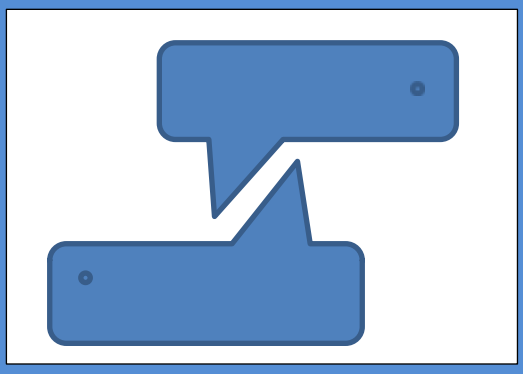
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# Trajectory of liquid production in typically developing children: European Portuguese[1]

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**Abstract**

Dependence relationship between segmental and syllabic acquisition has been described in several languages phonological acquisition. In European Portuguese, there are only two segments (/l/ and /ɾ/) licensed in all syllabic position: Onset, Onset cluster and Coda. This paper describes cross-sectional data for /l/ and /ɾ/ in all syllable position in typically developing children aged 3 to 5 years old, contributing with empirical data from European Portuguese to the dependence relationship between segmental and syllabic acquisition. A native speaker audio-recorded and transcribed single words in an original spontaneous picture naming task, allowing eliciting words in connected speech. Results show a dependence relationship between segmental and syllabic acquisition consistent with previous research on European Portuguese. Onset /l/ and /ɾ/ were in advance of /l/ and /ɾ/ clusters and Coda. Both segments have different paths in acquisition: /l/ stabilizes first in Onset cluster and later in Coda, whilst the rhotic stabilizes first in Coda and later in Onset cluster. Besides the syllable constituent, along with the syllable position in the word, was relevant for the stabilization of liquid consonants: contrary to lateral Coda, rhotic Coda acquisition stabilizes first in word-final position and only later within word. Finally, the prosodic variable tonicity was also relevant for the acquisition of within-word rhotic Coda: it is acquired earlier in stressed syllable and later in unstressed syllable.

**Keywords:** Phonological acquisition, liquids, syllable constituents, monolinguals, Portuguese

## 1. Introduction

Studies about European Portuguese (EP) phonological acquisition are relatively recent, having begun with Freitas's work about syllable structure acquisition (Freitas, 1997). After this seminal work, further research has been conducted either on syllable structure acquisition (Correia 2004; Almeida 2011) or on segmental acquisition (Mendes *et al.* 2009/2013; Costa 2010; Amorim 2015; Ramalho 2017). Following Brazilian Portuguese (BP) phonological acquisition research, EP works have used nonlinear phonology to describe and account for data collected, focusing mainly on segmental acquisition and its relationship with syllable, foot and prosodic word (Freitas 1997; Costa 2010; Almeida 2011; Amorim 2015; Ramalho 2017). In this theoretical framework, segmental acquisition description is based on distinctive features, which are inherent to segmental roots, and on distinctive features co-occurrences.

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In Portuguese, liquid consonants /l/ and /ɾ/ are the only segments licensed in all syllable positions: Onset[3], Onset cluster and Coda (Mateus & Andrade, 2000). It is known that even though the segments are already available in the child's system, they do not appear in all positions of the syllable structure simultaneously (Fikkert 1994; Miranda 1996; Freitas 1997; Lamprecht *et al.* 2004; Almeida 2011, Amorim 2015; Ramalho 2017, among others).

In Brazilian Portuguese (BP), the sequence for the acquisition of liquids in Onset cluster ($CC_{liq}V$) and in Coda ($CVC_{liq}$) is $CVC_l$ final > $CVC_l$ medial > $CVC_ɾ$ final > $CVC_ɾ$ medial > $CC_{ɾ/l}V$ medial / final (Lamprecht *et al.* 2004). According to Ribas (2004), the liquids in Onset cluster are dominated only after 5 years old and there is not a temporal sequence in mastering different Onset clusters ($CC_ɾV$ and $CC_lV$), unlike Coda. The position in the word also is not considered determinant in the acquisition of this constituent.

The existing data for EP are scarcer. The main study on EP syllable structure acquisition (Freitas 1997) shows that liquids are not used immediately in all syllable constituents, although they are already present in children's system. Therefore, although children used liquids in Onset position, lateral Coda acquisition occurs at a later stage, following the acquisition of Onset cluster (Freitas 1997).

The relationship between segment and syllabic constituent is also confirmed by Nogueira (2007). On her research about phonological development of very low birth weight infants between the ages of 3;6 and 4;6, a group of 15 very low birth weight children was compared to the control group, consisting of 15 children with the same ages. The results show that liquids stabilize first in Onset, then in Coda, and finally in Onset cluster. In Coda position, Nogueira (2007) points out that /ɾ/ has a more stable behavior than /l/, a fact already mentioned by Freitas (1997), who hypothesizes that the stabilization of /ɾ/ is faster than that of /l/ because it is more prominent in the system.

In a cross-sectional longitudinal study on the acquisition of rhyme in EP, Correia (2004) analyzes the productions of 6 children aged 2;10 and 4;7, attesting the following sequence: $CVC_ɾ$ final (stressed > unstressed) > $CVC_l$ final (stressed) > $CVC_l$ medial (stressed and unstressed) > $CVC_ɾ$ medial (stressed > unstressed).

Regarding the acquisition of the Onset cluster in EP, Santos (2013) reports that at the beginning of the first year of Basic Education, the syllable $CC_ɾV$ is produced incorrectly more frequently than the syllable $CC_lV$.

Lousada *et al.* (2012) indicate that the stabilization of the liquid in the most complex syllabic constituents follows different pathways: Coda > Onset cluster, in the case of the rhotic; Onset cluster > Coda, in the case of the lateral, as suggested by Nogueira (2007) and Santos (2013).

The aim of this paper is to provide additional empirical evidence for the dependence relationship between segmental and syllabic acquisition (among

[3] There is a theoretical discussion about the existence of one or two rhotic phonemes in Portuguese (Câmara Jr. 1953/1970; Harris 1983; Mateus & Andrade 2000; Amorim & Veloso 2018). At the phonetic level, there are two rhotics ([ɾ] and [ʁ]) in complementary distribution at word borders: only [ʁ] can occur at word initial position and only [ɾ] can occur at word-final position. Nevertheless, only [ɾ] can occur in all syllabic constituents (except in word initial position), therefore we are not analyzing rhotic productions at word initial position.

others, Miranda 1996; Freitas 1997; Lamprecht *et al.* 2004; Nogueira 2007; Almeida 2011). For that purpose, data of 80 EP northern dialects native speakers aged between 3;0 and 4;11 years old will be analyzed, namely all productions of liquid consonants in Onset, Onset cluster and Coda. In addition to the syllabic constitution, word position of the syllable (initial/ medial) and stress will also be analyzed.

## 2. Methodology

### *1.1. Participants*

The speech data analyzed in this paper were collected from a sample of 80 normally developed children aged between 3;0 and 4;11. All the children live in North of Portugal and acquire Portuguese as their first language. The sample was divided into four age groups, each with twenty children (3;0-3;5, 3;6-3;11, 4;0-4;5 and 4;6-4;11 months).

### *1.2. Data collection and processing*

The speech samples were collected in an original spontaneous picture naming task, built on the basis of the criteria used in Yavas, Hernandorena & Lamprecht (1992). In a single session, each child was invited to tell a story from a book with a sequence of five colored thematic drawings forming a narrative. The target words were, therefore, mainly elicited in connected speech.

The selection of target words had into account children's age as well as linguistic factors: the list includes at least three words of each liquid consonant (/l/ and /ɾ/) in all syllable constituents and word positions. The only exception is $CC_lV$ at word medial position. The distribution of the target segments in stressed and unstressed syllables is uneven because of the difficulty to find words that are present in the vocabulary of young children. The word list is presented in Table 1.

Table 1
*The list of target words*

| | **/l/** | | **/ɾ/** | |
|---|---|---|---|---|
| | **Stressed** | **Unstressed** | **Stressed** | **Unstressed** |
| **Initial CV** | **l**ágrima, **l**ápis, **l**ivro, **l**obo | **l**agarto, **l**avar | ___ | ___ |
| **Medial CV** | bo**l**acha, re**l**ógio, zoo**l**ógico | bo**l**a, cabe**l**o, camiso**l**a, caste**l**o, caval**o**, estre**l**a, janel**a**s, ve**l**a | cho**r**ar, gi**r**afa, na**r**iz, o**r**elha, | árvo**r**e, bandei**r**a, banhei**r**a, cadei**r**a, cla**r**o, pinhei**r**o |
| **Initial CCV** | **pl**aca, **bl**oco, **bl**usa, **cl**aro, **gl**obo, **fl**or | **pl**asticina, | **br**aço, **br**anco, **br**inco, **cr**eme, **fr**alda, **fr**ita, **gr**ande, **gr**ua, | **dr**agão, **gr**avata, **pr**esente, **tr**ator, **tr**iciclo |

| | | | | |
|---|---|---|---|---|
| | | | **pr**aia, **pr**ato, **pr**eto, **tr**ês | |
| **Medial CCV** | bici**cl**eta, | trici**cl**o | a**br**ir, so**pr**ar, es**tr**ela | ze**br**a, es**cr**ever, pe**dr**a, qua**dr**o, vi**dr**o, lá**gr**ima, ti**gr**e, qua**tr**o, li**vr**o |
| **Medial CVC** | ba**l**de, ca**l**ças, fra**l**da | go**l**finho | á**r**vore, ba**r**co, go**r**do, guar**d**a-chuva, lagar**t**o, ve**r**de | do**r**mir, ve**r**melho |
| **Final CVC** | azu**l**, pince**l**, so**l** | — | abri**r**, colhe**r**, cose**r**, chora**r**, dormi**r**, escreve**r**, flo**r**, lava**r**, ma**r**, nada**r**, pinta**r**, rasga**r**, sopra**r**, toma**r**, trato**r** | — |

The speech data were recorded in a Sony Minidisc MZ-NH900 digital recorder with a Lifetech unidirectional microphone (model LF 65) and later saved in a laptop ASUS N43SL and phonetically transcribed by the author. All doubtful transcriptions were reviewed by an experienced phonetician–transcriber. Whenever the transcriptions were not coincident, the productions were not analyzed. The productions considered motivated by assimilation or that suffered vowel epenthesis were also not analyzed, as these reconstruction strategies are not motivated by the internal structure of the segments, but the result of the effect of the sequence, either syllable structure or influence of adjacent sounds.

### *1.3. Data analysis*

A total of 6068 tokens were analyzed, with the following distribution in the syllable. Bold is used to signal the liquid consonant.

Table 2
*Number of tokens by segment and syllable constituent*

| | **C**V | C**C**V | CV**C** |
|---|---|---|---|
| **/l/** | 1508 | 455 | 615 |
| **/ɾ/** | 837 | 2653 | 1735 |

In order to obtain the frequency counts and factor weightings concerning the significance of linguistic factors (syllable constituent, stress, number of syllables), the data were analyzed using GoldVarb X (Sankoff, Tagliamonte & Smith 2005). This is a logistic regression factor-analysis software that performs a step-wise regression analysis presenting an ordered selection of the factors. A value greater than 0.5 means that factor favors use of a particular variant (in this case, substitution or omission of the target

segment); on the contrary, a value less than 0.5 means that use of the variant is disfavored.
The criteria adopted for determining if a segment is acquired is the same used in recent research on EP phonological acquisition (Costa 2010; Almeida 2011; Amorim 2015):
- target-like productions ≥ 80%: segment is acquired;
- target-like productions between 50% and 79%: segment is being acquired;
- target-like productions ≤ 50%: segment is not yet acquired.

## 3. Findings

### *3.1. Onset*

Although there is a small decrease in medial /l/ in 3;6-3;11 group age, the target-like productions of /l/ in Onset position surpasses the level of 80% at 3;0-3;5 years, which means that segment is already acquired at that age. The rhotic is acquired later, at 3;6-3;11.

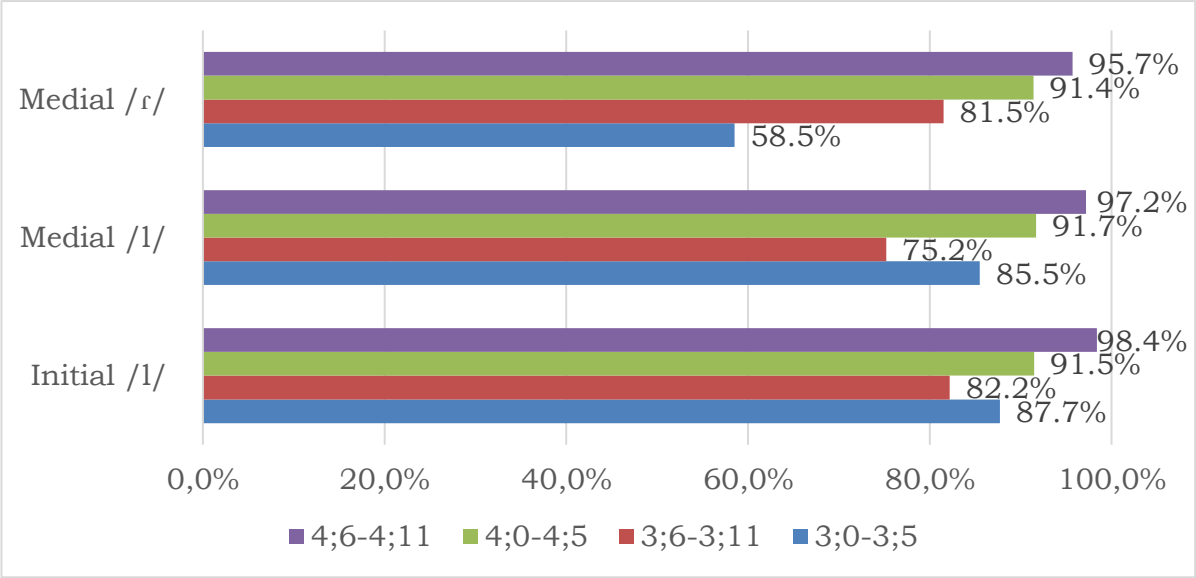



*Figure 1.* Liquids in Onset target-like productions per age

When children do not produce the target segment, they use different strategies: they tend to substitute [l] by another sound, although deletion of the segment is also present at younger ages: 3;0-3;5 (8.3%) and 3;6-3;11 (9.4%); whilst they prefer not to produce any sound to target /ɾ/. This is, in effect, the main strategy in almost age groups, although it decreases as children are older (36.9% of deletion at 3;0-3;5; 12.0% and 6.7% at 3;6-3;11 and 4;0-4;5 age groups).
Post-tonic syllable favors substitution of /l/ in Onset position. The preferred production to substitute [l] is the glide [w], which is used in 69% of the non-target-like productions and by 25% of the children.
When target /ɾ/ is substituted, the preferred sound produced is the homorganic sonorant [l].

Some examples of non-target-like productions for both liquids are provided in (1).

(1) */l/ >> Ø*

| | | | | |
|---|---|---|---|---|
| Lágrimas (tears) | /ˈ**l**agɾimɐʃ/ | → | [ˈaɣimɐʃ] | (M.ª Francisca 3;9.0) |
| Bola (ball) | /ˈbɔ**l**ɐ/ | → | [ˈbɔɐ] | (Leonor 4;2.17) |
| | */l/ >>[ɯ]* | | | |
| Estrela (star) | /iʃˈtɾe**l**ɐ/ | → | [iʃˈtɾe**w**ɐʃ] | (Rafaela 3;11.4) |
| Janelas (windows) | /ʒɐˈnɛ**l**ɐʃ/ | → | [ʒɐˈnɛ**w**ɐʃ] | (Bernardo 4;8.11) |
| | */ɾ/ >> Ø* | | | |
| Nariz (nose) | /nɐˈ**ɾ**iʃ/ | → | [nɐˈiʃ] | (Leonor 3;3.9) |
| Bandeira (flag) | /bɐ̃ˈðɐj**ɾ**ɐ/ | → | [bɐˈðejɐ] | (Marco 4;4.3) |
| | */ɾ/ >>[l]* | | | |
| Chorar (to cry) | /ʃuˈ**ɾ**aɾ/ | → | [ʃuˈ**l**aɾ] | (Rodigo 3;9.24) |
| Cadeira (chair) | /kɐˈðej**ɾ**ɐ/ | → | [kɐˈðej**l**ɐ] | (Afonso 3;10.7) |

### *3.2. Onset cluster*

The acquisition of /l/ in Onset cluster is completed only after 4 years old, as target-like productions surpass 80% only in 4;0-4;5 age group, both in initial and medial position. The consonant /ɾ/ is acquired later, surpassing 80% at 46;1-4;11 at initial position, as shown in the next figure.

