DOI: 10.17469/O2103AISV000013

VINCENZO GALATÀ, GIULIA ANGONESE, CLAUDIO ZMARICH

Italian as L2 in Romanian pre-schoolers. Evidence from a perception and production task

Following state-of-the-art research on the linguistic development of children acquiring a second language, the proposed study aims at deepening our understanding of the mechanisms that drive the phonetic and phonological acquisition of Italian as L2 in migrant Romanian pre-school children. By shedding some light on the difficulties faced by a group of 17 Romanian pre-schoolers in Italian L2 production and discrimination tasks, our aim is to provide evidence of their phonological development to support potential educational intervention activities that suit the needs of multilingual children. Moreover, though on a limited sample of children, we provide important evidence that needs to be taken into account when carrying out diagnostic language evaluations and treatments on bilingual children born to immigrant parents[1].

Key words: Italian L2 acquisition, Romanian pre-school children, non-word repetition, non-word discrimination, phonological skills.

1. *Introduction*

The growing rate of immigration in Italy in the last few decades poses serious challenges to the diagnostic evaluations and treatments for bilingual children born to immigrant parents with specific speech and language disorders. While such aspects are out of the scope of our research, understanding how the phonetic and phonological properties of a language affect the acquisition of a second language (L2) in young migrant children remains of crucial importance.

In L2 acquisition, one of the factors influencing the L2 proficiency is the so-called "L1 transfer", namely the cross-linguistic influence, going from the mother tongue to the L2. The L1 influences the acquisition of different linguistic domains of the L2, and this influence is more evident in phonology, phonetics, prosody and lexicon/semantics than in other domains such as syntax and morphology, especially during the initial steps of the acquisition process and mainly in children (Mioni, 2005: 36). In different words, the distance between L1 and L2 can facilitate the acquisition process, or interfere with it. The structural proximity between the two languages can ease the learning process, but it can favour, at the same time, the interference between

[1] Authorship note. Although the paper is the result of a joint collaboration and discussion between the three authors, the main research idea is to be attributed to VG and CZ; the data collection to VG, the data preparation, analysis and results' discussion to VG, CZ and GA. Finally, the paper drafting and preparation is to be attributed to VG.

the two languages; on the other hand, the structural distance requires the acquisition of unfamiliar structures which require more time to be acquired, but reduces the interference (cfr. Anderson, 2004; Mioni, 2005; Valentini, 2005).

We know from literature on adult L2 acquisition that, when learning a new language, speakers face situations in which phonemes of their first language (L1) are absent in the new L2 and *viceversa*; similarly, situations in which positional variants in L1 are phonemes in L2 (or *viceversa*) may also occur. Not to mention other differences originating from the relative frequency of occurrence in each of the two languages, the phonotactics (e.g. syllable position; Hansen, 2004), the prosodic domains larger than words (Young-Sholten, 1994) and stress patterns (Archibald, 1994). This is, for example, the case of adult members of migrant families in which the mother tongue is the main language spoken at home and in everyday communication, and in which the second language is learned only in their adulthood as a foreign language, hence emerging poorly intelligible, syntactically and lexically poor and not fluently spoken (MacKay, Flege, 2004).

This cross-linguistic influence produces acquisition strategies based on 3 factors (Topoliceanu, 2011): "congruency", that is identifying structures and elements which are similar in the two languages; "correspondence", i.e. relating norms and frames of the two languages; "difference", namely detecting in the new language, components which do not exist in the L1.

To explain this "L1 transfer", the Contrastive Analysis Hypothesis (CAH, first presented by Lado, 1957) ascribed to L1 an inhibitive role in L2 speech perception, processing and production. The CAH predicted that those aspects of the L2 sound system that are similar to the L1 will be easy to acquire, while other aspects that are different from the L1 will be more difficult (cfr. Zampini, 2008: 219). However, as pointed out by Zampini (2008), the role of L1 in L2 phonological acquisition is not so straightforward and many other factors affect L2 phonological acquisition thus limiting or reinforcing the role of the L1. These factors can be attributed to linguistic and extra-linguistic characteristics. Among the linguistic characteristics, factors such as the level of markedness (Eckman, 1977) and/or the acoustic closeness of the trait to be acquired can hinder a correct acquisition (because the L2 trait is assimilated to an existing similar, but not equal, L1 trait); whereas relative distance paradoxically makes differences more evident and recognizable, and then more learnable (Flege, 1995; Best, Tyler, 2007). Among the extra-linguistic characteristics, factors such as age and social context are important. These factors interact, as predicted by the Ontogeny Model of Phonological Development (Major, 1986), in the production errors of toddlers acquiring L2 (these errors derive both from normal developmental processes of acquisition, which have a universal nature, and from L1 transfer). In fact, the age of first exposure to L2 is another aspect among the most recognized and significant factors contributing to L2 proficiency (SLM model, cfr. Piske, MacKay & Flege, 2001; Flege, MacKay, 2010; Wei *et al.*, 2015). The concept "earlier is better" in L2 acquisition has been convincingly documented since the last century's '80s (as stated by Flege, MacKay, 2010). Focusing on pho-

