Title	Language performance of sequential bilinguals on an Irish and English sentence repetition task
Author(s)	Antonijevic, Stanislava; Durham, Ruth; Ní Chonghaile, Íde
Publication Date	2017-04-05
Publication Information	Antonijevic, Stanislava, Durham, Ruth, & Chonghaile, Íde Ní. (2017). Language performance of sequential bilinguals on an Irish and English sentence repetition task. Linguistic Approaches to Bilingualism, 7(3-4), 359-393. doi: doi:10.1075/lab.15026.ant
Publisher	John Benjamins Publishing
Link to publisher's version	http://dx.doi.org/10.1075/lab.15026.ant
Item record	http://hdl.handle.net/10379/6435
DOI	http://dx.doi.org/10.1075/lab.15026.ant

Language Performance of Sequential Bilinguals on an Irish and English Sentence Repetition Task

Stanislava Antonijevic
National University of Ireland, Galway
Ruth Durham
Health Service Executive Longford-Westmeath, Ireland
Íde Ní Chonghaile
Health Service Executive West, Ireland

Author Note

Stanislava Antonijevic, School of Health Sciences, National University of Ireland, Galway; Ruth Durham, Health Service Executive, Longford-Westmeath, Ireland; Íde Ní Chonghaile, Health Service Executive, West, Ireland.

The authors would like to thank members of COST Action IS0804 "*Language Impairment in a Multilingual Society: Linguistic Patterns and the Road to Assessment*" (www.bi-sli.org) for sharing their ideas and insights regarding LITMUS based SRep tasks. We acknowledge Theodoros Marinis for providing us with the School-Age Sentence Imitation Test-E32. We would also like to thank Sarah-Ann Muckley, Áine McKeown and Rosa Nutty who helped designing sentences for the Irish SRep task and Edward Jones who assisted in recording the sentences. Finally, we would like to thank three anonymous reviewers whose comments significantly improved the manuscript.

Correspondence concerning this article should be addressed to Stanislava Antonijevic, School of Health Sciences, National University of Ireland, Galway, Áras Moyola, Galway, Republic of Ireland.

E-mail: *stanislava.antonijevic@nuigalway.ie*

Abstract

Currently there are no standardized language assessments for English-Irish bilingual school age children that would test languages in comparable way. There are also no standardized language assessments of Irish for this age group. The current study aimed to design comparable language assessments in both languages targeting structures known to be challenging for children with language impairments. A sentence repetition (SRep) task equivalent to the English SRep task (Marinis, Chiat, Armon-Lotem, Piper, & Roy, 2011) was designed for Irish. Twenty-four typically developing, sequential bilingual children immersed in Irish in the educational setting performed better on the English SRep task than on the Irish SRep task. Different patterns were observed in language performance across sentence types with performance on relative clauses being particularly poor in Irish. Similarly, differences were observed in error patterns with the highest number of errors of omission in Irish, and the highest number of substitution errors in English.

Keywords: Irish, bilingualism, sentence repetition, sequential bilingualism, minority language

1. Introduction

The Republic of Ireland is a bilingual country having two official national languages with Irish being the first and English being the second (Irish Constitution, 1937). While all school children study the Irish language as a separate curriculum subject, there are also specialized Irish language schools, the Gaelscoileanna, which are at the forefront of the Irish-medium education sector (Gaelscoileanna Teo, 2013). Gaelscoileanna represent an immersion-education model whereby all subjects and all communication at school is conducted through the Irish language (Gaelscoileanna, 2013). The language demographics in schools is mainly determined by the geographical location of the school. Gaelscoileanna in Gaeltacht (areas in Ireland where the Irish language is, or was until the recent past the main spoken language of a substantial number of the local population) enroll a larger number of children with Irish as their L1, although there seems to be an increasing number of children who join those schools with no or very little Irish (Harris et al., 2006). Gaelscoileanna in other areas of Ireland are largely populated by children who have L1 English and acquire L2 Irish through immersion in the all-Irish schools. While children attending Gaelscoileanna in Gaeltacht are a heterogeneous population with various extents of exposure and proficiency in their L1 and L2 (Péterváry, Ó Curnáin, Ó Giollagáin, & Sheahan, 2014), children attending all-Irish schools in other parts of the country are much more homogenous with respects to Age of Acquisition (AoA) and the amount of exposure to L1 and L2 (Harris et al., 2006). The majority of this latter group are monolingual English speakers who are immersed in all-Irish school from age 4, or all-Irish preschool from age 3, while keeping English as the dominant home language. Due to the more homogenous background of children in all-Irish schools in predominantly English speaking areas in the current study we opted for testing the initial version of a SRep task by collecting data in all-Irish schools.

The above described educational situation in Ireland alongside various degrees and types of Irish-English bilingualism pose complex demands on speech and language therapy (SLT) (O'Toole & Hickey, 2013). In their clinical practice, speech and language therapists (SLTs) use knowledge of typical language development as a comparative tool for the efficacious assessment and treatment of language impairments in children. In current practice, the knowledge available is mostly based on monolingual English speaking children. Relatively little is known about the pattern of development in either language of Irish-English or English-Irish bilingual children. In order to adequately profile the pattern of language acquisition of those bilinguals it is necessary for children to be assessed in both languages (Armon-Lotem & de Jong, 2015; Muckley Uí Chomhraí & Antonijević, 2012; O'Toole & Fletcher, 2012). This study aims to provide comparable SRep tasks for Irish and English by piloting the tasks, in the first instance on L1 English L2 Irish children immersed in all-Irish schools.

2. Language Proficiency in Bilinguals

Several factors such as AoA, quantity and quality of language input and the interaction of the languages have been shown to influence language proficiency in L1 (Butler & Hajuta, 2006; Montrul, 2008; Muckley Uí Chomhraí & Antonijević, 2012; Thomas, Williams, Jones, Davies, & Binks, 2014) and L2 (Armon-Lotem, Gagarina, & Walters, 2011; Blom & Vasić, 2011; Chondrogianni & Marinis, 2011; Paradis, 2011; Thomas et al., 2014).

Generally, the literature has focused on children with minority L1 who are immersed in dominant L2 (e.g., Chondrogianni & Marinis, 2011; Paradis, 2011; Summers, Bohman, Peña, Bedore, & Gillam, 2010). By contrast, only a small number of studies have examined language acquisition in children who have a minority, endangered language as L1 and who attend either bilingual schools or schools in the minority language (Hickey, 2001; 2007; Thomas et al., 2014;

Thomas & Roberts, 2011). Unlike either of the two groups of studies, the current research focuses on a specific situation in which the dominant language, English, is the child's L1 while the minority, endangered language, Irish, is the L2 that is being acquired through immersion in an all-Irish school in a predominantly English speaking area. Studies of acquisition of English as L2 show that the richness of the English environment children are exposed to significantly contributes to their proficiency in English (Paradis, 2011). For children acquiring Irish as L2, in English speaking areas of Ireland, a rich Irish language environment does not exist. Even in Gaeltacht areas, a significant level of codeswitching, reduced or incomplete language acquisition and acquisition of the dominant English language have modified the language environment to the point that an Irish monolingual environment no longer exists (Péterváry et al., 2014). This creates a situation in which, although immersed in all-Irish schools, L1 English-speaking children never experience the same rich monolingual environment in their L2 Irish as they experience in English.

Another factor influencing language proficiency in bilinguals is the interaction between languages in terms of their lexical and grammatical similarities (Lofranco, Peña, & Bedore, 2006). Although English and Irish share a high number of cognates, the morphosyntactic characteristics of the two languages are very different (Ó'Dónaill, 2005). English is a Subject Verb Object (SVO) language while Irish is a Verb Subject Object (VSO) language. In English, the attributive adjective goes before the noun (e.g. the red ball), whereas in Irish the attributive adjective follows the noun (e.g. *an* 'the' *liathroid* 'ball' *dearg* 'red'). In addition, unlike English, Irish is a highly inflected language. Verbs can be inflected for tense, mood, aspect, voice, number and person while nouns are inflected for gender, number and case. Initial sound mutation that does not exist in English plays an important role in marking inflections in the Irish language, and also has other morphological, syntactic and phonetic functions. These differences between the

two languages are particularly important when assessing language proficiency in L1 English, L2 Irish bilingual children because it has been shown that the errors that typically developing (TD) children produce in L2 tend to resemble the morphosyntactic structures of their L1 (Meir et al., 2016). This means that as a result of the small number of inflections, and lack of initial mutations in their L1 English, children acquiring Irish as L2 might be inclined to omit those grammatical markings. Given that a deficit in morphosyntax is a key marker of primary language impairment (PLI) (Crago & Gopnik, 1994; Rice & Wexler, 1996), language production of L1 English L2 Irish children could appear similar to that of children with PLI. In this way morphosyntactic differences between English and Irish can add additional layer of difficulty to the language assessment of bilingual children.

3. Bilingualism and Language Impairments

Problems related to language assessment in bilingual children were addressed by European Cooperation in Science and Technology (COST) Action IS804 ‘Language Impairment in Multilingual Society: Linguistics Patterns and the Road to Assessment’. The approach adopted by this COST Action promotes “testing in both languages in tandem with tools that are sensitive to the nature of bilingual acquisition” (Armon-Lotem & de Jong, 2015, p.3). This lead to the development of the Language Impairment Testing in Multilingual Settings (LITMUS), a comprehensive set of assessment tools that have parallel versions in a number of different languages (for details see Armon-Lotem & de Jong, 2015).