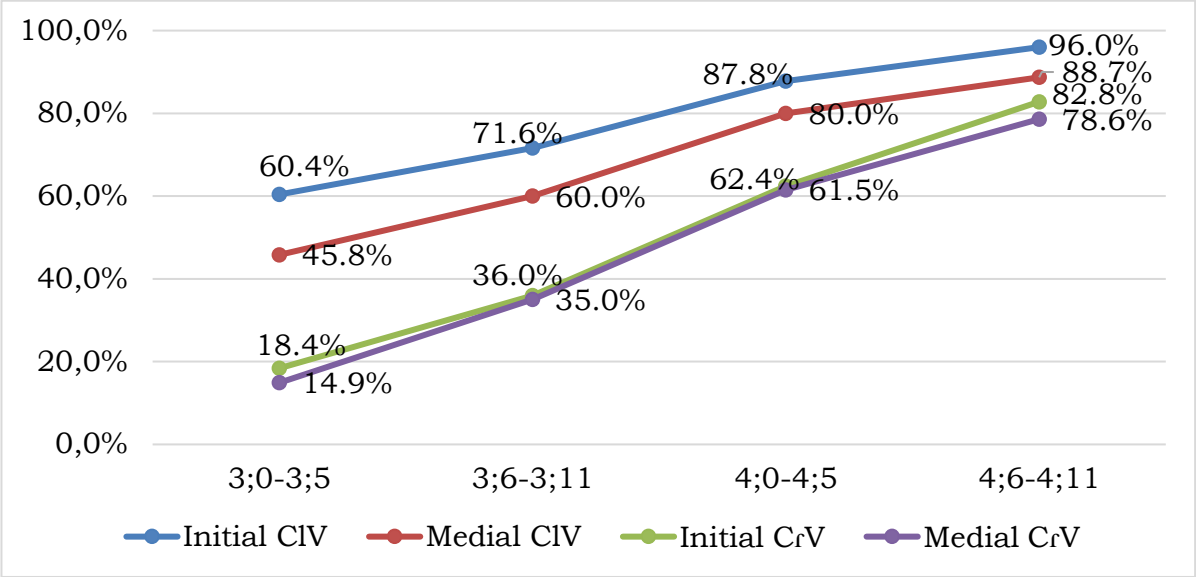



*Figure 2.* Target-like Onset cluster productions per age

When children do not produce the target segment, they use different strategies for each consonant: they tend to substitute the lateral and to delete the rhotic, as shown in Figure 3.

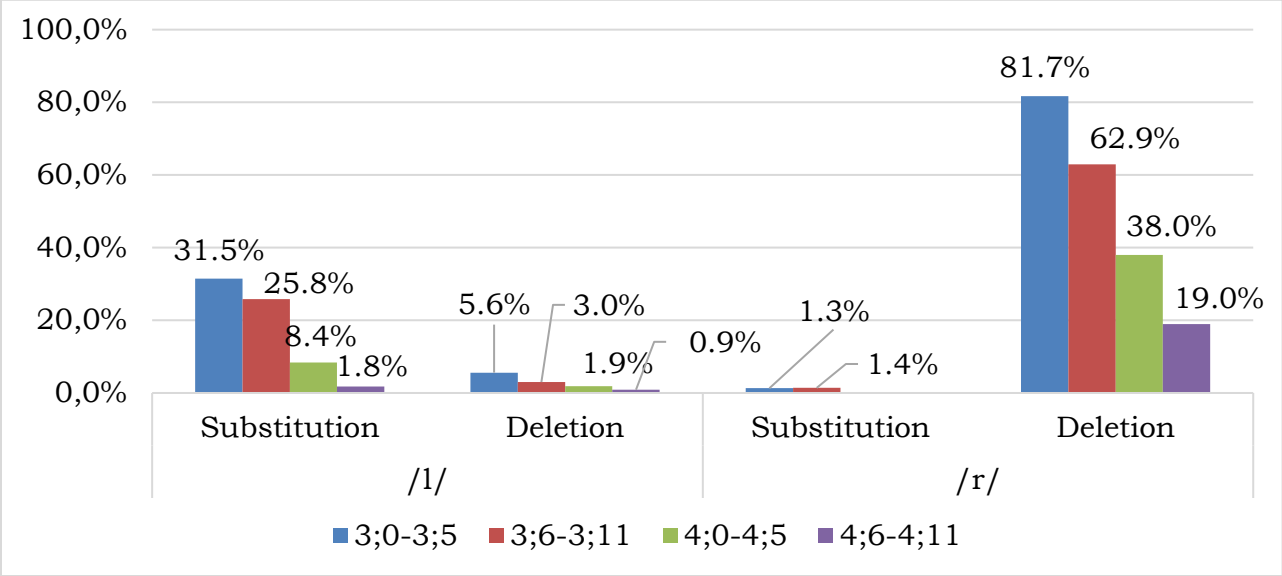



*Figure 3.* Substitution and deletion of liquids in Onset cluster

The results found in the production of $CC_rV$ confirm what has been reported in phonological development research: children tend to simplify the syllable structure (among others, Fikkert 1994; Miranda 1996; Freitas 1997; Bernhardt & Stemberger 1998; Morales-Front 2007). Therefore, what is particularly difficult to children is the syllable format and not the segment (which is acquired at 3;6-3;11).

There is no linguistic factor, such as adjacent sounds, stress or word extension, favoring the substitution of the lateral consonant in Onset cluster. That means that the only relevant factor that favors the substitution of this consonant in Onset cluster is age: younger children are expected to use this strategy more than older ones. Deletion, though, is favored in unstressed syllables.

The analysis of the substitutions reveals the same pattern found for /l/ in Onset: the glide [w] is the preferred production. The predominant substitution type affecting /ɾ/ is rhotic → glide [j].

Some examples in (2) illustrate the non-target-like productions for liquids in Onset clusters.

(2) */l/ >> Ø*

| | | | | |
|---|---|---|---|---|
| Plasticina (plasticine) | /p**l**ɐʃti'sinɐ/ | → | [pɐʃti'sinɐ] | Miguel (3;1.6) |
| Bloco (notepad) | /'b**l**ɔku/ | → | ['bɔku] | Afonso (3;0.23) |
| */l/ >>[w]* | | | | |
| Bicicleta (bicycle) | /bisi'k**l**ɛtɐ/ | → | [bisi'k**w**ɛtɐ] | Teresa (3;9.28) |
| Triciclo (tricycle) | /tɾi'sik**l**u/ | → | [ti'sik**w**u] | M.ª Vitória (3;4:3) |
| */ɾ/ >>Ø* | | | | |
| Abrir (to open) | /ɐ'bɾiɾ/ | → | [ɐ'biɾ] | João F. (3;8.4) |
| Brinco (earring) | /'bɾĩku/ | → | ['bĩku] | Lourenço (3;8.16) |
| */ɾ/ >>[j]* | | | | |
| Zebra (zebra) | /ˈzebɾɐ/ | → | [ˈzeb**j**ɐ] | Ana Rita (3;1.25) |
| Livro (book) | /ˈlivɾu/ | → | [ˈliv**j**u] | M.ª Francisca (3;9.0) |

### *3.3. Coda*

In Coda position, we found different results for both consonants, depending on the position of Coda in the word. In fact, /l/ in word-final Coda is acquired at 3;0-3;5 years, although a regression was found in the following age group, which does not accomplish 80% of target-like productions. On the contrary, within-word Coda is not acquired until 4;11 years old, which reveals a greater difficulty on the stabilization of /l/ in this position.

A similar behavior was found for /ɾ/ in Coda: it is acquired first in word-final position, at 4;0-4;5 and only later within the word, at 4;6-4;11.

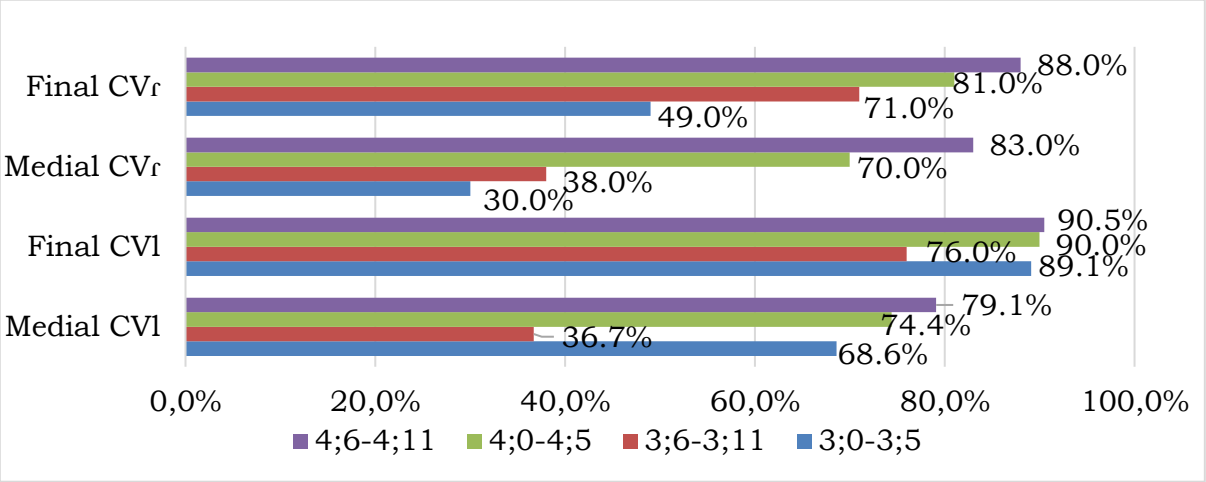



*Figure 4.* Target-like Coda productions per age

These results show a bigger difficulty in the production of both liquids when they are in within-word Coda position. While in Onset cluster, lateral is the first liquid stabilizing; in Coda position the first liquid being mastered is the rhotic.

Coda acquisition of the rhotic is affected by tonicity: in within-word stressed syllable, it is acquired at 4;6-4;11, whilst in unstressed syllable the acquisition is stabilized later (after 5 years old). Nevertheless, it should be emphasized that there were only two targets words with unstressed CVr, both in medial position, which means that Coda acquisition of the rhotic may also be affected by word position, and not only tonicity.

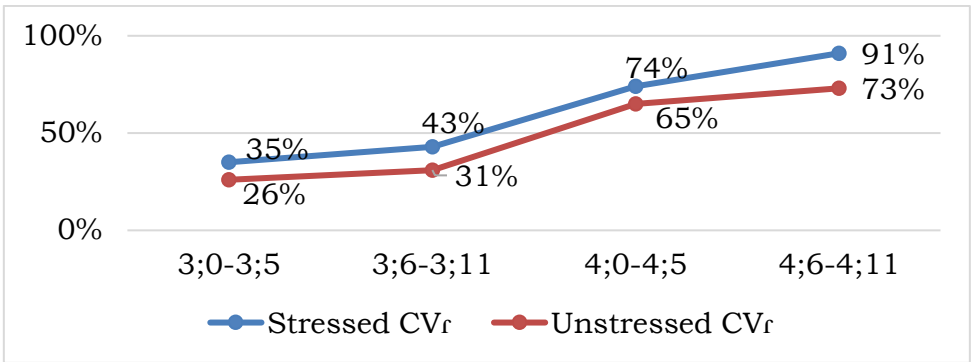



*Figure 5.* Target-like Coda productions in stressed and unstressed syllables

These results reiterate the importance of tonicity in phonological acquisition, as stated in other works (Freitas 1997; Correia 2004; Lamprecht *et al.* 2004; Vigário, Frota & Martins 2007; Jordão 2009; among others). Nevertheless, the reduced number of target words with unstressed CVCɾ (only two and in medial position) has to be taken into account.
Coda position is relevant for the selection of reconstruction strategies used in non-target-like productions: word-final /l/ is preferably deleted, whilst it is mainly substituted by another sound when it occurs in within-word Coda.

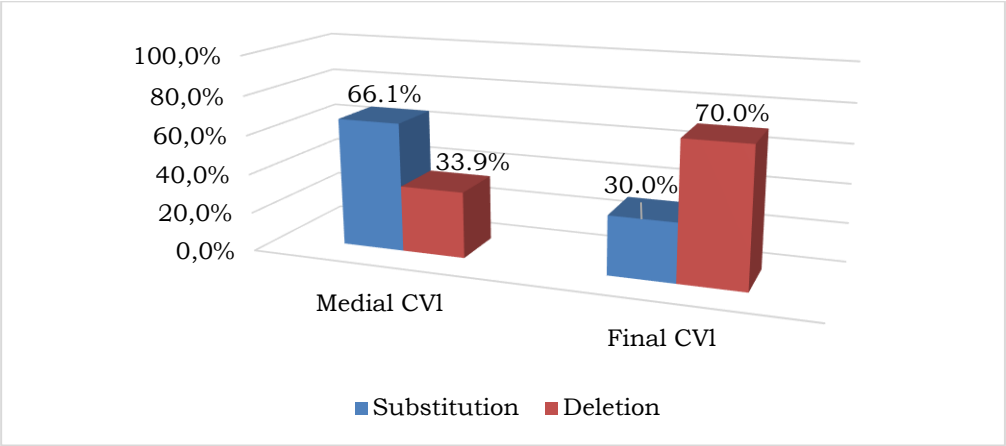



*Figure 6.* Strategies adopted in /l/ non-target-like productions

On the contrary, deletion is the main strategy used for final-syllable /ɾ/, either in word-final or medial position, as described for Onset and Onset cluster position.
Figure 7 shows the reconstruction strategies used for both liquids in Coda position.

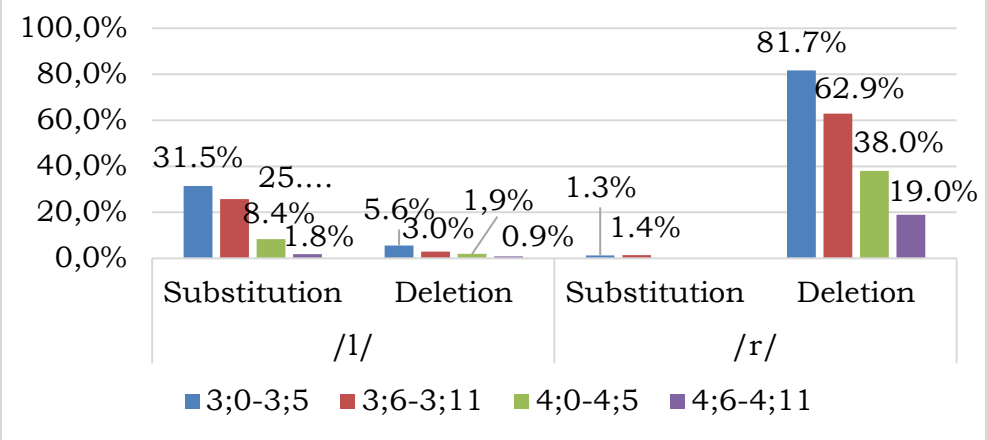



*Figure 7.* Substitution and deletion of liquids in Coda position

As previously reported for other syllable constituents, the glide [w] is the main substitute for [l], no matter whether it occurs in a stressed or an unstressed syllable. On the contrary, substitution by another sound is barely used for

final-syllable /ɾ/. Nevertheless, a different substitution pattern was found for the rhotic, depending on Coda position: in within-word position, only a glide (mainly [j]) is used; in word-final position other substitute sounds ([l] and [d]) can be found, although palatal glide is also the most used sound.
Some examples of non-target-like productions for both liquids are provided in (3).

(3) */l/ >> Ø*

| | | | | |
|---|---|---|---|---|
| Golfinho (dauphin) | /goɬˈfiɲu/ | → | [goˈfiɲu] | Rafaela (3;11.4) |
| Azul (blue) | /ɐˈzuɬ/ | → | [ɐˈʒu] | Lourenço (3;8.16) |
| */l/ >>[ɯ]* | | | | |
| Calças (trousers) | /ˈkaɬsɐʃ/ | → | [ˈka**w**sɐʃ] | Hugo (3;8.25) |
| Fralda (diaper) | / ˈfɾaɬdɐ/ | → | [ˈfɾa**w**dɐ] | João F. (3;8.4) |
| */ɾ/ >>Ø* | | | | |
| Árvore (tree) | /ˈaɾvuɾɨ/ | → | [ˈaviɾɨ] | Tirso (4;1.10) |
| Gordo (fat) | /ˈgoɾdu/ | → | ['godu] | Mariana M. (3,8:20) |
| */ɾ/ >>[j]* | | | | |
| Trator (tractor) | /ˈtɾatoɾ/ | → | [ta'to**j**] | M.ª Francisca (3;5.2) |
| Barco (boat) | /ˈbaɾku/ | → | [ˈba**j**ku] | Leonor (3;4.22) |

## 4. Discussion and Conclusions

The data analyzed in the previous section show that children master both liquids earlier in Onset and later in other syllable positions. In fact, although the distinctive feature [+approximant] and its co-occurrence with [±continuous, coronal] are already acquired at 4 years old (the lateral is acquired before the rhotic), allowing the contrast between /l/ and /ɾ/, both liquid consonants are not mastered in all syllable positions until much later.
When alveolar lateral in Onset is not produced target-like, it has a different substitution pattern from the one described for BP. In the data analyzed, the lateral is mainly substituted by the glide [w], although occurrences of [g] are also found, while Brazilian children prefer the glide [j] or coronal consonants [n] and [ɾ] (Mezzomo & Ribas, 2004).

