment." *International Journal of Language and Communication Disorders* 36(2).

Thordardottir, E. T., & Weismer, E. (2002). "Verb argument structure weakness in specific language impairment in relation to age and utterance length." *Clinical Linguistics and Phonetics*, 16, 233–250

Tomasello, M., (2003) *Constructing a language: A usage based theory of language acquisition* . Cambridge, MA: Harvard University Press.

Bastiaanse, R., Edwards, S., & Rispens J., (2002) *Verb and Sentence Test (VAST)*