4. Sentence Repetition Task

One of the tests developed within COST Action IS804 is the LITMUS-SRep task, a SRep task that has parallel versions in more than 20 languages (see Marinis & Armon-Lotem, 2015, for details). The SRep tasks target linguistic knowledge and draw on grammaticality, plausibility,

prosody and lexicality (Polišenská, Chiat, & Roy, 2015). SRep has been proven to be a good clinical marker for the identification of children with language impairment in monolingual populations (Archibald & Joanisse, 2009; Conti-Ramsden, Botting, & Faragher, 2001; Laws & Bishop, 2003; Redmond, Thompson, & Goldstein, 2011). This is due to the test's high sensitivity and specificity. Compering the SRep from the Clinical Evaluation of Language Fundamentals 3 (CELF-3) (Semel, Wiig, & Secord, 1995) with non-word repetition (NWRep), past-tense and third person singular -s as clinical markers of PLI, Conti-Ramsden et al. (2001) showed that the SRep had much higher sensitivity (90%) and specificity (85%) than the other tasks. These findings were confirmed by Archibald and Joanisse (2009) who used a combination of short SRep and NWRep tasks as screeners for language impairment as well as the Clinical Evaluation of Language Fundamentals 4 (CELF-4) (Semel, Wiig, & Secord, 2003). Comparing the results of CELF-4 and SRep the study indicated very high sensitivity of 96% and specificity of 65% for the SRep, confirming the task as very good at identifying monolingual children with language impairment.

Research employing the SRep in bilingual children has yielded mixed results. Chiat et al. (2013) compared SRep performance in 3 different second languages: Hebrew, German and English. The majority (91%) of both L1 Russian and L1 English speakers of L2 Hebrew were found to perform within monolingual norms in their L2 after 2 years of language exposure. In addition, about 70% of L1 Russian speakers of L2 German performed within monolingual norms in L2 after 2 years of exposure. At the same time, only 12% of L1 Turkish L2 English speakers performed with the monolingual norms in their L2 after the same length of time. However, performance across languages could not be directly compared due to the different SRep tasks used, and the potentially confounding variable of socioeconomic status (SES).

Thordardottir and Brandeker (2013) used comparable SRep tasks in English and French along with other clinical marker tools to assess language in simultaneous French-English school age monolingual and bilingual children with and without PLI. Significantly different performance was observed between the TD and PLI groups indicating the sensitivity of the SRep tasks. Language knowledge expressed through receptive vocabulary and the amount of exposure influenced performance on both SRep tasks.

A recent study by Meir, Walters and Armon-Lotem, (2016) examined sentence repetition in L1 Russian L2 Hebrew TD children and children with PLI using comparable LITMUS based SRep tasks (Marinis & Armon-Lotem, 2015). While monolingual TD Russian speakers outperformed bilinguals, there was no difference between monolingual and bilingual TD speakers of Hebrew. In addition, bilingual TD children outperformed bilingual children with PLI. Not only quantity, but also the quality of errors differed between the two bilingual groups. While bilingual children with PLI produced morphosyntactic errors in the form of omission of coordinators, subordinators and prepositions, as well as simplified wh-questions and relative clauses, the errors of bilingual TD children were mainly additions and substitutions related to grammatical properties of their L1 Russian. Because Russian is morphosyntacticaly complex (see Meir et al., 2016) it was possible to relate the error pattern to the children's L1. For children who have English as L1 and a highly inflected L2 (e.g. Irish), errors based on grammatical patterns from their L1 might appear very similar to the omissions of function words and inflections that have been indicated as a characteristic type of error for children with PLI. This would lead to an error pattern being the same or very similar for both TD bilinguals and bilinguals with PLI.

5. Method

The primary goals of the current study were: a) to design a LITMUS based SRep task in Irish to be used for language assessment of bilingual children in SLT practice, and b) to apply the SRep task in Irish together with the "School-Age Sentence Imitation Test-E32" (Marinis et al., 2011) in English to profile language proficiency in L1 English L2 Irish sequential bilinguals.

The study received full ethics approval from the College of Medicine, Nursing and Health Sciences Research Ethics Committee at the National University of Ireland, Galway.

5.1. Construction of Irish SRep task

A SRep task in Irish was designed following the principles used for other LITMUS-SRep tasks outlined by Marinis and Armon-Lotem (2015) and commenced from an adapted "School-Age Sentence Imitation Test-E32" (Marinis et al., 2011). Because of the lack of research related to syntactic structures in Irish which are challenging for children with PLI, we were not able to include this type of sentence in the Irish version of the task. Instead we used equivalent structures to those in the English SRep task that are known to be challenging for children with PLI in other languages. Another difficulty in designing the Irish test was that, at the time of the test creation, there was no available data related to word frequency, AoA and imageability and this data is still very limited (e.g., Měchura, 2015). Because of this and also because our aim was to create SRep task equivalent to the English SRep test, most sentence types and words used were the translational equivalents of those used in the English sentences.

Instead of SVO sentence structure and SVO with negation in the English SRep task, the Irish SRep task included VSO and VSO with negation sentence structures that are characteristic for the Irish language. Both types of structures also included auxiliaries as these are known to be

challenging for language-impaired children (Rice & Blossom, 2012; Rice & Wexler, 1996). Some Irish VSO sentences had two auxiliaries (Sentences 3, 4, 5 and 6) and some had only one (Sentences 1, 2, 7 and 8) in order to maintain consistency with the sentences in the English SRep task. Passive sentences were included because they are known to be challenging for English speaking children with PLI (Marinis & Saddy, 2013; Marshall, Marinis, & van der Lely, 2007; Montgomery & Evans, 2009; van der Lely, 1996). As in the English SRep task, wh-questions and object relative clauses were included because these have been identified as challenging for PLI children across languages (Adani, van der Lely, Forgiarini, & Guasti, 2010; Friedmann & Novogrodsky, 2004; Friedmann & Novogrodsky, 2011; Frizelle & Fletcher, 2014). Although previous research has shown that L1 Irish speaking children acquire both subject and object relative clauses by the age of 5, in several languages such as Irish, French and Serbian, children tend to use a nonstandard binding mechanism to form subject relative clauses (Goodluck, Guilfoyle, & Harrington, 2006; Goodluck & Stojanović, 1996; Labelle, 1996). Irish only permits subject relative clauses formed by movement (McChloskey, 1990), and, although L1 Irish children use movement mechanism to construct relative clauses, they also lack adult proficiency in using morphosyntactic details (Goodluck et al., 2006). The potential difficulty and low probability of subject relative clauses in Irish was suggested by SLTs working with L1 Irish children. Because of this in the current study subject relative clauses were excluded from both the Irish and the English SRep task. Bi-clausal sentences were included as a control condition. These sentences were matched to the syntactically complex sentences in terms of length. In this way the Irish SRep task, similarly to other LITMUS based SRep tasks, included a set of syntactically complex structures that have been identified as clinical markers of PLI across languages, a set of simple structures that served as controls, and a set of structures that are characteristic for the Irish

language (see Marinis & Armon-Lotem, 2015). Both English and Irish SRep tasks included twenty-four sentences with six sentence types and four sentences of each type (see Appendix A).

Due to variation in language structure, sentence length in the English SRep ranges from seven to eleven words, while in the Irish SRep sentence length ranges from seven to twelve words. Sentences were pre-recorded by an English-Irish bilingual speaker from the same region as the participants so that accent and dialect were similar to that of participating children. Recording took place in a sound proof room and recording equipment used included a Creative Labs EMU-0404 USB Audio Interface, a Shure PG-27 Microphone and Audacity Audio Recording and Editing Software. Audio sentences were presented via Power Point presentation, while to engage children, the presentation included animations and the children were able to see how many sentences they need to repeat. The children listened to the sentences via Sony over-ear headphones.

5.2. Participants

Thirty two children were recruited from a first class (3rd year of formal education) in an all-Irish school in an urban English-speaking area. Children with previous diagnosis of neurological, learning, language or hearing impairment were excluded from the study. To ensure children did not have significant language difficulties the Renfrew Action Picture Test (RAPT) (Renfrew, 1997) was carried out in English with all participants. On the basis of the results of their screening tests and/or due to a history of hearing difficulties three children were excluded from the study while one participant was absent during testing. A total of 28 children (12 male and 16 female) with average age of 85.19 months (*SD*=4.41) participated in the study. All children were sequential bilinguals with L1 English to which they were exposed from birth, and L2 Irish to which they were exposed through educational settings. All children lived in an English speaking

urban area and attended an all-Irish school. Eight of the children were first exposed to Irish in preschool which results in their Length of Exposure (LoE) to L2 Irish of 39 months at the time of testing and average Age of Exposure (AoE) of 46.5 months (*SD*=6.35). Twenty children were first exposed to Irish at school with LoE of 27 months and average AoE of 58 months (*SD*=3.65). According to parental reports, 18 children spoke no Irish outside of school, 4 children spoke Irish at home sometimes, and 6 children spoke Irish at home on most days.

In the school in which the data were collected, children are immersed in Irish for full day (4 hours and 40 minutes) from junior infants (first year of school) to the Christmas break of senior infants (second year of school). This means that the children are immersed in Irish for the full first year at school and the first half of the second year. After that children have a 20 - 30 minute English class daily. Children are expected to make an effort to speak Irish throughout the day including playtime and other breaks. From the first class (the third year of school) the school day increases to 5 hours 40 minutes which increases daily exposure to Irish by one hour. At the time of testing, the children were in the third month of their first class.