(4) *Substitution pattern for [l] in EP and BP*

| | | | | |
|---|---|---|---|---|
| Glidization | | | | |
| PE: [l] >> [w] | | | | |
| Cabelo (hair) | /kɐˈbe**l**u / | → | [kɐˈbe**w**u] | (Hugo 3;8.25) |
| PB: [l] >> [j] | | | | |
| | | → | [kɐˈbeju] | (Mezzomo & Ribas, 2004) |
| Substitution | | | | |
| PE: [l] >> [g] | | | | |
| Lápis (pencil) | /ˈlapiʃ/ | → | [ˈgapiʃ] | (Francisca 4;0.25) |
| PB: [l] >> [n, ɾ] | | | | |
| | | → | [ˈnapiʃ] | (Mezzomo & Ribas, 2004) |
| Calo (callus) | /ˈkalu/ | → | [ˈkaɾu] | (Mezzomo & Ribas, 2004) |

The difference found between the two substitution patterns may be explained by the different articulation of the lateral in the two language varieties. Articulatory and acoustic research has shown that, differently from BP, in

contemporary EP, /l/ is velarized in all syllable positions (although in varying degrees) and not only in Coda (among others, Andrade 1998, 1999; Martins *et al.* 2010; Oliveira *et al.* 2011; Monteiro, 2012).
Therefore, maintenance of the secondary point of articulation ([Dorsal]) of lateral /l/ in contemporary EP may account for the preferred use of a dorsal segment by Portuguese children for target /l/.
Although both liquid consonants are already in children's phonological systems at 4 years old, only later they emerge in other syllable positions.
Lateral Coda in word-final position stabilizes earlier (at 3;0-3;5 years old); when it occurs in within-word position it presents more difficulties to children. In this position, it stabilizes only after 4;11 years old. This result confirms the greater instability of lateral Coda when compared to rhotic Coda (Freitas 1997; Nogueira 2007), which Freitas (1997) assigns to the greater prominence of rhotic Coda in the system.
Acquisition of the lateral consonant in Onset cluster stabilizes at 4;0-4;5 years old in both word positions. The results show that the lateral stabilizes first in Onset cluster and only later in Coda position, which corroborates Lousada *et al.* (2012).
In non-target-like productions, lateral in $CC_lV$ is mainly substituted by another sound (mainly [w]), although deletion is favored in unstressed syllables.
The acquisition path of the lateral in all syllable positions in provided in (5).

(5) *Acquisition path of /l/ in all syllable constituents*

| $C_lV$ >> final $CVC_l$ | >> | initial $CC_lV$ >> medial $CC_lV$ | >> | medial $CVC_l$ |
|---|---|---|---|---|
| 3;0-3;5 | | 4;0-4;5 | | after 5;0 |

Contrary to lateral Coda, rhotic Coda acquisition stabilizes first in final-word position and only later within word, which is also described in other phonological acquisition research either on EP (Freitas 1997; Correia 2004) either BP (among others, Miranda 1996; Mezzomo 2004).
The earlier acquisition of final Coda may be explained by tonicity (Miranda 1996), as the majority of $CVC_ɾ$ syllables are stressed in Portuguese[4], and, on the other hand, by the relationship between phonological and morphosyntactic factors, as proposed by Freitas (1997):

> [...] the confluence of distinct grammatical (phonological, and morpho-syntactic) factors define the Coda at the end of the word, whether associated with fricative or liquid, as a structural point in focus in the acquisition, making its early stabilization in relation to the Coda in an inner syllable of a word, of an exclusively lexical nature (p. 253).[5]

We should note, though, that morphological Coda does not present, in this research, higher accuracy rates.
In Onset cluster, rhotic acquisition stabilizes first in word-initial position and later in within-word position. Therefore, path acquisition for the rhotic is

[4] In this research, there was no target word with final-word /ɾ/ in unstressed syllable.
[5] Own translation.

different from the lateral, as it stabilizes first in Coda position and only later in Onset cluster. Similar results are found by Lousada *et al.* (2012).
The main strategy in non-target-like productions for /ɾ/ in Onset cluster is deletion. Production of another sound may be found, although barely used. The most used sound is glide [j], both in within- and final-word position.
The acquisition path of /ɾ/ in all syllable positions in provided in (6).

(6) *Acquisition path of /ɾ/ in all syllable constituents*

| CɾV | >> | final CVCɾ | >> | medial CVCɾ + initial CCɾV | >> | final CCɾV |
|---|---|---|---|---|---|---|
| 3;6-3;11 | | 4;0-4;5 | | 4;6-4;11 | | after 5;0 |

In this paper, we have provided additional empirical evidence for the dependence relationship between segmental and syllabic acquisition (among others, Fikkert 1994; Miranda 1996; Freitas 1997; Lamprecht *et al.* 2004; Nogueira 2007; Almeida 2011). This was demonstrated by the fact that although /l/ and /ɾ/ are used contrastively before 4 years old, only later they are mastered in either Onset cluster and Coda.
Besides the syllable constituent, also the syllable position in the word has been found important in the stabilization of liquid consonants. Tonicity has been found relevant in the acquisition of within-word rhotic Coda.
The results have shown that liquid consonants acquisition has different paths: the lateral stabilizes first in Onset cluster ($CC_lV$ >> $CVC_l$), whilst the rhotic stabilizes first in Coda (CVCɾ >> CCɾV). The same path is attested by Lousada *et al.* (2012).

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# Macrostructural and microstructural discourse abilities in children with hearing impairment

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**Abstract**

Hearing loss can hinder a child's growth of speech and language skills. Earlier research has emphasized that children with Hearing loss have hitches in narrative development relative to their hearing peers both in terms of macro-structure and with micro-structural devices. The present study aims at comparing the discourse abilities under macro and micro structural aspects in children with hearing Impairment (HI) who have been receiving instruction in English at school and Tamil as their mother tongue with age matched typically developing children (TDC). Picture description Narrative sample from a total of 20 children (10 HI and 10 TDC) were collected and the discourse abilities were calculated based on the protocol prepared. Macrostructure of the narrative is descriptively documented using qualitative analysis and the microstructure elements are documented using quantitative analysis. The results revealed significant difference in most of the discourse domains in which the children with Hearing impairment performed poorer than their age matched peers.

**Keywords:** Macrostructure, Microstructural Discourse, Picture Description, Narration, Hearing Impairment

## 1. Introduction

A complex system of cognitive and linguistic process that underlies everyday language use is termed 'Discourse'. Language can be witnessed and examined on various levels, one among of which is "language in use" (Frattali & Grafman, in press), or discourse. Discourse analysis or discourse studies, understood over analysis of language in its comprehensive sense (including face-to-face talk, non-verbal interaction, images, symbols and documents), is a general term for various methods to analyzing written, spoken or signed language use. It is typically measured using two factors such as macrostructure and microstructure of the discourse.

The macrostructure level includes exploring the ability to make an initiating event, the internal response to achieve the goal (attempt and cause), and the

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reaction (Stein & Glenn, 1979). It appraises speaker's skill to impart the central idea of the story and synthesize its core by stating the moral of the story. Macrostructures are global meanings of discourse, typically well-defined in terms of topic, gist, or upshot. Semantic macrostructures or topics define what is termed the global coherence of discourse. It refers to the overall coherence and organization of the narrative. Oral and written fictional narratives include a variety of elements that create a framework for a story. These elements are referred to as the macrostructure of the narrative (Hughes et al., 1997). Story grammar, one of the most well-known narrative macrostructure concepts, includes the elements of setting, initiating event, internal response, a plan or attempt to solve the initiating event, consequence, and resolution (Stein and Glenn, 1979). These components are frequently examined for their presence or absence in a story. Complex narratives comprise all of the elements and oftentimes, several of each element.

The microstructure level discourse investigates fine-grained features of narrative elements, comprising referential cohesion, lexical diversity, and sentence structure (e.g., Bloom et al, 1994). Microstructures are the local structures of words, clauses, sentences or turns in conversation. Macrostructures may be derived from microstructures by acts such as abstracting, which is, leaving out or to the point specific details. In other words, microstructures are the actually and directly 'expressed' structures of the discourse. It refers to measures of productivity and complexity at the sentence level. Narrative microstructure refers to linguistic features of language that are present in a narrative, such as: the length of the narrative in words and morphemes, the different types of words used—including words marking time and causal connections, and the inclusion of dialogue. These features fine-tune the stylistic presentation of the narrative (Hughes et al., 1997) and also the lexical diversity of the narrative.

There are four different types of discourse among which, narrative discourse plays an imperative role in the development of discourse, literacy, and socialization abilities (McCabe, 1996). It embraces the ability to communicate a story containing sequential information generally about a past or future event (Gleason, 2002), and is considered a keystone of children's language development. Narratives provide a rich linguistic context and have been used to evaluate the linguistic development of individuals with different health conditions that may be associated with language disorders. Children's emerging narrative ability is crucial for developing social skills (Miller, 1994) and has been shown to foretell later literacy skills (Griffin, Hemphill, Camp & Wolf, 2004; Roth, Speece & Cooper, 2002). Children with hearing impairment in spite of advances in hearing technologies, they continue to lack full auditory access to the spoken language that surrounds them, and so consequently persist with communication delays (Marschark & Spencer, 2015). Typically developing children, at about 22 months (Eisenberg, 1985; Sachs, 1982), initiate referring real past events, at first with much aid from adults. At 2 years, their narratives often contain negative past events, especially injuries (Miller & Sperry, 1988). Between 3 and 5 years of age, children communicate each other longer and more complex personal narratives, and progressively

respond to narratives from peers (Umiker-Sebeok, 1979). Narration functions as a predecessor for literacy development. Several contemporarily developing, higher-level language and cognitive skills are crucial to form cohesive, coherent, and structured narratives (Bamberg & Damrad-Frye, 1991). Reviews put forward that children with Hearing Impairment, regardless of spoken language delays, are able to convey the main elements of content and structure in narrative but have greater effort in using grammatical devices more dependent on finer linguistic and pragmatic abilities. In routine exchange of ideas, children as young as 2–3 years naturally retell stories or recount a sequence of events, and as they grow up children increasingly become able to deal with the discourse-pragmatic necessities that support narrative. Having this importance, narrative assessment is a must to be carried out and further treatment should be intended accordingly. Discourses of children with Developmental Language Disorders are impaired in terms of their language content. These children produce shorter, less cohesive stories that are syntactically simple and contain frequent errors of syntax, semantics, and morphology. With respect to the information content and information structure, some authors report a comparative lack of difficulty with discourse production by such children.

Norbury et al (2003) quoted in their article that children with specific language impairment and autistic disorder made more syntactic errors, and children with autism were significantly more likely to provide ambiguous references in the story. Alexandra et al (2010) showed that hearing-impaired children have abnormalities in all aspects of language: form, content, and use. The abnormalities seem to be related with these children's failure to convert oral language-speech, as described in the literature. He concluded that hearing-impaired speakers have inadequate narrative competence regarding the rate of proposition use, narrative scores, narrative cohesion, cohesion measurements and overall narrative scores.

Jones et al in 2016 reported that children with hearing impairment, regardless of the spoken language delays, were able to convey the main elements of content and structure in narrative, however, have greater trouble using grammatical devices more dependent on finer linguistic and pragmatic skills.

Discourse is any natural form of language embracing utterances or phrases (Wright and Capilouto 2012) and may be ‘the supreme elaborative linguistic activity’ (Ska et al. 2004: 302). Owing to the intricacy of discourse processing, quantifying discourse production in clinical population is essential

Narrative discourse should be a chief element of assessment and treatment programs for school-age children with language disorders. A narrative sample is a means of language development assessment. However, the available standardized data for Hearing Impaired population are limited. Here comes the need to compare the narrative performance between Hearing-impaired and normal-hearing children especially in Indian scenario.

The current study aimed at comparing the narrative discourse ability in terms of macrostructure and microstructure domains in children with Hearing Impairment fitted with appropriate amplification device and age matched typically developing children age ranging 4 years to 8 years.

## 2. Methodology

### *2.1. Participants*

To document the *macrolinguistic* and *microlinguistic* discourse abilities in children with hearing impairment, a total of 20 children (10 children with congenital hearing impairment and 10 typically developing children) were included in the study. The children between the age ranges of 4 to 8 years participated in the experiment. The children were divided into two groups: Group I included hearing impaired children fitted with appropriate amplification devices with a minimum interventional age of 3 years and Group II included age matched typically developing children with no identified learning disability in both the groups. Children with multiple disabilities or other associated conditions and children intervened using sign language and other alternate mode of communication were excluded from the study.

### *2.2. Data collection and processing*

'The Umbrella sequence picture card' (Appendix 1) and an audio recorder was used to collect picture description samples from children. The children were instructed to look at the picture and narrate a story in sequence. The children were comfortably seated in a distraction free environment and was shown the picture sequence and was explained about the picture and was instructed to tell a story using the picture sequences presented in front of them. The samples were audio recorded and the recorded samples were orthographically transcribed. The transcribed sample were subjected to macrostructural analysis and microstructural analysis which had three and seventeen subdomains respectively as listed in Table 1 and are explained following the table.

Table 1
*Subdomains of macro and microstructure analysis*

| S.No. | Domains | Subdomains |
|---|---|---|
| 1. | Macrostructure | i) Topic maintenance<br>ii) Event sequencing<br>iii) Explicitness (includes 3 analysis)<br>• *Informativeness*<br>• *Elaboration*<br>• *Completeness* |

| | | | |
|---|---|---|---|
| **2.** | Microstructure | i) | Total number of words |
| | | ii) | Total number of different words |
| | | iii) | Total number of content words |
| | | iv) | Total number of functional words |
| | | v) | Number of bound morphemes |
| | | vi) | Number of free morphemes |
| | | vii) | Total number of morphemes |
| | | viii) | Proportion of content words |
| | | ix) | Proportion of functional words |
| | | x) | Proportion of morphemes |
| | | xi) | Complex structure per utterance |
| | | xii) | Relevant pieces per utterance |
| | | xiii) | Total number of mental state words |
| | | xiv) | Mazes per utterance |
| | | xv) | Number of pronouns |
| | | xvi) | Number of ambiguous pronouns |
| | | xvii) | Cohesion percentage |

*Topic Maintenance:* Topic maintenance refers to how well are the utterances in a narrative relate to a central topic. Utterances may be connected to a central theme by expansion, continuation, or contradiction. Topic maintenance skills develop in preschool and are become proficient during the school years (Brinton & Fujiki, 1984; Ervin-Tripp, 1979; Foster, 1986). In contrast, utterances that do not maintain a topic may be irrelevant, tangential, vague, or ambiguous.

*Event Sequencing:* It represents the presentation of events in chronological or logical order. Generally, there should be a correspondence concerning the order of events produced by a speaker and the real-life ordering of events unless the narrator specifies to the listener that a violation of ordering will befall. Violated forms comprises leap-frogging sequences, characterized by an achronological arrangement of events and/or lapse of critical events (McCabe & Rollins, 1994). They weaken discourse coherence since a listener cannot keep track of events that have been described. Children below five years of age tend to construct leap-frogging types of narratives (Peterson & McCabe, 1983). By the age five they are able to sequence events chronologically and bit by bit order multiple events if their culture values this type of discourse (Peterson & McCabe, 1983).

*Explicitness:* It is the sense-making process of discourse coherence; it encompasses three traits of the completeness and elaboration of a narrative. The first dimension is called informativeness which describes whether a narrator represent sufficient information for a listener to make sense of a narrative. Exclusions of essential information compromise discourse coherence. The second dimension of explicitness includes some degree of elaboration. Elective details help make a text coherent. Unelaborated narratives will be hardly coherent; the listener will comprehend the gist of an experience but will be unable to fill in all of the details. Finally, a wholly explicit, coherent narrative encompasses all the basic narrative ingredients. It is essential that it is complete. Description, action, and evaluation are the

three key narrative components that are mandatory for a good narrative (Labov, 1972). Descriptions entail attributions of people and objects (e.g., "the little boy"). Actions denote to events (e.g., "He drenched in rain"). Evaluation states to the significance of an event for a speaker (e.g., "He felt sorry because he did not listen to his mother"). McCabe and Rollins (1994) explained in detail several kinds of evaluation seen in children's narratives (e.g., internal states, exclamations, repetitions, and negatives). Evaluation is vital because it apprises the listener of the speaker's state of mind about an event. The aspect of evaluation has interpersonal implications. Lacking the evaluation, a speaker may give the impression of being aloof and unfeeling. Without evaluation or description, the narrative will be unexciting to the listener. The development of explicitness emerges increasingly (Peterson & McCabe, 1983). Preschool children omit information that can be effortlessly retrieved by context or topic, such as setting information (Peterson & McCabe, 1983). Evaluation develops at two years of age and becomes more common in the narratives of older children (Miller & Sperry, 1988; Peterson & McCabe, 1983). A failure in explicitness may be due to a limited awareness of the communication requirements of the listener.