It is important to stress at this point that, although children are immersed in their L2 Irish at school, the language environment in all-Irish schools is variable. Teachers are often L2 speakers themselves and sometimes employ code switching to support children in their first years of formal education. Children are expected to speak Irish at all times in school, including the playground, but this is not always strictly observed.

5.3. Procedure

Testing was carried out with each child individually. This study included three tests; (i) The Renfrew Action Picture Test (RAPT) (Renfrew, 1997) in English, (ii) the English SRep task, and

(iii) the Irish SRep task. Presentation of SRep tasks in English and Irish were counterbalanced to avoid possible order effects. All 24 sentences were presented in one block in pseudo-randomized presentation order.

The children were instructed to listen to the sentences and repeat as accurately as possible what they hear. Two practice sentences were played before the start of the 24 sentence test. Each sentence was played once unless there was an interruption in the room or if the child made no response at all.

5.4. Scoring

Participants' responses were recorded using a Sony ICDPX232 2GB Dictaphone and then transcribed verbatim for scoring. Scoring followed the "School-Age Sentence Imitation Test-E32" Guidelines (Marinis et al., 2011), which gives one point if the sentence was repeated entirely correctly and no points if there were one or more errors. This gave an overall SRep task score. The content word score included the overall number of content words produced regardless of their position in the sentence, and regardless of any changes in inflections. The function word score included the overall number of function words regardless of their position in the sentence. In the case of auxiliary verbs, a score of one is recorded for each correct verb regardless of inflection or tense (for further details see Marinis et al., 2011).

Further scoring was carried out on the types of errors made on content and function words separately. Omissions, substitutions and additions on content and function words were recorded. Finally, changes in word order, where one or more words were repeated in a different position in the sentence, were recorded (for details see Marinis et al., 2011).

5.5. Data Analysis

The current study had two main objectives: a) to construct an SRep task in Irish and examine the reliability and validity of the test, and b) to profile language proficiency in both languages of L1 English L2 Irish sequential bilinguals. To achieve these objectives we firstly examined reliability and validity of the SRep tasks. This was followed by the examination of the effects of chronological age and LoE on children's performance in the Irish SRep task. Further analyses were conducted comparing the overall performance on English and Irish SRep tasks, also examining performance across sentence types for the two languages. Finally, types and frequency of errors were compared across the languages and across word type (function vs. content).

In order to keep the SRep tasks short there were only four sentences for each sentence type. For each of the four sentences participants could score 1 or 0 resulting in a possible range of scores of 0-4 for each of the 6 sentence types. Because of this and because of a relatively small overall number of sentences, non-parametric tests were used for data analysis.

6. Results

6.1. Reliability and validity of the SRep tasks

In order to investigate inter-rater reliability three tests (+10%) in each language were second marked. The mean number of sentences without disagreement was 22 for English SRep task and 20.67 for the Irish SRep task.

In order to investigate intra-rater reliability three tests (+10%) in each language were marked and second marked by the same researcher. The mean number of sentences without disagreement was 22.33 for English SRep task and 22.67 for the Irish SRep task.

To test the internal validity of the SRep tasks, split-half method and Cronbach's Alpha tests were used. For the English SRep task both a Spearman-Brown estimate and Cronbach's Alpha indicated good internal validity (r'= 0.819; α = 0.838, N = 24). The same is true for the Irish SRep task although both values were slightly lower that for the English version of the task (r'= 0.758; α = 0793, N = 24).

Further examination of the frequency of correct repetition for each of the sentences indicated that in the English SRep task there were a number of sentences close to ceiling (Sentence 12 passive construction, Sentence 13 and in particular Sentence 16, both Wh-questions) (see Appendix A). There were also two sentences that were correctly repeated by less than 10 participants (Sentence 7 SVO + 2 aux + neg. and Sentence 23 Bi-clausal sentence).

In the Irish SRep task none of the sentences were close to ceiling, however there were two sentences that no participant repeated correctly (Sentences 17 Object relative and Sentence 23 Bi-clausal sentence) and a number of sentences that were correctly repeated by less than 5 participants (Sentence 2 VSO + aux, Sentences 5, 6 and 7 VSO + aux + neg., Sentence 15 Wh-question, Sentences 18 and 19 Object relative, Sentence 21 Bi-clausal sentence) (see Appendix A, Table A1). Further examination of the scores within each sentence type indicated that in the Irish SRep task the number of correct repetitions for all four relative clauses was low (Sentences 17-20, see Appendix A, Table A1). In all other sentence types there was at least one sentence that more than 40% of participants repeated correctly. This suggests that, unlike relative clauses, participants did not have problems with the sentence structures per se, but either with lexical and/or morphosyntactic forms within the sentences or with the cumulative effect of the sentence structure and the lexical and morphosyntactic form. Sentence descriptions and frequencies of

correct repetition for each sentence for English and Irish SRep tasks are presented in Appendix A Tables A1 and A2).

6.2. Effect of Age and Length of Exposure on Language Skills

A linear regression analysis indicated that age did not significantly predict variability in language skill as shown by overall score on either the English SRep: [$r^2 = 0.06$, $F(1,27) = 1.685$, $p > 1$] or the Irish SRep: [$r^2 = 0.06$, $F(1,27) = 1.872$, $p > 1$]. In addition, LoE in Irish did not significantly influence performance on the Irish SRep [$r^2 = 0.06$, $F(1,27) = 1.872$, $p > 1$]. Although chronological age and LoE are usually found to influence language performance it is possible that there was insufficient variability in these factors to achieve statistical significance.

6.3. Analysis across languages

Difference in overall language performance on English and Irish SRep tasks was examined using a Wilcoxon T test which found that participants performed significantly better on the English ($Md = 16.5$, $R = 19$) than the Irish SRep task ($Md = 6.5$, $R = 16$) [$T = 6$, p(2-sided) < 0.001], with a large effect size ($r = 0.60$). This is to be expected given that English is the participants' L1 while Irish is their L2.

SRep performance in both languages were further analysed according to the frequency of successfully repeated content and function words. A Wilcoxon T test revealed a significant difference between the number of content words produced in L1 English ($Md = 80$, $R = 35$) and L2 Irish SRep tasks ($Md = 70$, $R = 28$) ($T = 18.50$, $p < 0.001$) with a large effect size ($r = 0.56$). Participants produced significantly more content words in the English than in the Irish task. Further analysis was performed for function words. A Wicoxon T test indicated significant difference between the number of function words produced in English ($Md = 133$, $R = 52$) and

Irish SRep tasks (*Md* = 112, *R* = 50) (*T* = 5, p < 0.001) with a large effect size (*r* = 0.60) indicating that participants produced significantly more function words in English than in Irish.

Scores on each of the six sentence types were compared across languages. A set of Wilcoxon T tests revealed significant differences in the number of correct repetitions in English and Irish for all sentence types (Figure 1) (see Table 1 for the summary of the analyses).

Table 1

Summary of comparison of repetition accuracy for six types of sentences in English and Irish

Sentence type	English Md (R)	Irish Md (R)	*T*	*p*	*r*
SVO/VSO	3 (3)	2 (4)	18	0.0001	0.48
SVO/VSO + Neg.	2 (4)	1 (3)	13	0.0001	0.49
Passive	3 (3)	2 (4)	19	0.0001	0.44
Object Wh-questions	3 (3)	1 (3)	11	0.0001	0.58
Object relatives	2.5 (4)	0 (2)	0	0.0001	0.58
Bi-clausals	3 (4)	1 (3)	18	0.0001	0.53

6.4. Analysis across sentence types within each language

Analyses across sentence types were conducted separately for the English and Irish SRep tasks. Friedman's ANOVA indicated significant differences across sentence types in English SRep ($\chi^2(5) = 31.56$, p(2-tailed) < 0.001) with a relatively weak effect size (Kendall's $W = 0.22$) (see Figure 1). Post-hoc analysis using Wilcoxon T tests was conducted with a Bonferroni correction applied, resulting in a significance level set at $p < 0.003$. A significant difference was observed between SVO sentences and SVO sentences with negation ($T = -28$, p(2-tailed) = 0.002, $r = 0.55$); SVO with negation and wh-questions ($T = 16$, p(2-tailed) < 0.001, $r = 0.71$); SVO with negation and passives ($T = 15$, p(2-tailed) < 0.001, $r = 0.64$); wh-questions and relative clauses ($T = 19.50$, p(2-tailed) < 0.001, $r = 0.64$) and wh-questions and bi-clausal sentences ($T = 15.00$, p(2-tailed) = 0.002, $r = 0.58$). Participants performed similarly on SVO sentences, passives, wh-questions and

bi-clausal sentences. Lower performance was observed for SVO sentences with negation and relative clauses (see Figure 1).