*Total number of words:* This is a productivity measure that facilitates comparison of the size of samples and / or cross individuals. It plays an important role and is one of the first steps in discourse analysis. This was calculated by transcribing the entire picture description sample and counting the number of utterances the child produced throughout the discourse.

*Total number of different words:* Various word types, like nouns, verbs, adjectives, and adverbs, carry significant and inimitable semantic information that distinguish them (Neville 2014). Based on previous research that production of modifiers manifested qualitative changes in language usage in language disorder (Sarno et al. 2005), it would be worth developing core lexicon lists for different word types as an exploratory purpose. The number of different words uttered delivers a more sensitive and informative appraisal of lexical diversity. This measure is every so often denoted to as a metric of productive vocabulary for the reason that it indicates how well children can integrate items in their lexicons into the language they produce (Pérez-Leroux et al. 2012). The number of different words the child produced was calculated. The word segments repeated were calculated as one word despite being uttered twice or thrice. This is further divided into content words and functional words.

*Total number of content words:* Content words hold semantic content and add to the meaning of the sentence. This comprises the nouns, verbs, adjectives and adverbs.

*Total number of functional words:* Functional words are words that exist to explain or create grammatical or structural relationships into the content words may fit. This includes articles, auxiliaries, demonstratives, quantifiers, prepositions, pronouns and conjunctions.

*Total number of morphemes:* A morpheme is the smallest meaningful part of a word. Morphemes, which constitute prefixes, suffixes and base words, are the smallest meaningful units of language. Morphemes are vital for phonics in both reading and spelling, and also in vocabulary and comprehension.

*Number of free morphemes:* Free morphemes can stand alone as a word and cannot be broken down further into other word elements.
*Number of bound morphemes:* A bound morpheme is a word element that cannot stand alone as a word.
*Proportion of content words:* This was calculated by dividing the total number of content words by the total number of words.
*Proportion of functional words:* This subdomain was measured by dividing the total number of function words by the total number of words.
*Proportion of morphemes:* This parameter was calculated by dividing the total number of morphemes by the total number of total words.
*Complex structure per utterance:* These are utterances which include passive constructions, relative clauses, complement clauses, adverbial clauses or infinite clauses embedded in a sentence. Children with language impairment, made less complex sentences than their age peers (Sarah, 2010). As children grow, research highpoints specific variances in use of complex syntax both over time and amid children with and without language impairments. As typically developing school-age children grow, their sentences show increased clause density (Loban, 1976), improved mean length of T-unit, and usage of relative clauses more frequently (Nippold, Hesketh, Duthie, & Mansfield, 2005).
*Relevant pieces per utterance*: It is the number of relevant pieces that can be broken from an utterance. E.g., '*The mother gave the umbrella*' – One relevant piece; '*The mother gave the umbrella to the boy who was leaving the house*'– Three pieces per utterance.
*Total number of mental state words*: Mental state talk is defined as that is the set of words used by children to attribute thoughts, feelings, emotions, and desires to people, when referring to either themselves or other people (Bretherton and Beegley, 1982).
*Mazes per utterance:* Elin et al (2002) reported that Linguistic non-fluencies known as mazes have been used to draw inferences about processing hitches associated with the production of language. In typically developing children, maze occurrence in general increases as the linguistic complexity increases, being greater in narrative than conversational contexts and in longer utterances. An identical tendency has been observed in children with SLI. The children with SLI used considerably more content mazes than the typically developing children. Loban (1976) described mazes as a chain of words (or initial parts of words), or free fragments which do not constitute a communication unit and which are not essential to the communication unit. Levelt (1989) classified mazes as revisions, filled pauses, or repetitions that occur as a result of uncertainty. Levelt (1989) reported that the production of mazes reveals the speaker's reaction to the demands of language.
*Number of pronouns:* A pronoun takes the place of a noun, but a pronoun must always refer clearly to its antecedent, which is the noun that the pronoun replaces. Documented by calculating the total number of pronoun referrals the child has uttered.
*Number of ambiguous pronouns:* If the antecedent of the pronoun is unclear, then the sentence will be unclear as well. An ambiguous pronoun occurs when more than one probable antecedent exists.

*Cohesion percentage:* It is the percentage of ambiguous pronouns used in comparison to total number of pronouns.

### *2.3. Data analysis*

Macrostructural aspects were descriptively documented using qualitative analysis and the raw data obtained for microstructural aspects were entered in excel sheets and was subjected to statistical analysis using Mann-Whitney Test.

## 3. Findings

### *3.1. Macrostructural analysis*

#### *3.1.1. Topic Maintenance*

Descriptions of superfluous routine events (e.g., scripts), allied information such as descriptions of plans, likes, dislikes, capabilities, and possibilities epitomize deviances in topic maintenance that are often found in specific language impaired children (Miranda, 1995). Some school-age children with language disorder add irrelevant material to the ends of their narratives (Merritt & Liles, 1987; Miranda, 1993, 1995). In the present study, in contrast to the results obtained from children with SLI, it was observed that in both the experimental and the control group majority of the utterances were appropriate and related to the topic.

#### *3.1.2. Event sequencing*

Event sequencing was also observed to be appropriate in both Hearing Impaired and typically developing children. It was observed that majority of events were organized in the chronological order of occurrence. However the previous research evidences that few children with language disorders will have trouble marking temporal ordering of events (Johnston, 1982; Liles, 1985a; Olley, 1989). They would have not become skilled at temporal terms or concepts (Lucas, 1980) or may not be talented to use them to signal the order of events in narratives. For example, past the age of four, children with SLI continue to produce incoherent leap-frogging narratives in which events are not presented sequentially and essential ones are omitted altogether (Miranda, 1993, 1995). In addition, they may repeat events as a stratagem to escape sequencing additional actions

#### *3.1.3. Explicitness*

(1). Among 10, 8 kid's discourse were found to have adequate **information**; this may be attributed to the fact that they have undergone early intervention comparatively. (2). Among 10, 6 kid's discourse was found to be **elaborative**. (3). All the 10 kid's **action and evaluation** skills has been found to be sparse; in typically developing children, it was found that they all had adequate information and their discourse was elaborative and complete. Earlier findings document that children with Specific Language Impairment, traumatic brain injury, and hearing impairment are likely to omit information that refer to individuals, plans, actions, internal states, and orientation (Biddle, McCabe, & Bliss, 1996; Liles, 1987; Merritt & Liles, 1987; Roth & Spekman, 1986; Sleight & Prinz, 1985; Yoshinaga-Itano, 1986). Narratives of children with language disorders might also lack

elaboration. Though the text can be understood, the deficiency of optional information makes it challenging for a listener to fulsomely understand the text.

### *3.2. Microstructural analysis*

Among the seventeen subdomains significant difference were obtained in total number of utterances, number of different words, functional words, free morphemes, *total number of morphemes, number of complex utterances, relevant pieces per utterance, mazes per utterance, number of pronouns and cohesion* between the experimental group (Group I) and the control group (Group II). The p value is less than 0.05 for the above mentioned elements of microstructural discourse abilities. The typically developing peers outperformed the Hearing Impaired individuals except in mazes per utterances.

The above findings of the present study shall be supported by few pieces of evidence from the literature. Ruth et al (1996) revealed that the children with SLI also used significantly fewer different words than their age-equivalent counterparts. Children with language impairment, made less complex sentences than their age peers (Sarah, 2010). Comparing with typically developing peers in the same grade, school-age children with Specific Language Impairment used less complex sentences in conversation, and these complex sentences be likely to have scarcer clauses (Marinellie, 2004), and very less total words (Scott & Windsor, 2000) than their peers' complex sentences. Summer (2020) proposed that children with hearing impairment produced utterances containing complex syntax with limited errors and their complex syntax density is increasing with time. Elin et al (2002) reported that the children with SLI used considerably more content mazes than the typically developing children. Research has documented that more maze use may be reflective of language learning difficulty (Levelt, 1989; Levelt, 1999) and may often be measured a red flag for language impairment. The production of pronouns in spontaneous language was investigated by Gerard in 2008 in three groups of children with Developmental Language Disorders (DLD): children with Specific Language Impairment (SLI), children with hearing impairment (HI), and children with Down's syndrome (DS). The results were compared to the production of pronouns in typically developing children, matched on MLU. The number of pronouns used did not differ considerably between the groups. In the order of production of pronouns, more commonalities than variances were observed between the three Developmental Language Disorder groups and compared to normally developing peers. The number of errors in all the groups seemed to be very low and all groups presented a significant correlation between the increase in MLU and the production of pronouns. Masitha et al reported that the descriptive and narrative writing produced by the hearing-impaired students used very limited cohesive devices.

Other subdomains though showing a difference in the mean score and mean rank, does not show a significant difference in number of content words, number of bound morphemes, proportion of content words, proportion of functional words, proportion of morphemes, total number of mental state words and number of ambiguous pronouns. The Mean average, the mean

rank, and the significant values for each of the subdomains are tabulated in Table 2.

Table 2
*Mean Average, Mean rank and Significant value of Microstructure Elements*

| S.No. | Subdomain | Mean Average | | Mean Rank | | Sig. Value |
|---|---|---|---|---|---|---|
| | | Group I | Group II | Group I | Group II | |
| 1. | Total number of words | 45.1 | 65.7 | 7.75 | 13.25 | 0.037 |
| 2. | Total number of different words | 23.1 | 34.2 | 7.70 | 13.30 | 0.034 |
| 3. | Total number of content words | 16.8 | 23.3 | 8.00 | 13.00 | 0.057 |
| 4. | Total number of functional words | 6.3 | 10.8 | 7.70 | 13.30 | 0.033 |
| 5. | Number of bound morphemes | 4.6 | 5 | 9.05 | 11.95 | 0.271 |
| 6. | Number of free morphemes | 25.1 | 37 | 7.80 | 13.20 | 0.041 |
| 7. | Total number of morphemes | 29.7 | 42 | 7.90 | 13.10 | 0.049 |
| 8. | Proportion of content words | 0.745 | 0.682 | 11.90 | 9.10 | 0.289 |
| 9. | Proportion of functional words | 0.533 | 0.401 | 10.90 | 10.10 | 0.762 |
| 10. | Proportion of morphemes | 1.23 | 1.252 | 8.70 | 12.30 | 0.173 |
| 11. | Complex structure per utterance | 2.5 | 5.1 | 7.45 | 13.55 | 0.020 |
| 12. | Relevant pieces per utterance | 7 | 12.1 | 7.40 | 13.60 | 0.019 |
| 13. | Total number of mental state words | 0.6 | 2.5 | 10.00 | 11.00 | 0.676 |
| 14. | Mazes per utterance | 5.1 | 2.3 | 14.40 | 6.60 | 0.003 |
| 15. | Number of pronouns | 4.7 | 9.3 | 7.20 | 13.80 | 0.012 |
| 16. | Number of ambiguous pronouns | 0.7 | 0.2 | 11.60 | 9.40 | 0.300 |
| 17. | Cohesion percentage | 47 | 98 | 7.30 | 13.70 | 0.008 |

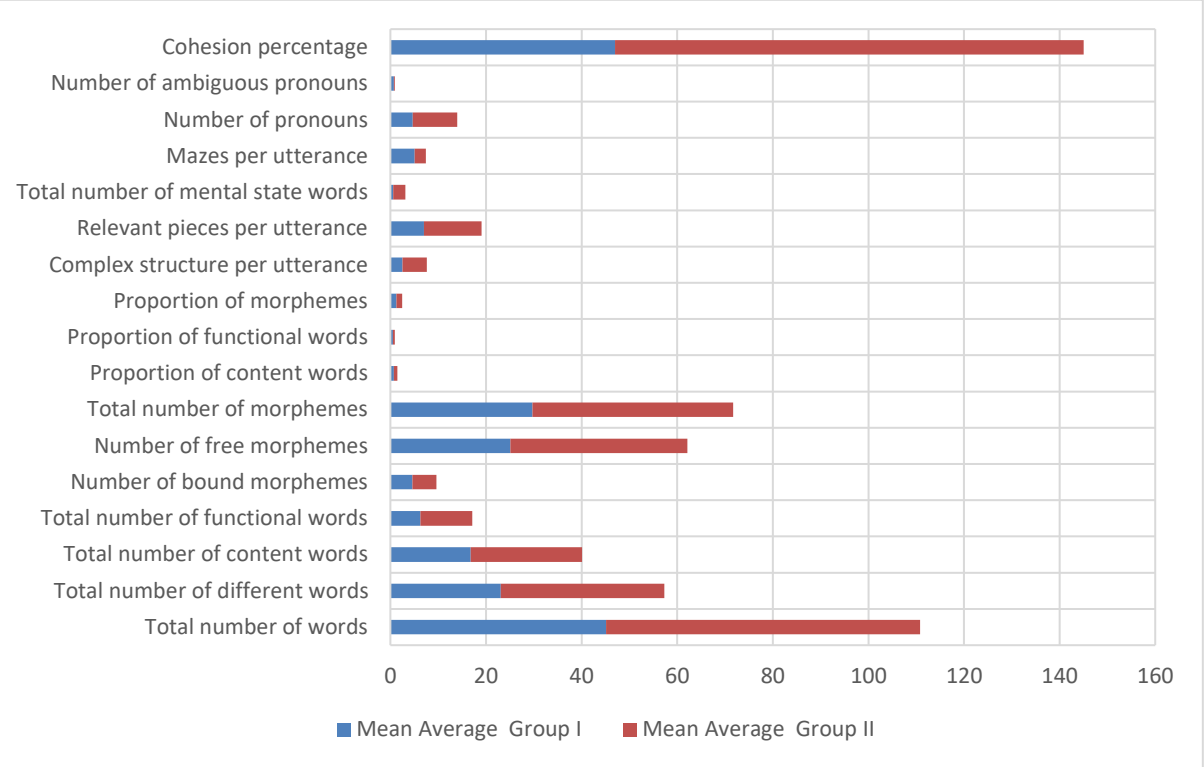



*Figure 1.* Mean Average of Group I (Hearing Impaired) and Group II (Normal Children)

## 4. Discussion and conclusion

It is comprehensible from this study that there is evident difference in discourse development between typically developing children and children with hearing impairment. The experimental group lacks majorly in explicitness and majority of the microstructural aspects of discourse. Other skills such as topic maintenance and event sequencing were developed adequately. On a qualitative comparison, macrostructures are comparatively better than the microstructural elements. There are variations within the experimental group. This arises due to other factors such as the age at which the child had sort intervention (early intervention), parental interaction at home, variation in the degree of hearing loss and other environmental factors.

Narration is one aspect which involves literacy knowledge that usually emerges during pre-school. It is essential for a child to effectively narrate that his early literacy skills should be developed adequately. Hearing impairment causes serious breakdown which makes the children to lag behind. So, it is important to provide appropriate intervention at the earliest evaluate narrative skills at early stage and to provide appropriate intervention.

Narrative is a virtuous way of assessing linguistic skill in older children with communication impairments. Core language abilities rather than pragmatic skill or diagnostic status are likely to have an effect narrative development.

Evident differences in discourse skills between typically developing children and children with hearing impairment have been documented in the present study. Narration serves as a precursor for literacy development and usually

emerges during preschool. Hearing impairment causes serious breakdown which makes children to lag behind. Therefore, it is important to evaluate narrative skills at early stage and providing appropriate intervention will enhance entry to mainstream.

## 5. Future directions

It is important to consider a large sample group across various age ranges and therefore as a future direction, it will be beneficial to consider a larger population analyzing both the macrostructural and microstructural aspects quantitatively.