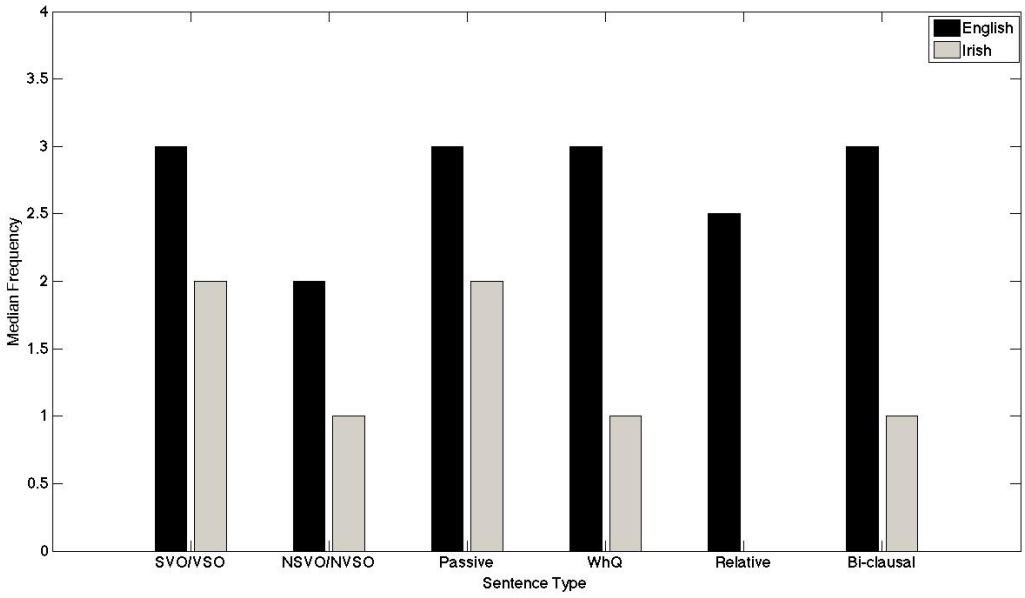

Figure 1

Median frequency of correct repetition for English and Irish SRep tasks across sentence types: SVO/VSO with two auxiliaries, SVO/VSO with two auxiliaries and negation (NSVO/NVSO), passives, object wh-questions, object relative clauses, and bi-clausal sentences. All differences between English and Irish scores are highly significant (p<0.001).

Friedman's ANOVA also indicated significant differences across sentence types in the Irish SRep ($\chi^2(5) = 43.86$, p(2-tailed) < 0.001) with a medium effect size (Kendall's $W = 0.32$) (see Figure 1). Post hoc analysis using Wilcoxon T tests was conducted with Bonferroni correction applied resulting in the same significance level as for the English ($p < 0.003$). Significant differences were observed between VSO sentences and relative clauses ($T = 5.5$, p(2-tailed) < 0.001, $r = 074$); VSO with negation and passives ($T = 15$, p(2-tailed) < 0.001, $r = 0.64$); VSO with negation and wh-questions ($T = 16$, p(2-tailed) < 0.001, $r = 0.71$); wh-questions and

relative clauses (T = 19.50, p(2-tailed) < 0.001, r = 0.64) and wh-questions and bi-clausal sentences (T = 15, p(2-tailed) = 0.002, r = 0.58). In the Irish SRep task participants performed similarly on VSO sentences and passives, followed by wh-questions, VSO sentences with negation and bi-clausal sentences while performance on relative clauses was rather poor (see Figure 1).

6.5. Error analyses

Errors were initally categorised as errors made on content versus function words. Within each category errors were further categorised as omissions, substitutions, additions and changes in word order.

6.5.1. Analyses across languages

Errors were first analysed within word type (content vs. function) and across languages. A set of Wilcoxon T tests conducted on content words revealed higher number of errors for all three error types in Irish than English (Figure 2) (see Table 2 for the summary of the analyses). Further set of Wilcoxon T tests conducted on function words indicated significantly higher number of errors in Irish than in English for all three error types (Figure 2) (see Table 3 for the summary of the analyses).

Table 2

Summary of comparison of the number of errors for three types of errors on content words between English and Irish

Error type	English Md (R)	Irish Md (R)	*T*	*p*	*r*
Omission	1.5 (22)	9.5 (24)	11.5	0.0001	0.57
Substitution	3 (14)	7 (11)	60	0.0001	0.44
Addition	0 (1)	0 (0.2)	3	0.03	0.29

Table 3

Summary of comparison of the number of errors for three types of errors on function words between English and Irish

Error type	English Md (R)	Irish Md (R)	*T*	*p*	*r*
Omission	2 (36)	14.5 (37)	9	0.001	0.59
Substitution	4 (18)	11 (21)	0	0.001	0.62
Addition	1.5 (6)	2.5 (7)	74	0.03	0.29

Although English is an SVO and Irish a VSO language the number of word order errors was quite small. Nevertheless, Wilcoxon T test found a signifficant difference in the number of word order errors between English ($Md = 0$, $R = 1$) and Irish ($Md = 1$, $R = 3$) ($T = 32$, $p = 0.01$) with a medium effect size ($r = 0.49$). Significantly more word order errors were made in Irish than in English. Despite the differences in Irish and English syntactic structures, the errors were neither related to the difference in the VSO versus SVO structure nor to the order of nouns and pronouns.

6.5.2. Analysis across word and error type withing each language

The number of errors were further compared across error types separately for each word type within each language. A Friedman's ANOVA indicated a significant difference in the number of errors on content words across error types in Irish ($\chi^2(2) = 47.59$, $p < 0.001$) with a large effect size ($W = 0.85$). Omissions were the most frequent errors ($Md = 9.5$, $R = 24$), followed by substitutions ($Md = 7$, $R = 11$) and additions ($Md = 0$, $R = 2$)(see Figure 2). Post-hoc analysis using Wilcoxon signed-rank tests was conducted with a Bonferroni correction applied, resulting in a significance level set at $p < 0.02$. A significant difference was observed between omission

and substitution errors ($T = 55.5$, $p < 0.001$, $r = 60$); omission and addition errors ($T = 0$, $p < 0.001$, $r = 0.86$) and substitution and addition errors ($T = 0$, $p < 0.001$, $r = 0.86$).

The difference in the number of errors of different types made on function words in Irish was also significant ($\chi^2(2) = 45.50$, $p < 0.001$) indicating a large effect size ($W = 0.81$). Similar to errors on content words, errors made on function words were most frequently omissions ($Md = 14.5$, $R = 37$), followed by substitutions ($Md = 11$, $R = 21$) and finally additions ($Md = 2.5$, $R = 7$) (see Figure 2). Post-hoc analysis using Wilcoxon T tests were conducted with Bonferroni correction applied, resulting in a significance level set at $p < 0.02$. Significant differences were observed between omission and substitution errors ($T = 68.5$, $p = 0.01$, $r = 0.57$); omission and addition errors ($T = 0$, $p < 0.001$, $r = 0.86$) and substitution and addition errors ($T = 0$, $p < 0.001$, $r = 0.86$).

A Friedman's ANOVA revealed a significant difference across error types made on content words in English ($\chi^2(2) = 41.22$, $p < 0.001$) with a large effect size ($W = 0.74$). Unlike Irish, most errors with content words in English were substitutions ($Md = 3$, $R = 14$) followed by omissions ($Md = 1.5$, $R = 22$) while there was only a very small number of additions ($Md = 0$, $R = 1$) (see Figure 2). Post-hoc analysis using Wilcoxon T tests were conducted with Bonferroni correction applied, resulting in a significance level set at $p < 0.02$. Significant differences were observed between omission and substitution errors ($T = 37.50$, $p = 0.01$, $r = 0.57$); omission and addition errors ($T = 0$, $p < 0.001$, $r = 0.73$) and also substitution and addition errors ($T = 0$, $p < 0.001$, $r = 0.85$).

A Friedman's ANOVA also revealed a significant difference in the number of errors across the function words in English ($\chi^2(2) = 28.60$, $p < 0.001$) with a large effect size ($W = 0.51$).

The highest number of errors were substitutions (*Md* = 4, *R* = 18) followed by omissions (*Md* = 2, *R* = 36) and a small number of additions (*Md* = 1.5, *R* = 6). Post-hoc analysis using Wilcoxon T tests were conducted with Bonferroni correction applied, resulting in a significance level set at $p < 0.02$. The difference between frequency of omission and substitution errors failed to reach significance ($T = 97$, $p > 1$, $r = 0.18$) while a significant difference was observed between omission and addition errors ($T = 16.50$, $p < 0.001$, $r = 0.67$) as well as between substitution and addition errors ($T = 0$, $p < 0.001$, $r = 0.80$).