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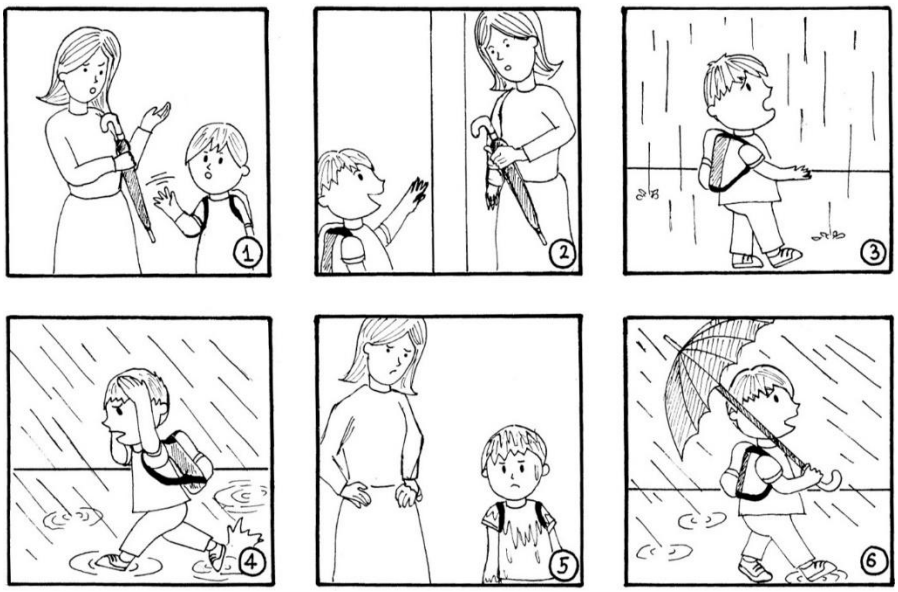
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## Appendix 1

The Umbrella Story




Source: https://aphasia.talkbank.org/protocol/pictures/?C=N;O=D

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# A comparative analysis of the production of aspect markers by Mandarin-speaking children with developmental language disorders and by their typically developing peers

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**Abstract**

Previous studies found that Mandarin-speaking children with developmental language disorder (children with DLD) have difficulty in producing aspect markers and their production of aspect markers was influenced by verbs' situation types. However, these studies did not include in their experimental paradigms all the four typical Mandarin aspect markers. Moreover, there have been controversies concerning the findings of these studies. Using a priming picture-description task, the present study investigated the performance of Mandarin-speaking preschool children with DLD in producing the four typical Mandarin aspect markers *zai-*, *-le, -zhe*, and *-guo*, as compared with typically developing age-matched children (TDA children). Seventeen 4 to 6-year-old children with DLD (mean age was 61.38 months old) and 17 TDA children (mean age was 62.31 months old) participated in the experimental task. The results demonstrate that children with DLD produced significantly fewer sentences wituggesth the three postverbal aspect markers *-le*, *-zhe,* and *-guo*, and produced significantly more sentences with bare verb forms and other types of responses (such as producing a single word or irrelevant sentences, saying 'I don't know', or giving no response, etc.) than the TDA children did; however, they performed similarly to their TDA peers in producing sentences with the preverbal aspect marker *zai-*. Furthermore, children with DLD were more likely to be affected by verbs' situation types than the TDA children were in producing Mandarin aspect markers. The difficulty of children with DLD in producing the postverbal aspect markers did not correlate with their general language abilities and intelligence, nor with their delay in aspectual development.

**Keywords** children with DLD, Mandarin aspect markers, postverbal aspect markers, neutral tone, bare verb forms

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## 1. Introduction

Developmental language disorder (also known as specific language impairment; hereafter, DLD) does not have a clear biomedical etiology (Bishop, Snowling, Thompson, Greenhalgh, & CATALISE-2 Consortium, 2017). Children with DLD have impaired language abilities, yet they are normal in hearing and nonverbal intelligence (Leonard, 2014a). The literature demonstrates that children with DLD are weak in grammatical abilities (e.g., Wexler, Schaeffer, & Bol, 2004; Bishop, Adams, & Norbury, 2006; Lukács, Leonard, Kas, & Pléh, 2009; Leonard, 2014b; Auza, Harmon, & Murata, 2018; Moscati, Rizzi, Vottari, Chilosi, & Guasti, 2020), they tend to omit grammatical inflections which express number, tense and subject-verb agreement (Leonard, Deevy, Miller, Rauf, Charest, & Robert, 2003; Bishop, 2013; Chondrogianni & John, 2018; Deevy & Leonard, 2018), and use nonfinite forms of lexical verbs (i.e., bare verb forms) more frequently than typically developing (hereafter, TD) children (for a review, see Krok & Leonard, 2015). The production of verbs' bare forms rather than verbs with grammatical inflections by children with DLD is highly related to their limited phonological short-term memory (Conti-Ramsden, Botting, & Faragher, 2001; Norbury, Bishop, & Briscoe, 2001; Bishop, Adams, & Norbury, 2006). Children with DLD are impaired in phonological short-term memory (Taylor, Lean, & Schwartz, 1989; Gathercole & Baddeley, 1990; van der Lely & Howard, 1993; Baddeley, Gathercole, & Papagno, 1998; Torrens & Yagüe, 2018). It is evidenced by the fact that children with DLD perform significantly worse than TD children in non-word repetition task, the most popular task used to measure the phonological short-term memory (Bishop, North & Donlan, 1996; Conti-Ramsden, 2003; Gray, 2003; Leonard, 2014a).

Aspect markers are the main mean to express aspectual notions in Chinese languages. There are four typical aspect markers in Mandarin (Li & Thompson, 1981; Smith, 1994, 1997). The progressive marker *zai-* is pronounced with a falling tone and precedes the predicate verb in a sentence. It indicates that an action/event is progressive/ongoing, as shown in sentence (1) below.

(1) *John* ***zai*** *qi yi-liang zixingche.*
John ZAI ride a-CL bike
'John is riding a bike.'

The perfective marker *-le* is pronounced with a neutral tone and without stress in a sentence. It follows the predicate verb and indicates the completion of an action, as shown in sentence (2) below.

(2) *Xiao nvhai hua-****le*** *yi-duo hua.*
little girl draw-LE a-CL flower
'The little girl has drawn a flower.'

The postverbal durative marker *-zhe* is pronounced with a neutral tone and is stressless in a sentence. It expresses the enduring state of a situation, as shown in sentence (3) below.

(3) *Xiao nanhai dai-**zhe** yi-ding maozi.*
little boy wear-ZHE a-CL hat
'The little boy wears a hat.'

The postverbal experiential marker *-guo* is pronounced with a netural tone and without stress in a sentence. It is used to express that someone has the experience of doing something in the past, as shown in sentence (4) below.

(4) *Mary qu-**guo** tuerqi.*
Mary go-GUO Turkey
'Mary has been to Turkey.'

Previous studies that investigate the acquisition of the Mandarin aspect markers by TD children demonstrate that Mandarin-speaking TD children are sensitive to the aspectual contrast between the perfective marker *-le* and the imperfective marker *-zhe* when they are about 30 months old (Yang, Shi, & Xu, 2018), and they are able to facilitate event recognition as well as adults with the cues of the temporal information encoded in aspect markers when they are three years old (Zhou, Crain, & Zhan, 2014). TD children acquire the aspect markers in the following order: the perfective marker *-le*> the progressive marker *zai-* and the durative marker *-zhe*> the experiential marker *-guo* (the aspect marker at the left side of the symbol '>' appears earlier than the aspect marker at its right side in TD children's production) (Erbaugh, 1992). The acquisition of aspect markers by TD children is consistent with the Aspect Hypothesis (Li & Bowerman, 1998; Jin & Hendriks, 2005). Based on the classifications of Vendler (1957) that verbs include Activity verbs, Accomplishment verbs, Achievement verbs and State verbs, the Aspect Hypothesis predicates that TD children use the past or perfective markers with Achievement verbs and Accomplishment verbs at the earliest stage of the aspectual development, and eventually extend their use to Activity verbs and State verbs; in languages that have the progressive aspect, TD children use the progressive aspect markers mostly with the Activity verbs at the earliest stage, and then extend them to the Accomplishment verbs and Achievement verbs (Shirai & Andersen, 1995; Andersen & Shirai, 1996). Chen and Shirai (2010) found that Mandarin-speaking TD children tend to combine the perfective marker *-le* with Achievement verbs, the progressive marker *zai-* with Activity verbs, the durative marker *-zhe* with Activity verbs, and the

experiential marker *-guo* with Accomplishment verbs at the earliest stage of their aspectual development; the strong tendency weakens with the aspectual development.

Children with DLD who speak Chinese languages perform poorly in producing aspect markers (Stokes & Fletcher, 2003; Cheung, 2005; Fletcher, Leonard, Stokes, & Wong, 2005; He, Sun, & Tian, 2013; Yu, Wang, & Liang, 2019). Two studies that investigate the performance of Cantonese-speaking children with DLD in producing aspect markers reveal that Cantonese-speaking children with DLD are less likely than TD children to produce aspect markers, and they are more likely to restrict aspect markers to verbs that present a maximal semantic match, such as Achievement verbs with the perfective marker, and Activity verbs with the progressive marker (Stokes & Fletcher, 2003; Fletcher, Leonard, Stokes, & Wong, 2005).

Consistent with the findings of the studies on Cantonese-speaking children with DLD, the studies that examine the production of aspect markers by Mandarin-speaking children with DLD demonstrate that Mandarin-speaking children with DLD also have difficulty in producing Mandarin aspect markers (Cheung, 2005; He, Sun, & Tian, 2013), and their production of aspect markers (i.e., grammatical aspect) is influenced by verbs' situation types (i.e., lexical aspect) (Yu, Wang, & Liang, 2019). Cheung (2005) examined the production of aspect markers *zai-*, *-le*, and *-zhe* by 6-7 years old children with DLD with a picture-story narrative elicitation task. He found that children with DLD improved in their production of these aspect markers within a one-year span and their performance was similar to that of the four-year-old TD controls. He, Sun, and Tian (2013) investigated the production of the aspect markers *zai-* and *-le* by 4 to 6-year-old children with DLD with an elicitation task. Their results showed that children with DLD had difficulty in producing the perfective marker *-le* evidenced by the fact that they were less likely to produce the perfective marker *-le*; however, no significant difference was observed between DLD and TD groups in the production of the progressive marker *zai-*. Two outstanding questions exist in the studies of Cheung (2005) and He, Sun, and Tian (2013). First, the two studies did not cover all the four typical Mandarin aspect markers in their experimental paradigms. As a result, the whole picture of the ability of children with DLD in producing the Mandarin aspect markers was not examined. Second, the two studies did not examine the correlation of the difficulty of children with DLD in producing aspect markers with their general language abilities and intelligence. Besides the two studies, Yu, Wang, and Liang (2019) investigated the performance of 7-10 years old children with DLD in processing the semantic consistent and inconsistent combination of lexical and grammatical aspects as compared with TD age-matched (hereafter, TDA) children and TD younger (hereafter, TDY) children through a self-paced reading task. By measuring the reaction time of the aspect markers *-le* and *-zhe* that followed different types of verbs,

they found that children with DLD, like TDY children, processed faster when verbs' situation types were consistent with aspect markers than inconsistent situations, as predicted by the Aspect Hypothesis. The authors concluded that the lexical aspects still affected the grammatical aspect processing in children with DLD and TDY children, and children with DLD were in their early stage of development of grammatical aspect processing.

Why do children with DLD who speak Chinese languages have difficulty in producing aspect markers? Stokes and Fletcher (2003) interpreted the difficulty of Cantonese-speaking children with DLD in producing Cantonese aspect markers within a limited processing-capacity account. However, they did not interpret the influence of the limited-processing capacity on children with DLD's poor performance of producing Contanese aspect markers in depth. Fletcher, Leonard, Stokes, and Wong (2005) and He, Sun, and Tian (2013) attributed the difficulty of children with DLD in producing aspect markers to the features of aspect markers in Chinese languages. Fletcher, Leonard, Stokes, and Wong (2005) proposed that the sparse morphology of Cantonese aspect markers and the nonobligatory nature of these forms were the causes of the difficulty of Cantonese-speaking children with DLD in producing Cantonese aspect markers. The sparse morphology of Cantonese aspect markers refers to the fact that each aspect marker is represented by a phonologically unvarying form. The nonobligatory nature of Cantonese aspect markers means that sentences with bare verb forms (i.e., without aspect markers) are still grammatical and acceptable in Cantonese although a different meaning is conveyed. Under the view of formal linguistics, He, Sun, and Tian (2013) interpreted the difficulty of children with DLD in producing the postverbal perfective marker *-le* with the proposition of Li and Xu (2010) that the aspect marker *-le* is a bound morpheme which attracts the movement of predicate verb in forming a sentence, and the movement might increase the burden of producing the aspect marker *-le.* The propositions of Fletcher, Leonard, Stokes, and Wong (2005) and He, Sun, and Tian (2013) that the difficulty of children with DLD in producing aspect markers is caused by the features of aspect markers in Chinese languages could explain the poor performance of children with DLD in producing aspect makers. However, it could not interpret well why children with DLD perform significantly worse than TD children in producing aspect markers when both groups are treated with the same experimental conditions.

In consideration of the outstanding issues in the previous studies, the present study aims to investigate the performance of Mandarin-speaking children with DLD in producing the four typical Mandarin aspect markers as compared with TDA children with a priming picture-description task. The research questions of the present study are:

(i) How do children with DLD perform in producing the four Mandarin aspect markers as compared with TDA children?

(ii) Does the ability of children with DLD in producing aspect markers correlate with their general language abilities and intelligence?

## 2. Methodology

Previous studies that elicited the production of aspect markers by children with DLD used video/picture story narration tasks (e.g., Stokes & Fletcher, 2003; Cheung, 2005), picture-description elicitation tasks (e.g., Fletcher, Leonard, Stokes, & Wong, 2005; He, Sun, & Tian, 2013), or conversational tasks (e.g., Stokes & Fletcher, 2003). The disadvantage of these experimental paradigms is that they could not provide participants with appropriate conditions to produce the experiential marker *-guo* since it is used to express someone's experience in the past, which is difficult to be displayed by the tasks mentioned above. Therefore, a priming picture-description task that takes the advantage of the structural priming effect was conducted in the present study to elicit the four typical Mandarin aspect markers.

Children with DLD show similar structural priming effect to TD children, and priming is promising as a method for investigating production factors in language development (Miller & Deevy, 2006). In a priming picture-description task, the experimenter describes a picture with a sentence that contains a grammar point first, then the participant is encouraged to describe a similar picture. The participant could be primed to produce another sentence with the grammar point by the experimenter's sentence if he/she has mastered it.

In the present study, the experimenter and the participant described pictures in turn. The experimenter described the priming picture with a sentence that contained an aspect marker first, and then a similar picture (the target picture) was displayed to the participant. The participant was expected to describe the picture with a sentence that contained the same aspect marker.

### *2.1 Participants*

Thirty-four 4 to 6-year-old children participated in the present study. Seventeen children with DLD were recruited from special education schools, kindergartens, and hospitals, and 17 TDA controls were recruited from kindergartens. The criteria to recruit the participants were listed below.

First, the intelligence of the participants was measured with the fourth edition of Wechsler Preschool and Primary Scale of Intelligence (WPPSI-IV; Wechsler, 2012). The scores of the full-scale index in the WPPSI-IV test (i.e., IQ scores) for all the participants were higher than 75.

Second, the general language abilities of the participants were tested with the Peabody Picture Vocabulary Test-Revised Chinese Version (PPVT-R; Dunn & Dunn, 1981) and Rating Scale for Pre-school Children with Language Disorder-Revised Chinese Version (RSPCLD-R; Lin, 2008). Three scores were

obtained from the two language tests, including the score of PPVT-R, and the scores of language comprehension and language production in the RSPCLD-R. At least two out of the three scores of children with DLD were 1.25 SD below the norms of their age (Tomblin, Records, Buckwalter, Zhang, Smith, & O'Brien, 1997); while the scores of all the TDA children were within the norms of their age.

Then, the teachers or therapists of all the participants were interviewed to exclude those who had hearing loss, neurological or psychiatric disorders, behavioral disorders, emotional abnormality, etc. Finally, the parents of the participants signed the consent form. The descriptive information of the participants is shown in Table 1.

Table 1
*The participants' basic information*

| Group | N | MoA (SD) | PPVT(SD) | LC(SD) | LP(SD) | IQ(SD) |
|---|---|---|---|---|---|---|
| DLD | 17 | 61.38 (9.56) | 48.24 (11.39) | 21.76 (3.98) | 26.29 (5.53) | 96.18 (10.38) |
| TDA | 17 | 62.31 (6.54) | 70.59 (20.52) | 31.76 (2.73) | 39.59 (1.77) | 111.06 (9.16) |

***Notes:*** **N** = Number of Participants, **MoA** =Months of Age, **LC** = Language Comprehension, **LP** = Language Production, **IQ**=the score of the full-scale index in WPPSI-IV.

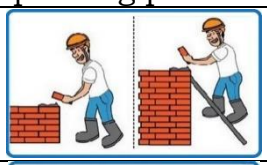
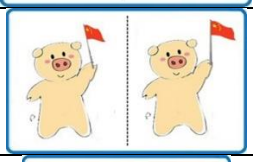
The DLD group and the TDA group were group-matched in age, $t(32)=0.332$, $p=.742$. The TDA children, however, got significantly higher scores on the general language abilities tests and IQ test than children with DLD, $t_{ppvt}(32)=3.93$, $p=.000$; $t_{LC}(32)=8.56$, $p=.000$; $t_{LP}=9.44$, $p=.000$; $t_{IQ}(32)=4.43$, $p=.000$.