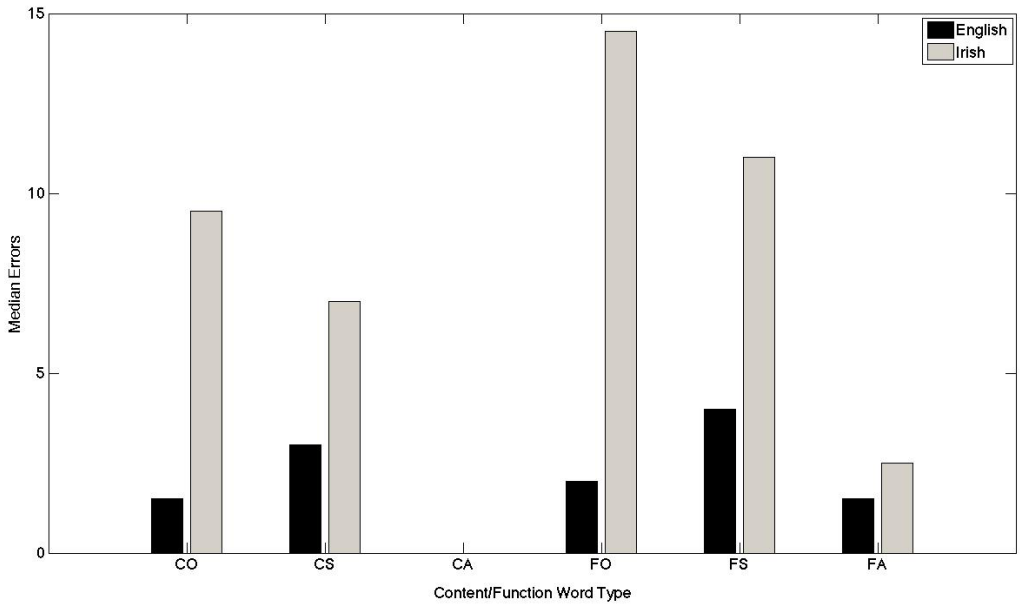

Figure 2

The number of errors of omission (O), substitution (S) and addition (A) for content (C) and function (F) words in English and Irish SRep tasks. Differences across languages in the number of omissions and substitution errors for both word types were highly significant (p<0.001). The difference in the number of additions reached significance at p<0.05 level

6.5.3. Qualitative analysis of errors across sentence types

6.5.3.1. Irish

Across all Irish sentences there were errors related to morphosyntax. An example of this is the interchangeable use of determiners without changing the number of the noun: determiner *an* that marks singular and *na* that marks plural. The gender marker *í* 'female singular' was replaced by *íad* 'plural' or *é* 'male singular'. Gender substitution also appeared in the form of exchanging the female singular pronoun *sí* and male singular pronoun *sé*. Another instance of changing gender involved omitting the feminine gender marker expressed through initial mutation (e.g. *an foireann* /fʲ i ɾʲ ə n̪ˠ / instead of *an fhoireann /o ɾʲ ə n̪ˠ/* 'the team'). These types of errors appeared across all sentences, but were more frequent in those that are longer and structurally more complex. Another type of error, which was not specific to a particular sentence type was noun substitution or omission in cases where children did not know the word. Finally, errors related to initial mutations appeared across several sentence types. Initial mutations affect the initial consonant by changing a stop into a fricative, which is orthographically marked by an *h* after the consonant. We observed omissions of lenition of the initial consonant that marked different morphological and syntactic functions. Most frequent was the omission of lenition marking past tense (e.g., bácáil / bˠ aː k aː lʲ / instead of bhácáil / vˠ aː k aː lʲ/). The omissions of gender marking lenition for feminine nouns (see the example above) as well as genitive marking lenition for masculine nouns were also observed (e.g., *fear an bainne* /bˠ a n̪ʲ ə/ instead of *fear an bhainne /vˠ a n̪ʲ ə/ 'man of milk'/'milkman').*

Errors related to sentence types were also observed. In VSO sentences with auxiliaries that included the passive marker *á* (Sentences 1 and 2, see Appendix A), the marker was either

omitted or substituted with an *ag*, the prefix marking present continuous (note that the same phonological form also marks the preposition 'by') which changed the verb tense. This error was followed by omitting the preposition *ag* 'by' after the verb. In VSO with auxiliaries in Sentences 3 and 4 the second auxiliary *bheith*, verbal noun form of *bí* 'to be' was frequently omitted. The same trend was observed in VSO sentences with auxiliaries and negation. The only specific error related to the VSO negative sentences was replacing negation *ní*, the negative form of copula *is* 'is' with *níl*, the negative form in present tense of verb *bí* 'to be'.

Errors specific to passive sentences involved incorrect forms of irregular verbs. For example, instead of using the verbal adjective (e.g. *ite* 'eaten') children used the verbal noun (*ithe*). Errors on regular verbs were less frequent and involved omitting verbal adjective marking *te* (e.g. *ciceáil* instead of *ciceálite* 'kicked'). Another typical error in passive sentences was omitting or replacing the preposition *ag* 'by' with a different preposition (e.g. *ar* 'on').

Wh-questions typically involved omission of the past tense (e.g. *dóirt* 'spill' instead of *dhóirt* 'spilled'). Wh-question words that were particularly difficult were *Cé dó* 'Who for'. These were either substituted with *Cé hé* 'Who is' or omitted. It seems that starting a sentence with *Cé dó* (Sentence 15) was so complicated for children that eight of the children did not manage to repeat the sentence at all and reported that they forgot the sentence. In Sentence 13, the verb *dhóirt* 'spilled' was frequently substituted with the verb *fuair* 'found' and this is most likely a phonological transition from the noun *fear* 'man' that was the next word in the sentence.

In the case of relative clauses, specific errors consisted of omitting the second clause. In addition, similarly to VSO + auxiliaries and VSO + auxiliaries + negation, in Sentence 19 the

passive marker *á* was either omitted or replaced by the prefix *ag* which marks present continuous.

The most frequent error in bi-clausal sentences was either omission or substitution of the conjunction *má* 'if', which was in a number of cases replaced by its equivalent in English. Sentence 22 that starts with the conjunction *má* seemed to have been difficult for the participants resulting in four of them omitting the first sentence. In addition and similarly with relative clauses, in Sentence 23 the second sentence was frequently omitted, which is most likely because of the length of the sentence. Other errors referred to the verb conditional (e.g. *beadh* instead of *bheadh* conditional of 'to be'). Errors across all sentence types in Irish are presented in Appendix B, Table B1.

6.5.3.2. English

Unlike in the Irish SRep task, morphosyntactic errors were not prevalent in the English version of the task. General errors refer to substitution of content words and some function words such as prepositions or personal pronouns. In some cases, past tense forms of irregular verbs were changed (e.g. substitution of *hit* with *hitten*).

In SVO sentences with 2 auxiliaries verb tense of auxiliaries was sometimes changed or omitted. In addition, past tense forms were sometimes substituted with present tense forms or an over-regularized form (e.g. *hitted*).

In SVO sentences with 2 auxiliaries and negation similar type of errors were observed. Longer forms of auxiliary with negation were substituted by shorter forms, sometimes in a different verb tense (e.g. *won't have* substituted with *hasn't*) and past tense verb forms were substituted with present tense forms.

In the case of passive sentences, errors typical for this structure were omissions of an auxiliary and changes to the past tense verb form (*eaten* was substituted with *eated* or *eatened*). The preposition *by* that is characteristic for passives was sometimes replaced with preposition *with*.

For wh-questions there were a few cases in which the wh-pronoun was substituted (*which* was substituted with *what*). General errors of content word substitution were observed, along with personal pronoun substitutions, and one case of substitution of auxiliary.

In object relative clauses, relative pronoun *that* was substituted with different types of wh-pronouns (*what* or *who*) or conjunctions (*and* or *so*).

Errors related to the bi-clausal sentences were diverse and mainly consisted of substitutions of single words or sentence fragments. There were also a small number of verb tense substitutions or substitutions of auxiliaries. Errors across all sentence types in English are presented in Appendix B, Table B2.

Overall, the results indicated significantly better performance in children's L1 English than L2 Irish. Analysis of correct repetitions showed less accurate repetition of wh-questions and bi-clausals in Irish relative to expectations based upon comparison of correct repetitions across six sentence types in both languages (see Figure 1). The most significant difference was observed in the case of relative clauses for which there were a very small number of correct repetitions in Irish. Error analyses showed that significantly more errors of all three types on both content and functions words were made for Irish relative to English. While in the Irish task the most frequent error type were omissions for both content and function words, in the English task the most frequent errors related to content words were substitutions, these were followed in

frequency by omissions with a very small number of additions. There was no significant difference in frequency of omission and substitution of function words in the English SRep task with a significantly smaller number of additions. Qualitative analysis showed that in both languages there were errors made across all sentences and errors related to specific sentence types.

7. Discussion

The present study aimed to design a LITMUS based SRep task (Marinis & Armon-Lotem, 2015) for Irish and to profile language proficiency of bilingual children in L1 English L2 Irish using comparable SRep tasks. The Irish SRep task was designed to be equivalent to the "School-Age Sentence Imitation Test-E32" (Marinis et al., 2011). Participants were English-Irish sequential bilinguals who spoke L2 Irish in the educational setting and L1 English in their everyday life. The assessment procedure followed recommendations resulting from COST Action IS804 that both of the languages of bilingual children should be tested using comparable tests and testing procedures (Armon-Lotem & de Jong, 2015).

7.1. Reliability and validity of Irish SRep task

Analysis of reliability and validity of Irish and English SRep tasks indicated good inter- and intra-rater reliability and also good internal validity. Given that the current study only included TD children, sensitivity and specificity of the tasks could not be tested for the bilingual population acquiring L1 English and L2 Irish. This question will be address in future studies.

Examination of scores across individual sentences indicated that not all sentences in the Irish SRep task had good discriminability, i.e. they did not show enough variability across participants. In the case of relative clauses it was evident that participants had low scores across

all four sentences. For all other sentence structures, a high number of correct repetitions was observed for at least one sentence indicating that the difficulties participants had were not with the sentence structure, but with some of the individual words/word forms. In Irish, the most common error was the omission of function words *á* 'passive marker', *ag* 'verb prefix denoting present continuous' and *an* 'the'. These function words are, depending upon their phonetic environment, sometimes stressed (e.g., in front of a vowel), but sometimes they are pronounced as if they are a part of the verb that follows (e.g., *ag ól* / ɛ ɟ oː l̪ʲ/ 'drinking' -> *agól /a g oː l̪ʲ/*). Because of this variability in pronunciation, those forms might be difficult to acquire (Muckley Uí Chomhraí & Antonijević, 2012). In the current study, the presence of these forms across sentences in the Irish SRep task was not controlled and could have interacted with the effect of sentence structures and unsystematically hinder correct repetitions. The use of this type of function words needs to be balanced in a further version of the task.

7.2. Factors that influence L2 performance

Length of exposure and chronological age did not significantly influence language performance on Irish SRep task. This could have been the case because all children participating in the study were of similar age and similar language exposure, resulting in reduced variability on both factors. AoA and LoE effects on sentence repetition are not consistently reported in other studies. Chiat et al. (2013) reported effects of AoA and LoE only in the case of a Russian-Hebrew bilingual group, but not in case of Turkish-English and Russian-German groups.

Another factor known to effect language proficiency is the interaction between bilinguals' two languages. As discussed earlier, English and Irish exhibit a number of differences in their morphosyntactic structure (Ó'Dónaill, 2005). Therefore, it is reasonable to expect that L2 development will be slower than if the morphosyntactic structure of these languages were similar

(Lofranco, Peña and Bedore, 2006). As evidenced by the overall scores for correct repetitions and errors, and also comparisons across sentence types and error types, participants exhibited significantly higher language performance in their L1 English than L2 Irish. In addition, analysis of errors indicated that the dominant type of error made in L2 Irish was omission of function words. With the exception of definite article *an* 'the' that exists in both languages, omitted function words (like passive marker 'á' and present continuous marker 'ag') are characteristic in Irish, but not in English. Omission of function words that are characteristic in L1, but do not exist in L2 supports the possibility that morphosyntactic characteristics of L1 influenced language performance in L2. Previous research has indicated that errors made in SRep task by TD bilingual children in L2 are related to the structure of their L1 (Meier et al., 2015). In the case of children whose L1 is English, which does not have a rich inflectional morphology and L2 is Irish, which does have rich inflectional morphology, errors based on the structure of L1 would appear as omissions of morphosyntactic forms. Although this was the case in the current study, we cannot come to clear conclusions because the same error pattern could indicate that children have not yet acquired complex morphosyntactic forms. Further research examining L1 Irish L2 English speakers might give us an opportunity to resolve this issue. However, as a result of frequent incomplete acquisition of the minority language (Péterváry et al., 2014), even L1 Irish speakers might be sufficiently influenced by the English language and variability in the Irish input (Hickey, 2007; Muckley Uí Chomhraí & Antonijević, 2012; Muckley, 2016) to omit morphosyntactic forms in Irish.

In the current study, difference in word order between the two languages (VSO vs. SVO) did not seem to cause problems in either language. However, in order to properly examine the

acquisition and use of word order in L2 speakers of Irish a language production task should be employed to allow spontaneous production.

Another factor that significantly influences acquisition of Irish both as L1 and L2 is the variability of the input. It has been shown that the input from teachers in all-Irish preschools in Gaeltacht attended by both L1 and L2 learners seems to be impoverished in that the teachers tend to adjust their use of Irish to the needs of the L2 learners. Teachers also use codeswitching to aid comprehension of L2 learners (Hickey, 2007). With respect to all-Irish schools in dominantly English speaking areas there is no systematic evidence about the type of language that teachers use. However, it is very likely that the Irish input children receive in all-Irish schools is simplified relative to traditional Irish. In addition, most of the teachers in all-Irish schools are themselves L2 speakers which could contribute to modifications of the traditional form of the language.

7.3. Language skills in L1 and L2

The current study unambiguously indicates that bilingual English-Irish children age 6-7, who are immersed in all-Irish school for at least two years performed significantly better in the L1 English SRep task than in the L2 Irish SRep task. This is to be expected given that Irish is a minority language and most of the children are exposed to Irish only within school hours. Some previous studies report school-age children's performance in L2 to be equivalent to their monolingual peers after two years of L2 exposure (Chiat et al., 2013; Meir et al., 2016). Importantly, these studies refer to children acquiring a dominant rather than a minority L2. Even under those circumstances this is not the case for all languages. In particular, L1 Turkish L2 English bilingual children did not manage to catch up with their monolingual peers even after two years of exposure to English as dominant language (Chiat et al., 2013). The same was observed for

sequential Turkish-Dutch bilinguals, who performed significantly better in L1 Turkish than L2 Dutch (Verhoeven, Steenge, & van Balkom, 2012). To properly interpret results of the current study, it is important to take into account the language environment participants are exposed to. Children acquiring Irish as either L1 or L2 are acquiring a minority language for which a monolingual language environment does not exist anymore. Although adult L1 speakers of Irish have relatively good competence and speak a version of traditional Irish, they use a high level of codeswitching (Péterváry et al., 2014) so the input that the children receive in Irish is not equivalent to the input in dominant languages. Furthermore, Ó Giollagáin, Mac Donnacha, Ní Chualáin, Ní Shéaghdha, & O'Brien (2007) report a lack of social and communal integration of young Irish speakers outside of the education system. This makes it difficult to compare bilingual acquisition of Irish to the language acquisition of other bilinguals who are exposed to dominant languages. A bilingual language environment similar to Irish has been observed for Welsh. In Wales, Welsh is minority language while English is dominant language. A number of studies report that English dominant bilinguals show a strong preference for the use of English with peers even when the peers are Welsh dominant. On the other hand, while Welsh dominant children may favor the use of Welsh they are often in situations where the majority of speakers are not Welsh dominant and therefor opt to speak English (Thomas & Roberts, 2011; Thomas, Lewis, & Appoloni, 2012). In this type of situation the mutual understanding of the dominant language among bilingual speakers reduces the speakers' perception of the need to use the minority language (Mueller Gathercole, 2007). Children's sensitivity to the appropriate use of language contributes to the use of the minority language at school/preschool, but at the same time reduces the use of the minority language with peers (Hickey, 2007; Thomas et al., 2014). This type of language environment reduces the possibility of a full acquisition of the minority languages and

in the case of L1 English L2 Irish language acquisition reduces the richness of L2 language environment and the opportunity for speakers to use their L2 in everyday life. In the case of all-Irish schools in dominantly English speaking areas, all children are L1 speakers of the dominant language and are therefore likely to use the dominant language amongst peers rather than the minority L2. This means that even though participants in the current study are immersed in Irish-language education, the quality and quantity of L2 they are exposed to is not comparable to the quality and quantity of L2 experienced by children who are immersed in education in a dominant language. This is the most likely reason for significantly worse performance of our participants in their L2 Irish than L1 English.

7.3.1. Pattern of frequency of correct repetitions across sentence types

Across all sentence types participants were much more successful repeating sentences in L1 English than L2 Irish. In addition, the pattern of frequency of correct repetitions across sentence types differs between the two languages. In English, participants were most successful in repeating bi-clausal sentences, closely followed by passives and wh-questions and SVO sentences with two auxiliaries. The least successful repetitions were registered for SVO sentences with two auxiliaries and negation and object relative clauses. In Irish, participants were most successful repeating VSO sentences with two auxiliaries and passives, followed by VSO sentences with two auxiliaries and negation, wh-questions and bi-clausal sentences. Object relative clauses came last having a surprisingly small number of correct repetitions. The largest difference between English and Irish scores was observed for relative clauses. Although this sentence type should be acquired by the age of 5 (Goodluck et al., 2006), and participants were successful in repeating relative clauses in their L1 English, it is possible that relative clauses are not as frequent in an immersive

Irish L2 education. Further research should address repetition of relative clauses by L1 Irish speaking children to examine their suitability for the Irish SRep task.

7.3.2. Error patterns

Differences in the frequency of errors on content and function words were much more prominent in Irish than in English. As with successful repetitions, the pattern of frequency of errors differed across error types for the two languages. In Irish, the most frequent errors on both content and function words were omissions, followed by substitutions and a very small number of additions. In English, the most frequent errors on content words were substitutions followed by omissions and, similar to Irish, a very small number of additions. There was no difference in the number of omission and substitution of function words and a very small number of additions. Previous research indicates that the pattern of errors between bilingual TD and PLI children differs in that PLI children produce mainly errors of omission while TD children produce mainly additions and substitutions (Meier et al., 2015). Although all children participating in this research are typically developing, a similar pattern is evident between their L1 and L2. A larger number of omission errors in L2 and substitutions in L1 could suggests that participants are at different stages in acquisition of L1 and L2. Errors of omission could indicate that content words or grammatical forms have not been acquired yet, while substitution errors might indicate that participants have acquired the words or morphosyntactic forms, but did not use the exact word or form as in the sentence they were supposed to repeat.

Some errors are related to the specific phonetic environment in Irish. Initial mutations that phonetically change the first consonant and mark morphological and syntactic functions are characteristic for participants L2, but do not exist in their L1. Omissions of initial mutations

marking verb tense, gender in feminine nouns and genitive in masculine nouns were observed. Given that participants' L1 English is morphosyntactically much simpler than L2 Irish, it is possible that the omissions of initial mutations reflect morphosyntactic characteristics of participants' L1. As discussed earlier, this combination of languages is likely to pose difficulties in differentiating between error patterns of TD children with morphosyntactically simpler L1 acquiring morhosyntactically complex L2 and children with PLI. Given that morphosyntactic deficit is a key indicator of PLI (Crago & Gopnik, 1994; Rice & Wexler, 1996), both groups of children can be expected to produce a large number of omission errors.