*2.2 Stimuli*

There were two practice items and 20 test items (five for each aspect marker) in the task. Each test item included the priming part and the target part. The verbs used in the priming part of this task were all Activity verbs. For the aspect markers *zai-*, *-le*, and *-zhe*, the priming picture and the target picture demonstrated the same stage of different actions/events (the priming picture was above the target on a page). Following Li and Bowerman (1998) and He, Sun, and Tian (2013), each picture contained two small pictures that depicted the process (both small pictures displayed the ongoing stage of an action/event) or the completed state (one small picture displayed the ongoing stage and the other displayed the completed stage of an action/event) for the aspect markers *zai-*, *-le*, and *-zhe*. Since the experiential marker *-guo* is used to indicate that someone has experienced something at least once in the past, there were photos behind the figures in both the priming and the target

pictures to represent the experience of the figures in these pictures. Table 2 demonstrates the examples of the priming and target pictures for the four aspect markers.

Table 2
*Examples of the pictures for the four aspect markers*

| aspect markers | priming picture | target picture |
|---|---|---|
| *zai-* |  |  |
| *-le* |  |  |
| *-zhe* |  |  |
| *-guo* |  |  |

The pictures in the task were displayed with the PowerPoint on a laptop or a pad with the pictures of each test item on a page.

*2.3 Procedure*

Participants were tested individually in a quiet room. At the beginning of the task, an experimenter instructed each participant with the rules of the task. For each test item, the experimenter described the priming picture with a sentence that contained an aspect marker firstly, and the participant was asked to describe the target picture. For instance (taking the progressive marker *zai-* as the example), the experimenter gives the following instruction first, "'The man is building a house' in this picture.' (Point to the priming picture). How about this picture? (point to the target picture)". The instructions were given in Mandarin. The participant was expected to describe the target picture (which displayed the ongoing stage of a different action/event) and he/she was expected to describe the target picture with the progressive marker *zai-*. The test process was audio recorded by an assistant, who also kept a written record of the responses of participants. The task lasts for fifteen minutes.

*2.4 Data treatment*

The production written down by the assistant was checked and confirmed by the experimenter after the experiment. The production was analyzed from three aspects.

From the first aspect, participant's production for each aspect marker was classified into four types: 1) the sentences with the target aspect marker; 2) the sentences with bare verbs; 3) sentences with other aspect markers; 4) the other types of responses, which includes producing sentences irrelevant to the task or a single word, saying "I don't know", and giving no response, etc. Then, the proportion of each type in the production of the participant was calculated separately and presented in percentage form.

It was hard to say that one participant was wrong if he/she viewed a picture presented to him/her differently from other participants and described the picture with one aspect marker that was not our expectation. Therefore, each participant's total production was classified into six types: 1) the sentences with the progressive marker *zai-*; 2) the sentences with the perfective marker *-le*; 3) the sentences with the durative marker *-zhe*; 4) the sentences with the experiential marker *-guo*; 5) the sentences with bare verbs; 6) other types of responses, which includes producing the sentences irrelevant to the task, producing a single word, saying "I don't know", or giving no response, etc. Then the proportion of each type of production among the total production was calculated and presented in percentage form.

Finally, the verbs combined with the aspect markers in the production of the participants were classified according to the classifications of Vender (1957) and analyzed to examine whether children with DLD follow the Aspect Hypothesis.

## 3. Findings

No participant was excluded from the data analysis in this section. In section 3.1, the proportion of each type of production for every aspect marker was compared between the DLD group and the TDA group. Then, the proportions of the six types for the total production were compared between the two groups in section 3.2. In section 3.3, the verb's situation types combined with the perfective marker *-le* were classified and analyzed. Finally, the correlation between the performance of children with DLD in producing the three postverbal aspect markers and their language abilities and intelligence was analyzed in section 3.4.

*3.1 Comparison of the production for each aspect marker*

The mean proportion and SD of each type of production of the four aspect markers are presented in Table 3 below.

Table 3
*Mean proportion (%) of each type of production for each aspect marker*

| Types of production | *zai-* (SD) | | *-le* (SD) | | *-zhe* (SD) | | *-guo* (SD) | |
|---|---|---|---|---|---|---|---|---|
| | DLD | TDA | DLD | TDA | DLD | TDA | DLD | TDA |
| target aspect markers | 85.88 (24.25) | 98.82 (4.85) | 23.53 (26.68) | 87.06 (15.72) | 71.76 (33.96) | 97.64 (6.64) | 42.35 (38) | 95.3 (8.75) |
| bare verbs | 12.94 (23.39) | 1.18 (4.85) | 10.59 (12.49) | 1.18 (4.85) | 12.94 (23.39) | 1.18 (4.85) | 23.53 (28.49) | 0 (--) |
| other aspect markers | 1.18 (4.85) | 0 (--) | 4.71 (11.25) | 0 (--) | 14.12 (25.26) | 0 (--) | 7.06 (12.13) | 2.35 (6.64) |
| other types of responses | 0 (--) | 0 (--) | 61.17 (30.39) | 11.76 (14.25) | 1.18 (4.85) | 1.18 (4.85) | 27.06 (30.77) | 2.35 (6.64) |

Because the data of this task were non-normally distributed (confirmed with the Kolmogorov-Smirnov test), Mann-Whitney U tests were conducted to compare each type of production between the DLD group and the TDA group for the four aspect markers. The results are as follows:

1) For the progressive marker *zai-*, there were no significant differences between the DLD group and the TDA group in the four types of production, the sentences with the target aspect marker *zai-*: U=100.5, Z=2.148, *p*=.131; the sentences with bare verbs: U=101, Z=2.127, *p*=.14; the sentences with other aspect markers: U=136, Z=1, *p*=.786; other types of responses: U=144.5, Z=.00, *p*=1.0.

2) For the perfective marker *-le*, the DLD group produced significantly fewer sentences with the target aspect marker *-le* than the TDA group did, U=10, Z=4.73, *p*=.000; on the contrary, the DLD group produced significantly more sentences with bare verbs (U=84.5, Z=2.691, *p*=.038) and other types of responses (U=28.5, Z=4.107, *p*=.000) than the TDA group did. No significant difference was observed between the two groups in producing the sentences with other aspect markers, U=119, Z=1.785, *p*=.394.

3) For the durative marker *-zhe*, the DLD group produced significantly fewer sentences with the target aspect marker *-zhe* (U=63, Z=3.238, *p*=.004) and significantly more sentences with other aspect markers (U=85, Z=2.909, *p*=.041) than the TDA group did. Meanwhile, there was no significant difference between the two groups in producing the sentences with bare verbs (U=101, Z=2.127, *p*=.14) and other types of responses (U=144.5, Z=.00, *p*=1.0).

4) For the experiential marker *-guo*, the DLD group produced significantly fewer sentences with the target aspect marker *-guo* than the TDA group did, U=27, Z=4.267, *p*=.000; on the contrary, the DLD group produced significantly more sentences with bare verbs (U=59.5, Z=3.645, *p*=.003) and other types of responses (U=69.5, Z=3.034, *p*=.009) than the TDA group did. In producing the sentences with other aspect markers, no significant difference was observed between the two groups, U=118, Z=1.298, *p*=.375.

The comparisons above indicate that the DLD group produced significantly fewer sentences with the target aspect marker than the TDA group did for the

three postverbal aspect markers *-le*, *-zhe*, and *-guo* on the one hand; and on the other hand, the DLD group produced significantly more sentences with bare verbs than TDA group did for the postverbal aspect markers *-le* and *-guo*, more sentences with other aspect markers for the durative marker *-zhe*, and more other types of responses than TDA group did for the experiential markers *-guo*.

*3.2 Comparison of each type of production for the total production*

Since children in both groups described pictures with other aspect markers rather than the aspect marker expected for the four aspect markers, and it could not recognize that one participant was wrong if he/she viewed a picture presented to him/her differently from other participants, the total production of each participant was classified into six types and compared between the DLD group and the TDA group in this section. The mean proportion and SD of each type for the total production is displayed in Table 4.

Table 4
*Mean proportion (%) of each type of production for the total production*

| groups | *zai-* (SD) | *-le* (SD) | *-zhe* (SD) | *-guo* (SD) | bare verbs (SD) | other types of responses (SD) |
|---|---|---|---|---|---|---|
| DLD | 27.35 (11.61) | 8.24 (7.89) | 18.53 (8.97) | 10.88 (9.23) | 29.71 (15.66) | 5.29 (7.6) |
| TDA | 25 (1.77) | 22.35 (5.04) | 24.41 (1.66) | 23.82 (2.19) | 3.82 (4.85) | 0.6 (1.66) |

Because the data were non-normally distributed (confirmed with the Kolmogorov-Smirnov test), Mann-Whitney U tests were conducted to compare the DLD group with the TDA group in the six types of production. The results show that there was no significant difference between the two groups in producing the sentences with the preverbal aspect marker *zai-*, U=112, Z=1.257, *p*=.274. However, the DLD group produced significantly fewer sentences with the postverbal aspect markers *-le* (U=20.5, Z=4.359, *p*=.000), *-zhe* (U=79, Z=2.595, *p*=.024), and *-guo* (U=27, Z=4.262, *p*=.000), and significantly more sentences with bare verbs (U=7, Z=4.798 *p*=.000) and other types of responses (U=73.5, Z=2.9, *p*=.013) than TDA group did.

The analysis in this section and Section 3.1.1 demonstrates that children in the DLD group had difficulty in producing the postverbal aspect markers.

*3.3 The verbs combined with the perfective marker -le*

As revealed by Erbaugh (1992), TD children acquire the perfective marker *-le* firstly, and then the progressive marker *zai-* and the durative marker *-zhe*; the experiential marker *-guo* is the last aspect marker acquired by TD children. To

testify whether the children with DLD in the present study followed the Aspect Hypothesis, the perfective marker *-le* that acquired firstly was concerned with and the verbs combined with it in the participants' production were classified according to the verbs' situation types of Vender (1957) in this section. Figure 1 displays the mean proportion of each combination of verbs' situation type with the perfective marker *-le*.

As shown in Figure 1, children in both the DLD group and the TDA group combined the perfective marker *-le* with Achievement verbs, Activity verbs, and Accomplishment verbs although they were primed by the Activity verbs. Because the data were non-normally distributed (confirmed with the Kolmogorov-Smirnov test), Friedman tests were conducted to examine whether there were significant differences in the proportions of Activity verbs, Achievement verbs, and Accomplishment verbs within each group of children.

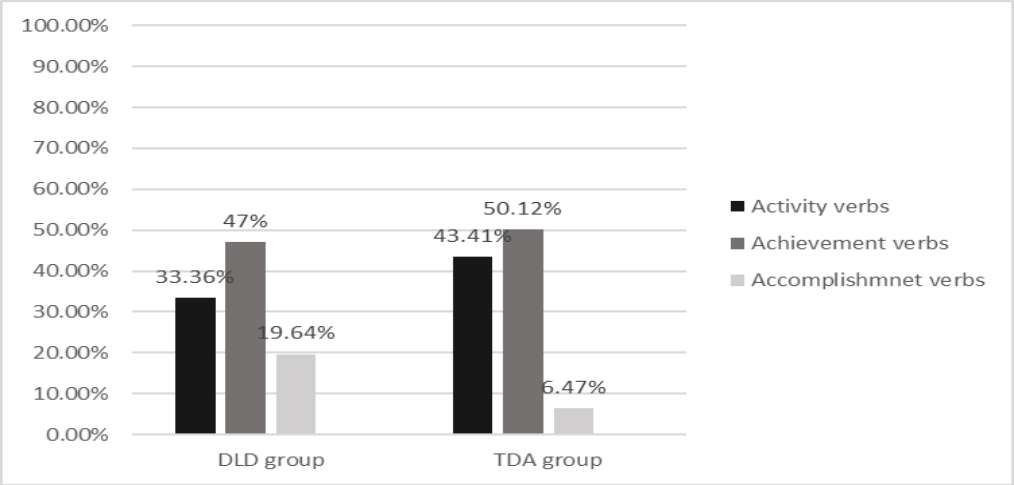



*Figure 1.* Mean proportion (%) of each type of verbs combined with the perfective marker *-le*

The results show that there was no significant difference between the three types of verbs for the DLD group, $Chi^2$=4.667, $p$=.097. However, a significant difference was observed for the TDA group, $Chi^2$=10.133, $p$=.006. The post hoc Friedman's test shows that the TDA group combined significantly fewer Accomplishment verbs than Activity verbs ($p$=.049) and Achievement verbs ($p$=.018) with the perfective marker *-le*, while no significant difference was observed between Activity and Achievement verbs.

It can be speculated from the combination of verbs' situation types with the perfective marker *-le* in the present study that the production of children with DLD was consistent with the Aspect Hypothesis, but they were in the early stage of aspectual development because they combined the perfective marker *-le* with Achievement verbs and Accomplishment verbs as many as Activity verbs although they were primed with Activity verbs.

### *3.4 Correlational analyses*

In section 2.1, it can be seen that children with DLD got significantly lower scores on the language tests and the intelligence test than TDA children did. As a result, it could be supposed that the difficulty of children with DLD in producing the postverbal aspect markers might be related to their poor language abilities or intelligence. To test whether there were correlations between the language abilities and intelligence of children with DLD with their performance in producing postverbal aspect markers, the Pearson correlation tests were conducted in this section.

The language abilities were represented with the three language scores and the intelligence was represented with the score of the full-scale index in the WPPSI-IV test. The proportions of the postverbal aspect markers *-le*, *-zhe*, and *-guo* in the total production were applied in the correlation analysis. The Arc-sine transformations were applied to the percentage data for the postverbal aspect markers. The correlations between pairs of variables are reported in Table 5.

Table 5
*Results of correlation analysis (r)*

| | *-le (p)* | *-zhe (p)* | *-guo (p)* |
|---|---|---|---|
| PPVT | -.003 (.99) | .058 (.824) | .146 (.577) |
| LC | -.274 (.288) | -.072 (.784) | -.026 (.921) |
| LP | .004 (.989) | -.212 (.413) | -.1113 (.665) |
| IQ | -.005 (.986) | -.063 (.811) | -.158 (.544) |

***Notes:*** **LC** = Language Comprehension, **LP** = Language Production, **IQ**=the score of the full-scale index in WPPSI-IV.

The table above shows that the performance of children with DLD in producing the three postverbal aspect markers did not have significant correlations with their language abilities and intelligence.

## 4. Discussion

The analyses above showed that Mandarin-speaking children with DLD have difficulty in producing the three postverbal aspect markers *-le, -zhe* and *-guo*. Specifically, children with DLD were less likely to produce sentences with the postverbal aspect markers, and were more likely to produce sentences with bare verb forms or other types of responses than TDA children did; for the preverbal progressive marker *zai-*, however, they performed as well as TDA children did.

The results of the present study were consistent with Stokes and Fletcher (2003) and Fletcher, Leonard, Stokes, and Wong (2005). The two studies examined the performance of producing Cantonese aspect markers by Cantonese-speaking children with DLD as compared with TD children and

found that children with DLD were less likely to produce aspect markers and more likely to produce sentences with bare verbs than their TD peers did. Since the aspect markers in Cantonese are postverbal, it could be deduced from the two studies that Cantonese-speaking children with DLD have difficulty in producing postverbal aspect markers. The results of this study were also compatible with He, Sun, and Tian (2013). With an elicited production task, they found that Mandarin-speaking children with DLD were less likely to produce the postverbal perfective marker *-le* and were more likely to used bare verb forms than TDA children, but no significant difference was observed in producing the preverbal progressive marker *zai-* between children with DLD and TD children. The results of the present study, however, were inconsistent with the findings of Cheung (2005). With a picture-story narrative elicitation task, Cheung found that Mandarin-speaking children with DLD produced the aspect marker *-le* most (account for 89.09% in six years old, and 82.3% in seven years old children with DLD), and the aspect markers *zai-* and *-zhe* ranked second and third in the production of children with DLD. He, Sun, and Tian pointed out that, "Cheung (2005) counted the sentence-final - *le* as the perfective marker *-le*" (He, Sun, & Tian, 2013, track 30). The production of *-le* mostly in Cheung (2005) might be attributable to his counting of sentence-final - *le* as the post-verbal perfective marker *-le*.

Why do Mandarin-speaking children with DLD are less likely to produce sentences with the postverbal aspect markers than TDA children do? Since children with DLD got significantly lower scores than TDA children in the tests of language abilities and the intelligence test, one might propose that the poor performance of children with DLD in producing the three postverbal aspect markers might be correlated to their language abilities and intelligence. However, as shown in section 3.4, there were no significant correlations between the language abilities and intelligence of children with DLD with their performance in producing the three postverbal aspect markers in the present study. Therefore, the poor performance of Mandarin-speaking children with DLD in producing the three postverbal aspect markers might be related to other factors.

Through analyzing the combination of verbs' situation types with the perfective marker *-le*, the present study showed that Mandarin-speaking children with DLD followed the Aspect Hypothesis, but they might be in their early stage of aspectual development because they combined the perfective marker *-le* with Achievement verbs and Accomplishment verbs as many as Activity verbs although they were primed with Activity verbs. This finding is consistent with other studies (e.g., Stokes & Fletcher 2003; Cheung, 2005; Fletcher, Leonard, Stokes, & Wong, 2005; He, Sun, & Tian, 2013; Yu, Wang, & Liang, 2019) which found that children with DLD are inclined to combine the aspect markers with maximal semantic matched types of verbs. Therefore, it can be proposed that the reason for the difficulty of Mandarin-speaking

children with DLD in producing the three postverbal aspect markers in the present study was that they were in the early stage of aspectual development. However, Erbaugh (1992) found that TD children acquire the perfective marker *-le* earlier than the progressive marker markers *zai-*. If children with DLD of the present study were in the early stage of aspectual development, they would also have difficulty in producing the preverbal progressive marker *zai-*. The results of the present study showed that children with DLD performed as well as TDA children in producing the preverbal progressive marker *zai-*. Hence, the difficulty of Mandarin-speaking children with DLD in producing the postverbal aspect markers might not attribute to the fact that they were in the early stage of aspectual development.

Fletcher, Leonard, Stokes, and Wong (2005) attribute the difficulty of Cantonese-speaking children with DLD in producing the Contanese aspect markers to their sparse morphology and the nonobligatory nature of these aspect markers. And He, Sun, and Tian (2013) explain the difficulty of Mandarin-speaking children with DLD in producing the perfective marker *-le* from the view of formal linguistics that the movement of predicate verbs in forming sentences with the postverbal aspect markers may increase the cognitive burden of producing sentences. However, the interpretations of Fletcher, Leonard, Stokes, and Wong (2005) and He, Sun, and Tian (2013) from the features of aspect markers in Chinese languages could not explain why children with DLD performed significantly worse than TD children did when the two groups were treated with the same experimental conditions. Stokes and & Fletcher (2003) interpret the difficulty of Cantonese-speaking children with DLD in producing Cantonese aspect markers with a limited processing-capacity account. However, Cheung (2005) commented that "the limited processing-capacity account is not elaborated" (Cheung, 2005, track 11). To make the limited processing-capacity account more specific, it is proposed in the present study that the difficulty of children with DLD in producing the three post-verbal aspect markers was related to their impaired phonological short-term memory. Although the phonological short-term memory of children with DLD was not measured in the present study, numerous previous studies have found that children with DLD performed significantly worse than TD children in the non-word repetition task, the best way to measure the phonological short-term memory (Bishop, North & Donlan, 1996; Conti-Ramsden, 2003; Gray, 2003; Leonard, 2014a; Torrens & Yagüe, 2018).

The performance of English-speaking children with DLD in producing inflectional morphemes that relate to tense and agreement is highly related to their impaired phonological short-term memory (Gathercole & Baddeley, 1990; Bishop, Adams, & Norbury, 2006). Specifically, English-speaking

children with DLD are more frequently than their TD peers form sentences that may be optionally finite (with tense markers) or nonfinite (with the bare verb form) (Rice, Wexler, & Cleave, 1995; Rice & Wexler, 1996). Mandarin-speaking children with DLD perform similarly to English-speaking children with DLD because they produce the postverbal aspect makers that are bounded to the predicate verbs less frequently and the bare verb form more frequently than TD children do. Therefore, it could be proposed that the poor performance of Mandarin-speaking children with DLD in producing the three postverbal aspect markers might be related to their impaired phonological short-term memory.

Furthermore, the pronunciation features of the three postverbal aspect markers might also lead to the difficulty of children with DLD in producing them. Unlike the preverbal progressive marker *zai-* which has a falling tone and is salient in front of the predicate verbs, the three postverbal Mandarin aspect markers are pronounced with the neutral tone, and they are stressless in sentences. The pronunciation features of the postverbal aspect markers make them less prominent than the preverbal progressive marker *zai-* in sentence production. As a result, children with DLD who are impaired of phonological short-term memory might ignore the three postverbal aspect markers and produce more sentences with bare verb forms than their TDA peers because they are unable to store the inconspicuous postverbal aspect markers efficiently in the process of sentence formation.

Therefore, it can be speculated from the discussion above that the difficulty of Mandarin-speaking children with DLD in producing the three postverbal aspect markers might be related to their impaired phonological short-term memory and the pronunciation features of the postverbal aspect markers.

## 5. Conclusions

With a priming picture-description task, the present study investigated the performance of Mandarin-speaking children with DLD in producing the four typical Mandarin aspect markers as compared with TDA children. The findings of the present study are the following. First, children with DLD produced significantly fewer sentences with the three postverbal aspect marker *-le, -zhe,* and *-guo* than their TDA peers. Second, children with DLD produced significantly more sentences with bare verbs and other types of responses than TDA children did. Third, children with DLD were more likely to combine the perfective marker *-le* with its cognate inherent verbs' situation type Achievement verbs than their TDA peers did. The poor performance of children with DLD in producing the postverbal markers might be related to their impaired phonological short-term memory and the pronunciation features of the postverbal aspect markers. The present study has its limitations. First, the phonological short-term memory of children with DLD was not measured in the present study, and the conclusion about the correlation between

phonological short-term memory and performance in producing the postverbal aspect markers was speculative. Second, the gender difference was not taken into account in the present study because the majority of children with DLD were boys, which makes it difficult to match the participants in gender.

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# Multilingualism as an advantage or an obstacle to the early acquisition of Croatian

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**Abstract**

One of the goals of the European Union's language policy is multilingualism and multiculturality which contribute to creating a multilingual community. Research that was conducted in Croatian primary schools indicates that learning a foreign language positively affects the mother tongue acquisition, i.e. that parallel language codes are not an obstacle but rather an advantage in the process of acquiring standard Croatian language. Various factors influence children's early stages of language acquisition, like e.g. media a child is exposed to (cartoons in different languages, language of advertisements and of computer games), the environment in which a child is raised and most of all, speech models in the family (parents) and kindergarten (kindergarten teachers), the acquisition of, i.e. learning a second language to which a child is exposed being an additional factor of influence. It is, therefore, the aim of this paper, to examine the interference of parallel language codes of both related languages and those that are not related, but are dominant in a child's environment, with the process of Croatian language acquisition at the kindergarten and preschool age. 15 kindergarten and preschool children (aged 5 and 6) participated in the research and were examined by longitudinal process of monitoring and by short linguistic questionnaire designed for the purpose of the research with the topics of everyday life, colours and animals and a number of pictures were used to prompt children to tell a story orally. It was expected that there would be interference between foreign languages and the process of Croatian language early acquisition and a more significant influence of related Slavic languages and English as a *linguae francae*. Moreover, it was expected that the interference would not be a difficulty but rather an advantage for acquiring the mother tongue (Croatian).

**Keywords** acquisition of language, media, language in contact, Croatian language, multilingualism.

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## 1. Introduction

One of the goals of the European Union's language policy is developing multilingualism and multiculturalism that together lead to creating a multilingual community. In this context, it is expected from European speakers to use at least two languages: their mother tongue and one foreign language. Data collected by Eurobarometer statistics show that the most common language in the European Union is German (16%), then English (13%), French (12%), Spanish (8%), i.e. (EACEA/Eurydice, 2017). Polish. Interestingly one should point out, 54% of the citizens of the European Union can conduct a conversation in one foreign language, and 10% are able to do it even in three languages. Most often used second language is English (38%), followed by French (12%), German (11%), Spanish (7%) and Russian (5%). Acquiring at least two foreign languages besides your mother tongue is recommended in the *Zajednički europski referentni okvir za jezike: učenje, poučavanje, vrednovanje*[3] (2005).

In most European countries acquiring foreign languages starts between the ages of six and eight, and in 2014 about 84% of European students learned at least one foreign language, which is a considerable difference in comparison with 2005 when 67% students were doing that. At the same time about 60% of European students in primary schools learned two foreign languages, whereby it was in most countries their choice to learn a second foreign language and not their obligation. Knowing the (multi) linguistic trends and tendencies in Europe, it is important to understand how these efforts towards multilingualism are reflected in the language policy of the Republic of Croatia. However, before offering an insight into that question, it is essential to understand the context.

Croatian language is, namely, the 24th official language of the European Union, and since it is a small language with a relatively small number of active speakers (about seven million), learning other languages is an important educational component of the curriculum. Moreover, through history and today still, the influence of other, in different periods differently dominant languages (Turkish, Italian, German and Hungarian) is inevitable, and today the predominant influence is that of the English language and the rest the anglicisms and globalism accompanying it and with IT industry supporting it, that is evident throughout the world.

### *1.1. Acquiring the mother tongue (Croatian)*

The process of language acquisition starts as early as in the prenatal period when a child listening to the language in his/her environment starts acquiring it. There are recognisable milestones and developmental patterns present (or absent) in the process at expected developmental stages (Kuvač Kraljević and Kologranić Belić, 2015).

The prelinguistic stage lasts *to the end of the first year, i.e. until a child speaks its first meaningful word and it represents the hive of developmental activities* (Kuvač Kraljević and Kologranić Belić, 2015: 27). During that period a child communicates with his/her environment crying, laughing and by other non-verbal signs understanding more than producing language. Typical of the

[3] *Common European Framework of Reference for Languages*

prelinguistic stage are rhythmic logatomes that occur in pronunciation of a combination of simple consonants and vowels: *pa-pa*, *ba-ba*, *ma-ma*, *ta-ta*. Around the first year of age rhythmic logatomes acquire their first meaning.
In the next linguistic stage, a child continues to develop his/her lexical system, at the same time making mistakes on phonological, morphological, syntactic and semantic levels. A child switches certain sounds, skips those that are difficult to pronounce or pronounces them incorrectly. He or she gradually acquires grammatical rules, generalising them and making mistakes on a morphological level, staying constantly within the system of the Croatian language.
Around the age of two a child pronounces first sentences that often resemble so called telegraphic speech, i.e. they lack uninflectable words, auxiliary verbs and emphatic pronouns. The first sentence most often consists of one or two words. Moreover, a child enriches his/her vocabulary using words in only one of their meanings or creates neologisms in order to fill his/her lexical gaps. One could say that around the age of three a child commands the base of the mother tongue and, according to estimates, has in his/her mental lexicon about 1 000 words. This number grows progressively with age and around the age of six, a child's vocabulary consists of about 10,000 words. Language acquisition is a spontaneous process and its success depends on a number of factors, for example the number of children in the family, the structure of the family, sex, environment and education of the parents, the amount of time that parents and relatives spend interacting with the child, social conditions in which the child is growing up and other factors.
There are numerous theories about early acquisition of language trying to answer the question of how a child acquires a language. Since it is a very complex process, theories addressing this question vary to a considerable degree. Each offers a part of the answer to this complex question and the rest of them are universal and apply to all the languages in the world. However, one should bear in mind that the language acquisition process is specific and depends on the features of a particular mother tongue.
We could agree with generativists (Chomsky, 1967, acc. to Jelaska, 2005) that all children are born with the same mind grammars but completing the mind map will depend on the exposure to and specifics of a particular mother tongue. We could, also, agree with the statements of behaviourists (acc. to Aladrović Slovaček, 2019) who claim that a child acquires language through imitation, but then one should consider the total language production of a child that could not have been heard in such a form ever before. What equally affects language acquisition is a child's environment as well as his/her cognitive abilities, i.e. thinking capacity. Description of Croatian language acquisition is based on the parents' records of three monolingual children and it is in the world base of children's language – CHILDES.
With regard to the fact that learning a foreign language starts in school, a question arises as to what happens in the early kindergarten and preschool period, i.e. what role do languages that children are exposed to have in their acquisition of their mother tongue, which continues, for Croatian, up to the seventh year of age. *Nacionalni okvirni kurikulum za predškolski odgoj i*

*obrazovanje te opće obavezno i srednjoškolsko obrazovanje*[4] (2015) in the Republic of Croatia encourages and supports the development of eight key competences for lifelong learning among which communication in the mother tongue is the most important one, followed by communication in a foreign language (*Preporuke o ključnim kompetencijama za cjeloživotno učenje*[5] (2006)). Communication in a mother tongue is strengthened by instructing children how to correctly express themselves orally and in writing: their thoughts, feelings, experiences in different activities that are purposeful and meaningful to them. Communication in a mother tongue includes developing a child's consciousness about the influence of language on others and the need to use language in a positive and socially responsible way. This competence is developed in such organisation of the educational process in kindergartens that is based on creating an encouraging language environment and encouraging children to socially interact with other children and adults in various ways.

On the other hand, a child in the early childhood and pre-school education learns a foreign language in groups that are formed especially for that purpose (most often English, German, French, Italian) or in kindergartens that specialise in teaching children a foreign language (French, German, Italian or a minority language). A foreign or a minority language is acquired in an encouraging linguistic context, through play or other activities with the same purpose of learning the language. Teaching a foreign language is woven into everyday educational activities of the kindergarten and does not take place through separately defined methodical procedures. Encouraging cross-cultural understanding and communication between children and other subjects in and outside of the educational facility contributes to the development of this competence.

Research (Pavličević Franić, 2005 and 2011) shows that both horizontal and vertical multilingualism occur already in the early language acquisition, i.e. children that enter the kindergarten with their own idiom, get to know other children's idioms and in this way become vertically mulitlingual, i.e. they are acquainted not only with different forms of their mother tongue (dialects), but also with a foreign language through media and various programmes taking place in and outside of the kindergarten. All of that, naturally, has a powerful impact on the process of a mother tongue acquisition.

### *1. 2. Influence of the media on language acquisition*

Nowadays we cannot speak of language acquisition without connecting it to numerous other processes and situations that today's children are exposed to. Even though language acquisition process in the prelinguistic stage has the same phases in all the languages of the world, it will still be influenced not only by the structure of the language, especially its grammar, but also by numerous extralinguistic reasons. In conclusion, the influence of the media on children's language acquisition process is inevitable. Research (Jelaska, 2007) has shown that children of educated parents have somewhat better linguistic competences, children that attended kindergarten programmes for

[4] *The National Curriculum Framework for Pre-School Education and General Compulsory and Secondary Education*

[5] *Recommendations on Key Competences for Lifelong Learning*

at least three years later have better reading competences (PIRLS, 2011), children who can use computers also have significantly better competences as well as children who have more varied and richer language input. However, even though most children do not learn a foreign language in early childhood and at the preschool age, they are still exposed to it through media, watching cartoons, following YouTubers and playing various computer games, so, in order to comprehend this problem, one should definitely consider the influence of the media that children are more or less exposed to every day. To what extent they are exposed to the media depends mostly on their parents' attitudes towards media and on how busy or able they are to spend quality time with their children.

Author Vandewater and the rest (2007) conducted a comprehensive research in America which included more than 1 000 parents who confirmed that their children who are not even two years old, spend a little more than two hours in front of the screen every day. Also, author De Decker et all. (2012) conducted a research about the amount of time preschool children spend in front of the TV. Six European countries were included in the research and the results differed to a great extent – from 20 minutes to 4 hours a day. German and Spanish children spend the least amount of time in front of the screen (20 – 30 minutes), in Greece it is half an hour to an hour and a half a day, whereas parents from Belgium, Poland and Bulgaria state that their preschool children spend from one to four hours a day in front of the screen.

Research that was conducted in 2017 in the Republic of Croatia included 653 preschool children whose parents completed a questionnaire on the influence of the screen on the life of their preschool child and on the children's and parents' habits during a week and on weekdays. The results showed that all preschool children use TV screens and that it begins before the age of two with children doing it more than two hours every day (Roje Đapić, Flander Buljan and Selak Bagarić, 2020). The authors emphasise that about 43% of preschoolers in the Republic of Croatia can use the Internet, 97% watch TV v every day, 68% follow media content via their smart phones and the rest in some other way, all of which is a clear indication that the influence of media on language development is inevitable. Children choose media content mostly on their own although the American Pediatric Society recommends that they do it with the help and support of their parents. Since they choose the content themselves, they at the same time choose the language in which the content will be consumed and so they encounter new speech forms, idioms and different languages. To investigate to what extent this is the case and which languages they are exposed to is the crucial question of this research.

Research shows (acc. to Aladrović Slovaček, 2019) that too much time spent in front of the TV has as a consequence less interaction between the child and parents and other children. On the other hand, quality TV programmes can offer good speech models to children. Moreover, quality content on TV can provide models for new games with friends and children who watch multicultural programmes are more likely to play with children from other cultures, which enhances understanding and acceptance and increases tolerance.