Interestingly, word-order errors were not prominent. On the basis of the fact that Irish and English have different word order (VSO vs., SVO) higher number of this type of errors was expected. It is possible that because of its nature SRep task was not sensitive enough to register word order errors related to the difference between Irish and English. In order to properly examine the use of word order in bilingual English-Irish children it might be necessary to employ a task that allows spontaneous language production.

In the Irish SRep task, qualitative analysis of errors indicated that similar morphosyntactic errors occurred across all sentence types. However, there were also errors related to specific sentence types. Errors related to the English SRep did not indicate a large number of morphosyntactic errors, however errors related to specific sentence types were observed. Comparison of errors between Irish and English tasks indicates that while morphosyntactic errors that occurred across all sentences are very different and related to the specific characteristics of the two languages, errors related to sentence structure were similar. In both languages there were omissions of second auxiliary in VSO/SVO sentences with auxiliaries and also those with negations. In passive sentences, errors related to prepositions were observed in both languages,

while diverse errors were observed in biclausal sentences. However in the Irish task, children frequently omitted the second clause of relative clauses, which was not the case in the English task. This disparity in errors on relative clauses was also reflected in the pronounced difference between the number of correct sentences produced for that sentence type in English and Irish.

7.4. Clinical Application

The main reason for designing an Irish SRep task is its potential for clinical application. Given the lack of language assessments for school age Irish speaking children and the good ability of SRep tasks to identify children with PLI we embarked on the task of designing an Irish SRep task. As the first step, the current study examined TD L1 English L2 Irish children. This group was selected because of higher homogeneity of the linguistic background in all-Irish schools in dominantly English speaking areas. We reasoned that testing children with similar AoA, LoE and language exposure would give us better chances of examining the characteristics of the tests itself. The current study involved only TD children so that the reliability and validity of the Irish SRep task can be examined. The next step will be to adjust the SRep task according to findings of the current study and test sensitivity and specificity of the test by involving L1 Irish L2 English TD children and those with PLI. The final aim is to end up with a SRep task in Irish that can be used in SLT clinics for assessing Irish-English bilingual children for language impairment. On the basis of the error patterns in the current study we expect that children with PLI will omit short and under-stressed function words in Irish. A further expectation is that they would have difficulties with different forms of irregular verbs, as it has already been observed by SLTs working with L1 Irish children, and also with different forms of initial mutations on nouns. Wh-questions could pose difficulties for children with PLI and also relative clauses as has been

documented for other languages (Adani, van der Lely, Forgiarini, & Guasti, 2010; Friedmann & Novogrodsky, 2004; Friedmann & Novogrodsky, 2011; Frizelle & Fletcher, 2014).

7.5. Future Studies

Future studies are necessary for the development of a standardized SRep task for Irish-English bilinguals. More detailed consideration of subject relative sentences is needed to test their potential use in an Irish SRep task. Dialectal versions need to be considered and the familiarity of speakers with this type of sentence needs to be measured. In addition, structures specific for the Irish language that might pose difficulties to children with PLI will be considered. The existing literature on the acquisition of Irish morphosyntax, such as the study by Muckley Uí Chomhraí (2016), indicating the types of morphosyntax that is consistent in the input and that L1 Irish children with good language exposure acquire early, will be used together with ILARSP that profiles the acquisition of syntax in Irish (Hickey, 2012).

The situation with designing language assessments in Irish is further complicated by its dialects. There are three main dialects of Irish and the difference between dialects is significant (Irish Language, 2014). Therefore we would either have to adjust SRep tasks for dialects of different regions or use words and morphosyntactic forms that are universal across the dialects.

8. Conclusion

The current study aimed to design a SRep task in Irish and define the language profile of L1 English L2 Irish sequential bilinguals. The results showed that the children performed significantly better in their L1 English than their L2 Irish on all aspects of the task. Although the pattern of correct repetitions across sentence types was similar across the two languages, with the exception of relative clauses, further improvement of the Irish SRep task is needed. Acquisition

of sentence structures that are typical for the Irish language need to be explored, and in particular those that might be challenging for children with language impairment. Error patterns confirmed the dominance of L1 English in that more errors were made in Irish than in English, and in particular omission errors were more frequent in Irish while substitution errors were more frequent in English. Error analysis also indicated particular function words in Irish that presented difficulties for sequential English-Irish bilinguals.

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Appendix A

Sentences presented in the Irish and English SRep tasks

Table A1

Sentences presented in the Irish SRep task together with sentence type and the number of correct repetitions

S1: VSO + aux Correct: 12 *Seo é an béile atá á ithe ag na páistí* this is.aux.1P.SG.MASC the.SG meal.MASC that passive marker eat.VN by the.PL children This is the meal that the children are eating
S2: VSO + aux Correct: 3 Seo í an liathróid atá á chiceáil acu this is.aux.1P.SG.FEM the.SG ball that passive marker kick.VN they This is the ball that they are kicking
S3: VSO + 2 aux Correct: 12 Tá an Garda tar éis bheith ag breathnú orainn aux the.SG Garda (policeman) after aux prefix.PRES.CONT looking.VN us The Garda has been looking at us
S4: VSO + 2 aux Correct: 22 Bhí na páistí tar éis bheith ag snámh

aux.3P.PL. PAST the.PL children after aux prefix.PRES.CONT swimming.VN The children had been swimming
S5: VSO + aux + neg. Correct: 2 Ní hiad seo na milseáin a bhí á n-ithe ag na tuismitheoirí neg.V particle they.3P.PL these the.PL sweets aux.PAST passive marker eat.VN by the.PL parents These aren't the sweets that were eaten by the parents ate
S6: VSO + aux + neg. Correct: 3 Ní hé seo an t-am chun bheith ag caint liom neg.V particle gender marker.MASC this the.SG time.MASC to aux to prefix.PRES.CONT talk to me This isn't the time to be talking to me
S7: VSO + aux + neg. Correct: 1 Ní hí seo an aimsir cheart chun bríste gearr a chaitheamh neg.V particle gender marker.MASC this the.SG weather right to trousers.MUSC short wear.VN This isn't the right weather to be wearing shorts
S8: VSO + aux + neg. Correct: 25 Ní hé sin an deoch a d'ól mé neg.V particle gender marker.MASC this the.SG drink.FEM drank I

That isn't the drink I drank
S9: Passive Correct: 14 Bhí an ceapaire ite ag fear an phoist aux.PAST the.SING sandwichMASC eaten by man the.SG post.GEN.SG The sandwich was eaten by the postman
S10: Passive Correct: 15 Bhí sé ciceáilte sa chos ag an asal aux.PAST he kicked in leg.FEM.NOM by the.SG donkey.MASC He was kicked in the leg by the donkey
S11: Passive Correct: 10 Bhí an fhoireann buailte ag na buachaillí sa pháirc aux.PAST the.SG team.FEM beaten by the.PL boys in field The team was beaten by the boys in the field
S12: Passive Correct: 15 Bhí sí feicthe ag an dochtúir ar maidin aux.PAST she seen.V Adj by the.SG doctor.MASC in morning She was seen by the doctor in the morning
S13: Object Wh Question Correct: 8 Cén deoch a dhóirt fear an bhainne sa teach? What drink.FEM poured man the.SG milk.MASC in house.MASC?

Which drink did the milk man pour in the house?
S14: Object Wh Question Correct: 12 Cén pictiúr a phéinteáil sé sa bhaile inné? What picture.MASC painted he in home.MASC yesterday? What picture did he paint at home yesterday?
S15: Object Wh Question Correct: 1 Cé dó ar ullmhaigh an t-athair an béile inniu? What Prep.MASC for prepare.PAST the.SG father.MASC.NOM the.SG meal.MASC today? Who did the father prepare the meal for today?
S16: Object Wh Question Correct: 12 Cé dó ar thug sí an rós álainn? What Prep.MASC for give.PAST she the.SG rose.MASC lovely? Who did she give the lovely rose to?
S17: Object relative Correct: 0 Chuimil an moncaí an capall ar scanraigh an phéist é Stroked the.SG monkey.MASC the.SG horse.MASC frightened the.SG worm.FEM Pronoun.3.SG.MASC The monkey stroked the horse that the worm frightened
S18: Object relative Correct: 4

Bhain na páistí taitneamh as na milseáin a bhlas siad Won the.PL children enjoyment.MASC from the.PL sweets tasted they The children enjoyed the sweets that they tasted
S19: Object relative Correct: 2 Bhácáil an mamaí an béile atá á ithe ag na páistí Baked the.SG mam.FEM the.SG meal.MASC that passive marker eat.VN by the children The mam baked the meal that was eaten by the children
S20: Object relative Correct: 1 Ba cheart dó an leanbh atá á chuimilt ag an bpáiste a ní Aux.CON right.FAM for him the.SG baby.MASC that passive marker pat.VN by the.SG child to wash He should wash the baby that the child is patting
S21: Bi-clausal Correct: 14 Gheobhaidh na daoine bronntanas má ghlanann siad an teach get.3.PL.FUT the.PL people present.MUSC if clean.PL.PRES they the.SG house.MASC The people will get a present if they clean the house
S22: Bi-clausal Correct: 6 Má bhíonn na gasúir múinte, rachaimid amach sa ghairdín If aux the.PL kids good mannered, go.PL.FUT out in garden If the kids are quiet, we will go out in the garden
S23: Bi-clausal Correct: 0

Ní bheadh a chara tugtha leis aige dá mbeadh sí gránna neg.VParticle aux.COND the friend bring.VAdj with.MASC at.MASC if aux.3.SG.FEM.COND she nasty He wouldn't have brought his friend with him if she was nasty
S24: Bi-clausal Correct: 7 Dá mbeadh sí tinn, rachfadh sí go dtí an mbanaltra if aux.3.SG.FEM.COND she sick, go.3.SG.FEM.COND she to the.SG nurse.FEM.NOM If she was sick, she would go to the nurse

Table A2

Sentences presented in the English SRep task together with sentence type and the number of correct repetitions. Sentences were adapted from Marinis et al. (2011)

No	Sentence type	Sentence	Correct
1	SVO +2aux	The Policeman had been looking at us	22
2	SVO +2aux	The kitten could have hit the rattle down the stairs	17
3	SVO +2aux	She might have waited for them in the street	17
4	SVO +2aux	They have been riding the goat around the garden	25
5	SVO +2aux + neg.	John won't have talked about it with his father	15
6	SVO +2aux + neg.	We shouldn't have been picking the flowers	17
7	SVO +2aux + neg.	The mice can’t have liked the cream in the bowl	6
8	SVO +2aux + neg.	They haven’t been chasing the goose by the river	24
9	Passive	The sandwich was eaten by the postman	25

10	Passive	He was kicked in the leg by the donkey	24
11	Passive	The bear was feared by the boy in the park	15
12	Passive	She was seen by the doctor in the morning	26
13	Object Wh-question	Which drink did the milkman spill in the house?	26
14	Object Wh-question	Which picture did he paint at home yesterday?	22
15	Object Wh-question	Who did the father cook the meal for today?	13
16	Object Wh-question	Who did she give the beautiful rose to?	28
17	Object relative	The monkey stroked the horse that the worm frightened	12
18	Object relative	The children enjoyed the sweets that they tasted	25
19	Object relative	The mum baked the meal that the children are eating	16
20	Object relative	He should wash the baby that the child is patting	10
21	Bi-clausal	The people will get a present if they clean the house	20
22	Bi-clausal	If the kids behave we will go in the garden	22
23	Bi-clausal	He wouldn’t have brought his friend if she was nasty	8
24	Bi-clausal	If she was ill she would go to the nurse	20

Appendix B

Error Analysis across Sentence Types in Irish and English

Adapted from Meir, Walters and Armon-Lotem (2016)

Table B1

Errors across sentence types in Irish

VSO + aux (Sentences 1-4) Sentence fragment omission/ Omission or substitution of passive marker *á* with *ag* as prefix marking PRES CONT/Omission of PP *ag* (by)/ Substitution of FEM pronoun *í* with PL form *íad* or MASC form *é*/ Omission of 2nd auxiliary *bheith*/ Substitution of definite article SG *na* with the PL form *an*/ Omission or substitution of N *béile* 'meal'
VSO + aux + neg. (Sentences 5-8) Sentence fragment omission/ Omission of negative copula *ní* or substitution with verb *níl* 'neg. to be'/ Omission or substitution of passive marker *á* with *ag* as prefix marking PRES CONT/ Omission of aux *bhí* / Omission of aux bheith/ Omission of PP *chun* 'to'/ Substitution of FEM personal pronoun *hí* with the masculine form *hé*
Passive (Sentences 9-12) Verb tense substitution/ Omission of PP *ag* 'by' or substitution by definite article SG *an*/ Addition of definite article SG *an*/ Substitution of *ceapaire* 'sandwich' with the PL form *cepairí/* Substitution of *asal* 'donkey' with *cappall* 'horse'/ Substitution of V Adj *ciceáilte* with verbal noun *ciceáil*/ Omission of *chos* 'leg'/ Omission of gender marker *h* in *fhoireann*/ Omission or substitution of *buailte* 'beaten' with a non-word/ Substitution of pronoun FEM SG *sí* with the MASC form *sé*
Object Wh-question (Sentences 13-16) String of non-words/ Sentence fragment omission/ Omission of *Cé do* 'Who for' or substitution with *Cé hé* 'Who is'/ Omission of past tense marker *h* in *phéinteáil* 'painted'/ Substitution of *dhóirt* 'spilled' with *dóirt* 'spill' or a phonologically similar non-word/

Omission of GEN marker *h* in *fear an bhainne* ‘man of milk/milkman’/ Addition of gender marker *h* in *phictiúr* instead of *pictiúr* ‘picture’/ Omission of V *phéinteáil* ‘painted’ or substitution by a non-word/ Omission of *inne* ‘yesterday’
Object relative String of non-words/ Omission of 2nd sentence/ Omission or substitution of passive marker *á* with *ag* as prefix marking PRES CONT/ Omission of past tense marker *h* in *bhácáil* ‘baked’/ Omission or substitution of *scanraigh* ‘frightened’ by a non-word/ Substitution of *chuimil* ‘stroked’ by a non-word/ Omission or substitution of *taitneamh* ‘enjoyment’ by non-word/ Omission or substitution of *bhain* ‘won’ by non-word/ Substitution of *bhlas* ‘tasted’ with non-word *glasana*/ Omission or substitution by a non-word of an béile ‘meal’
Bi-clausal (Sentences 21-24) Omission of sentence fragment / String of non-words/ Substitution of *má* with English ‘if’ or Irish conjunction *no*/ Substitution of *da mbeadh* ‘if was’ with *má* ‘if’ or English word ‘if’ together with PRES form *tá* ‘is’/ Substitution of *gheobhaidh* ‘will get’ with the root form *faigh*

Table B2

Errors across sentence types in English

SVO + 2 aux (Sentences 1-4) Substitution of *had* with *has*/ Substitution of *have* with *had*/ Substitution of *had been* with *were*/ Omission of *been*/ Omsion of *have*/ Omission of *could*/ Addition of *us*/ Substitution of *hit* with *hitten*/ Substitution of *rattle* with *rats*/ Substitution of *she* with *they*/ Substitution of PP *for* with *from*/ Substitution of *in the street* with *down the street*/ Change of word order instead of *for them: them for*
SVO + 2 aux + neg. (Sentences 5-8) Substitution of *won’t have* with *hasn’t*/ Addition of *has*/ Omission of *have*/ Omission of

can't/ Substitution of *talked* with *talk*/ Substitution of *won't have* with *had no*/ Substitution of *haven't* with *hadn't*; *weren't*/ Substitution of *have talked* with *talk*/ Omission of *–ed* in *talked*/ Substitution of *it* with *this*/ Substitution of *father* with *mom*/ Substitution of *we* with *you*/ Omission of *been*/ Omission of *the*/ Omission of *MV*/ Substitution of *bowl* with *hall; wool; wall*/ Substitution of *the cream* with *whipped cream*/ Substitution of *liked* with *left*/ Substitution of *chasing* with *taken*/ Substitution of *by* with *from*
Passive (Sentences 9-12) Substitution of *postman* with *postbox*/ Omission of *postman*/ Substitution of *eaten* with *eated; eatened*/ Substitution of *in* with *by*/ Omission of *the*/ Substitution of *donkey* with *dog*/ Substitution of *feared* by *scared; peared; afraid*/ Substitution of *by* with *with; in; of; from; when*/ Omission of *was*/ Addition of *is*/ Substitution of *she was* with *she's been*
Object Wh Questions (Sentences 13-16) Substitution of *which* with *what* /Omission of sentence fragment/ Substitution of *milkman* with *postman*/ Substitution of *father* with *farmer*/ Substitution of *drink* with *milk*/ Substitution of *spill* with *drop*/ Substitution of *did* with *had*/ Substitution of *he* with *you*/ Omission of *yesterday*/ Omission of *today*
Object relative (Sentences 17-20) Substitution of *should* with *shell*; *will have to*/ Substitution of *that* with *what; and; so; with; who*/ Omission of *frightened*/ Substitution of *frightened* by a non-word/ Substitution of *worm* by *horse*/ Substitution of *baked* with *bakes*; *makes; cooked*/ Substitution of *mom* with *mother*/ Substitution of *are* with *were*/ Substitution of *eating* with *making*/ Substitution of *wash* with *watch*/ Substitution of *he* with *she; you* / Substitution of *wash* with *rub*/ Addition of *at*/ Addition of *was*/ Word order
Bi-clausal (Sentences 21-24) Omission of *will* /Substitution of *would* with *should; will*/ Substitution of *clean the house* with *work in the house*/ Substitution of *clean* with *walk out*/ Substitution of *a* with *the*/ Substitution of *a present* with *the presents*/ Substitution of *behave* with *behaved*/ Substitution

of *in* with *on*/ Substitution of *go in the garden* with *go ahead*/ Substitution of *will* with *could; can*/ Substitution of *children* with *people*/ Substitution of *he* with *she; they*/ Substitution of *his* with *her; a*/ Substitution of *ill* with *good*/ Substitution of *nurse* with *house; bed*/ Omission of *nurse*/ Substitution of *nasty* with *naughty*; *nice*/ Addition of *in*/ Addition of *didn't*