Author Jasna Šego (2009) believes that programmes in dialectal speech and foreign languages enrich children's language and speech development, e. g. when children hear different words or different pronunciation of a word for an object, activity or occurrence that they know, it makes them more aware of the communicative function of the language. Unfortunately, television can also have a negative impact on children's language and speech development. If children watch it for too long, their linguistic abilities will become insufficient (prereading skills will be weaker, sentences too simple, and their interactions with peers and parents will be reduced). Most programmes intended for children up to the first year of age in English are completely appropriate if we consider their colours, movement and language simplicity, but psychologists emphasize that the presence of so many colours and movement will influence early emotional and social development in a negative way because they surround children with an unnatural situation to which they will get accustomed and later expect the same to happen in the world that surrounds them.

Still, most research on the influence of the media on language acquisition and development was conducted among school children. One such empirical study was conducted in the Netherlands where the Dutch is the official language and it was the aim of the researchers to compare the influence of three different media in English on the language of primary school children. The research showed that the students who watch TV programmes and films with subtitles show considerably better results in the tests of oral skills in English. Similarly, students who play computer games more often, as well as girls had better results in the knowledge of the English language (Kuppens, 2010). A Croatian the research shows (Pavličević-Franić and Aladrović Slovaček, 2017) that learning a foreign language positively affects the mother tongue acquisition, i.e. that parallel linguistic codes are not an obstacle in learning but an advantage in acquiring standard Croatian. It means that children that learn English or some other language as a second language think more about rules and communication in their mother tongue. So, that has positive effect on the process of learning Croatian language. All of that contributes to the basic educational goal of the European Union – nurturing multilingualism and multiculturalism as the fundamental values on which this community is founded.

### *1.3. Bilingualism, multilingualism, plurilingualism*

As already stated in the introduction, nurturing multilingualism is one of the educational and cultural goals of the European Union and it is therefore important to encourage learning at least one or possibly two foreign languages besides a mother tongue. The importance of acquiring a mother tongue is hereby not to be neglected since it is a precondition for learning other languages which is confirmed in the document *Preporuke o ključnim kompetencijama za cjeloživotno učenje* (2006). When we talk of multilingualism, in theory we encounter several different concepts. Most often the terms that are used are speaking two languages or bilingualism, which means knowing two languages in the identical way even though one language is the dominant one. It is most often the one used in the community in which

a child or a person lives. In short simple terms, bilingualism is the ability of speaking two languages (Trask, 2005).

Bilingualism can be individual but also a characteristic of the whole community in which two or more languages are regularly spoken. Author Trask (2005) states that more than 70% of the world population is bilingual or multilingual. The term multilingual or multilingualism implies the possibility to learn different languages in any educational institution or in various multicultural environments which need not interfere with each other (Pavličević-Franić, 2006), and plurilingualism implies interlinguistic connectedness, intertwining and interference of various linguistic codes in the same speaker who uses his existent language knowledge to acquire a new language (Pavličević-Franić, 2006; *Zajednički europski referentni okvir za jezike: učenje, poučavanje, vrednovanje*[6], 2005).

Author Kȍnigs (2000, acc. to Jaić-Novogradec, 2017) differentiates between three kinds of individual plurilingualism: retrospective plurilingualism, which describes bilingual speakers who coming to class already have a considerable knowledge of the second language (L2 knowledge), retrospective and prospective plurilingualism, which describes speakers who are plurilingual and have advantage over other learners whereby neither of their languages is the language being taught. Through learning the third language those learners further develop their plurilingualism and prospective plurilingualism, which is characteristic for students who are monolingual coming to classes and who develop their plurilingualism by learning a foreign language at school. Prospective plurilingualism is the kind of plurilingualism typically present in most European schools, including those in the Republic of Croatia where, students starting school start learning one or more foreign languages and develop their plurilingualism mostly learning their first foreign language at school.

In conclusion, it is the main idea and goal of this research to examine to what extent exposure to other languages influences the process of Croatian language acquisition, be it in kindergartens, preschools or language schools which children at this young age attend, or through the exposure to media content that is most often in the form of cartoons, following youtubers and playing computer games.

## 2. Methodology

### *2.1. Description of research samples, instruments and methodology*

15 children, seven boys and eight girls, from the ages of 4 to 7 participated in this research. All of them are monolingual and the rest of them learn English as a second language once or twice in a week. Children were selected purposefully (we know their parents and we have confidence that they will do it how we explain) in order to systematically record their speech in the course of three months, from September to December 2019. Their speech was recorded by their parents who followed a short instruction provided by the researcher. Parents were supposed to record all the words or utterances that a child produces in free speech and that do not belong to the system of

[6] *Common European Framework of Reference for Languages*

Croatian language. Apart from this longitudinal research during three months, each child was examined using storytelling cards. They were each offered six cards in different colours and they were asked to choose three cards from the six that they were offered. The children were then supposed to tell a story using these three cards. Researchers were prompting them and if they had difficulties telling a story or did not include pictures on their cards in their story, the researchers would ask them questions about the cards. Each card colour represented a category: place of action, a role, feelings, things, time and people. Each examinee was recorded and then his/her speech was transcribed and entered into NooJ – a linguistic computer program for text analysis. The corpus was date of first type of researching – transcripts of parent's recordings and second was data of recordings of stories of children that they talked by storytelling cards). We annotated words that we thought are important for our research. The data were processed using both the qualitative method of content analysis and the quantitative method using SPSS tests of parametric statistics: t-test, variance analysis, chi-squared test and the descriptive markers for every stated variable (age, sex) were defined. Moreover, children were in the research divided into two groups; kindergarten group (4 and 5 years of age) and preschoolers (6 and 7 years of age).

### *2.2. Research goals and hypotheses*

The main research goal was to establish the influence of other languages that children are exposed to in the process of Croatian language acquisition. In accordance with this goal, the present study was designed to examine

1. the interference of parallel language codes of both related languages and those that are not related, but are dominant in a child's environment, with the process of Croatian language acquisition at the kindergarten and preschool age.

2. the characteristics of children speaking in early age phase (sentences, most frequent words, lexical diversity and lexical density).

In accordance with the goal mentioned above, the following research hypotheses were identified:

H1 – It is expected that parallel linguistic codes will appear, i.e. separate lexemes and phrases from languages that children are exposed to. The most powerful influence is expected to be that of the English language, especially on the lexical level, but also of the Serbian language on both lexical and grammatical level since numerous cartoons are synchronized in the Serbian language and of other Slavic languages. It does not mean that Children are bilingual or multilingual, it just confirms the influence of other dominant languages in medium or in context of living.

H2 – It is expected, with regard to the purposefully chosen sample, that the children will exhibit a high level of linguistic competence, i.e. linguistic knowledge and confidence. Therefore, a high level of lexical diversity (the ratio of variants and occurrences in the text) and density (the ratio of full words and

occurrences) is expected which means that the examinees have a broad vocabulary completely in accordance with their cognitive age. Their sentences are expected to be built respecting the syntactic rules of Croatian language and consisting of a number of words characteristic of their cognitive age and also that there will be some deviations on the stylistic level in speech and recorded utterances.

## 3. Findings and discussion

Examinees were, with regard to their answers, divided into two groups: kindergarteners – children aged 4 and 5 and preschoolers – children who are almost 6 or 6 years old. In spontaneous parents' notes there were mostly separate words that children used in free speech exchanging thereby the Croatian word, in naming colours in particular: *bijela* (white), *crna* (black), *smeđa* (brown), *narančasta* (orange), *crvena* (red), *plava* (blue) and *siva* (gray). Children would sometimes, talking about a picture or drawing or explaining what a toy or a person looks like, use the English word for a colour instead of the Croatian one. Doing that they would not apply the rules of Croatian grammar for the used word. They would not inflect it for instance, which can later be observed among primary school students. Here are some examples: *Imam brown (smeđeg) medu* (*I have a brown teddy bear.*). *Neću obući tu majicu black (crne) boje* (*I'm not wearing that black T-shirt.*). *Mama, to je white* (*Mom, it's white.*). *Sunce je yellow* (*The sun is yellow.*). Apart from colours, children would also use English words to name animals (bear, polar bear, snake) but in naming animals one could observe some words that belong to Serbian: *lenjivac* (*ljenivac – sloth* ), *lagano* (*ljenivac*), *sisar* (*sisavac – mammal* ).
Considering the fact that the Serbian language is also a South Slavic language and similar to Croatian with regard to its lexical structure, children sometimes choose cartoons in Serbian or Bosnian, not knowing that these are different language codes. Watching cartoons about animals (*Wild Kratts* in particular), a child adopts some lexical terms that he/she does not have filled in Croatian language. For example the word *sisavac* (mammal in English) and *sisar* have, actually, the same root, but different suffixes, so that the child retained the Serbian word because he/she possibly had never heard the Croatian word. The child probably does not know the complete meaning of the word but knows what kind of animals it refers to in relation to the cartoon that he/she watches. Apart from the mentioned words, some others were recorded that children used because they had heard them in a cartoon: nouns: *makaze* (*škare* – scissors), e. g. *Daj mi te makaze*! (*Give me those scissors!*); *WC šolja* (*WC školjka-toilet)*, e. g. *Idem na WC šolju.* (*I'm going to the toilet.*). Examples of recorded verbs are: *posmatrati* (*promatrati* – watch) – e. g. *Mama, vidi kako me pas posmatra!* (*Mom, look at the dog watching me!*). Children also use some words that exist in Croatian too, but are pronounced with different accent, e. g. *zubići*, *čudovište* in which instead of the short rising accent on the first syllable they use long rising accent on the second syllable in the word *zubići*, whereas in the word *čudovište* they use short rising accent on the second syllable instead of the short rising accent on the first syllable.
It is interesting that the interference of the English language is observed in counting as well since a lot of children start counting in English (mostly to

ten) instead of Croatian. This is especially appealing for young children who have only just started learning English. This interference of English is particularly evident in naming colours, counting and in using some other nouns that have entered Croatian as globalisms and have not been replaced in active speech, like for example the word shopping that is rarely used in the Croatian version *kupovanje* or *kupovina*. Consequently, we can sometimes hear interferences of the whole simple English sentences: *Mummy, let's go shopping, Let's start! Dance!, Clean up!, Be quiet*! and *Fly*. Apart from the mentioned phrases, the interference of English is evident in spontaneous speech as well where words like snowman instead of *snjegović*, laptop instead of *računalo*, book instead of *knjiga*, candy instead of *slatkiš* sometimes appear. All of the above examples demonstrate that children interfere that which they learn and they most often first learn numbers, colours, typical and frequent phrases like *Be quiet!* or *Clean up!* and some words that are connected to certain occasions or seasons like, e. g. snowman or Christmas, for instance in a sentence: *Mama, sada je Christmas* (*Mom, today is Christmas*.). Another example is the word birthday, e. g. in the sentence: *Danas je Karlin birthday* (*Today is Karla's birthday*).

The whole language acquisition process is characterized by filling the lexical gaps that a child has with new words. Sometimes they are words that a child uses in only one meaning that needs to correspond with the meaning that adults assign this particular word (for instance, a child may use for all four-legged animals the word dog – for a wolf and a fox as well…). However, a lot of children use so-called neologisms, i.e. new words. Some of them were recorded in this research: *putovnici* (*putnici* - travellers), *stojiti* (*stajati* - stand), *otopiti* (*utopiti* - drown), *otklopac* (*poklopac* - lid), *okopako* (*naopako* – upside down), *galub* (*golub* - pigeon) and *pozviniti* (*pozvoniti* - ring the bell). Moreover, they also use English words with Croatian endings, for instance: *prenkujem te* (*šalim se s tobom, zezam te - I am just joking with you*.) in which the English noun prank was given a Croatian verb form ending for the first person singular in the present tense *-jem*. It was observed that some children, who watch cartoons about little battle tanks sometimes use two Russian words: *babuška* and *deduška* in the meaning grandma and grandpa because they spend part of their time being exposed to Russian TV.

It could be said that, as a result of spontaneous observation, a significantly bigger number of words was recorded that do not belong to the corpus of Croatian due to the fact that children speaking spontaneously do not think about what and how they are going to say something and choose their words depending on the situation. However, if they are telling a story and are aware of the fact that their speech is being recorded, they very rarely use the Croatian word for a colour instead of the English word but they use neologisms when they lack words for naming a concept or a thing. All of that supports accepting the first hypothesis, i.e. the idea that the interference of other linguistic codes children are exposed to is evident, and significantly more so in spontaneous speech.

The second goal of the research was to examine lexical density and diversity of children's speech when telling stories, i.e. to establish some characteristics of their lexical development. With regard to the fact that children were divided in two groups: kindergarteners and preschoolers, it was observed that there

is not a statistically relevant difference in lexical diversity when telling stories with the help of storytelling cards. Namely, the results of the ratio between the total number of types and tokens show a very similar number: kindergarteners (0.63), preschoolers (0.65). Kindergarteners have in their sentences 6 words on average, which is in accordance with their age, whereas preschoolers have seven words in a sentence, quite consistent with their age. Interestingly, in texts they most often use coordinating conjunctions (*i*), contrasting ones (*a*), time conjunctions (*kad* or *onda*), and relative pronouns to connect sentences (*koji*). Their texts have 3-4 sentences on average, which is in accordance with their developmental age. Here are some examples: the child's name, age, number of sentences in the text, average number of words in a sentence and most often used connectors (in brackets):

- Marta, 6 years – 3-4 sentences
- Diego Emanuel, 4 years – 3 sentences
- Antea, 4 years – 3 sentences
- Lana, 7 years – 4 sentences, 7 words in a sentence (using *i, a, koji*)
- Jan, 6 years – 3 sentences, 7 words in a sentence (using connectors *i, a, koji*)
- Eva, 5 years – 3 sentences, 6 words in a sentence
- Andrija, 5 years – 5 sentences, 6 words in a sentence (using connector *kad* and *onda*)
- Grgo, 7 years – 4 sentences, 7 words in a sentence (using *koji, i, kad*).

Described, collected, and analysed data indicate that the second hypothesis which presupposes a high level of linguistic knowledge and confidence since the sample was purposefully chosen, can be accepted. Consistent with the expectations, the examinees demonstrated excellent lexical diversity in their speech, significant number of words in their texts and sentences and superb use of connectors. Comparing results that were collected for first-graders (Aladrović Slovaček 2019), these results show that the children's oral linguistic competence is on a high level. The obtained results were similar to the results of a research in which kindergarteners' and preschoolers' basic emotion expression was examined (Aladrović Slovaček, Čosić and Magašić, 2020). In these studies we show that children speak the most when they describe sadness, they have about six words in sentences and they use simple phrases and words when they started describe their feelings.

## 4. Conclusions

Multilingualism as the main idea of the European Union's language policy manifests itself in various ways, from inclusion in educational curricula and other documents to fostering this idea in different informal ways. The process of Croatian language acquisition as well as other languages is under a strong influence of English as the global language, but also of other languages surrounding Croatian, i.e. Slavic languages among which the mentioned research confirms the presence of Bosnian and Serbian. The situation in which there is lack of cartoons for kindergarten and preschool children

synchronized in Croatian is the reason why children watch cartoons in other languages and thus acquire some language forms or lexemes that they incorporate in their speech. They do that sometimes not even knowing the exact meaning of these words. Apart from the language of cartoons, another powerful influence are youtubers who children follow (e.g. Filip and Zaga – Bosnian YouTubers) and computer games that they play, as well as films about playing computer games which are often in Bosnian or Serbian. The influence of the Russian language which also 'came' the same way, i.e. through cartoons is particularly interesting. Children discovered it searching on YouTube with parents being present but not controlling their activities.

Since the sample is relatively small and purposefully selected, the results should be taken with some reservation, i.e. they can not be generalized. The influence is definitely present, and a more comprehensive examination would answer the question how significant it really is. It should be pointed out that two methods of examination were used, which led, as it was explained, to different results, i.e. to using lexemes differently depending on the occasion, situation and goal. Other extralinguistic factors, naturally, played a part in this research but they were not measured, e.g. if a child has a brother or a sister, parents' social status, sex, parents' reading habits, etc. Since the sample was purposefully chosen, the social situations of the families that participated in the research were similar and it can therefore be inferred that differences would not be of significance after comparing data. However, such analysis was not conducted because the sample was also very small. One should definitely consider conducting it in the future. In conclusion, we can say that parallel language codes developing in the process of early language acquisition is something not typical only of families and countries where bilingualism is natural but also that it happens spontaneously and does not influence acquisition of Croatian in a negative way. On the contrary it is beneficial for it and it directs the child from the early childhood in the direction of multilingualism and multiculturalism. One more observation is that this process will depend on the amount of time spent in front of a screen. Parents' control over their child's media consumption and on a child's interests and age. So, boys will watch war cartoons with battle tanks (in Russian), cartoons about animals and follow YouTubers talking about computer games and girls will choose female YouTubers talking about making yourself look beautiful and cartoons with less aggression and more colours. Also, in our research we did not find any differences according to gender. All of that will more or less affect the language in which these contents are presented and consequently this language will influence the process of the mother tongue (Croatian) acquisition.

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