nological learning specifically, early second language learners usually display more native-like patterns in L2 perception than late learners (Archila-Suerte, Zevin & Hernandez, 2015), and age of first exposure to L2 strongly influences perception and production abilities in L2, such as perceptive efficacy, degree of foreign accent and speech accuracy (Flege, 2007). The real importance of this factor, however, is its alleged association with "causative" variables thought likely to vary with age of exposure, such as variation in neural maturation (itself thought to influence degree of neural plasticity), the state of development of native language phonetic categories, and the kind and/or amount of L2 input typically received (Flege, MacKay, 2010). Moreover, it has been shown that age of acquisition modulates functional neural activity in several aspect of language processing, with various studies suggesting that age of acquisition of L2 may have important effects on the functional organization of the language system in bilingual brains (see Wei *et al.*, 2015 for a review).

Another determinant of the level of proficiency attained in a second language to be taken into account is the concept of "the more experience, the better": that is, time and amount of exposure to a language (Sebastián-Gallés, Bosch, 2005). It is known that learning language-specific properties requires exposure to relevant speech in learning environments that support interpretation and social interaction; the interesting question is how the environment aids or hinders specific learning outcomes (Carroll, 2017a). Given that experience matters to bilingual language acquisition, it is also necessary to deepen the investigation on how exposure guides specific learning mechanisms towards the solution to a well-defined learning problem (Carroll, 2017b).

The situation described so far applies to the young Romanian children in the present study. These children are systematically exposed to L2 (Italian) only as they enter kindergarten and where they acquire the second language "in the environment where the language being learned is spoken" (Gass, Glew, 2008: 266; see also Bettoni, 2001; Ritchie, Bathia, 2009). On the segmental level, these young children need to cope with cognitive challenges (categorization of phones and their possible combinations), as well as with motor control abilities (learning new articulatory habits). If we then would take into account also the prosodic level, which again is outside the scope of the present contribution, the number of difficulties would increase enormously (see Zampini's review, 2008; Mennen, 2015).

Notwithstanding the enormous difficulties outlined above, when entering kindergarten at age 3-6, these children are in the optimal condition to become simultaneous bilinguals by learning their mother tongue (their parents' language spoken at home) and the second language (the language of the country they live in). The age period from 3 to 6 represents, from a neurobiological point of view, a fruitful and privileged time-window for the acquisition of languages (Bates, 1995; Birdsong, 1999; Ioup, 2008).

As far as the authors are aware of, the present study is one of the firsts to be carried out on a group of Romanian pre-schoolers learning Italian as L2 by addressing specifically their phonetic and phonological development. In addition to this, studies

tackling the phonetic and phonological development of Italian pre-schoolers are also very limited (e.g. Zanobini, Viterbori & Saraceno, 2012, who analysed the phonological development of children between 36-42 months of age in relation to other aspects of language acquisition; for a review, see also Zmarich, Pinton & Lena, 2014).

2. *Objectives*

Our main aim is to assess the phonetic-phonological development of a group of pre-schoolers born from Romanian parents and attending the Italian kindergarten in order to contribute to the very sparse literature on the acquisition of Italian in pre-schoolers and children learning Italian as L2.

The research question we try to answer here is whether differences between the phonetic-phonological system of Romanian (ro) and Italian (it) may influence the perception and the production of Italian as L2 in Romanian children. We hypothesize that Romanian children learning Italian as L2 by entering the kindergarten may encounter major difficulties in the production and perception of specific sounds not present in their home language (L1 Romanian). To this end, we specifically focus on the consonantal system of the two languages the children are exposed to.

The Romanian language is very similar to Italian in different linguistic domains (Topoliceanu, 2011), but for the purpose of our study, we limit ourselves to highlight that on the phonological level, with respect to Italian, consisting of 23 consonants, the Romanian language counts 22 consonants (and various allophonic variants; more details in Chitoran, 2001) and lacks the phonemes /ɲ/ (found in words like <gnomo>, Eng. 'goblin'; <ragno>, Eng. 'spider'), /ʎ/ (as in words like <gli>, one of the alternative forms for Eng. 'the'; <aglio>, Eng. 'garlic') and /dz/[2] (quite infrequent, as in words like <zero> Eng. 'zero'; <azzurro>, Eng. 'blue') as well as the consonants' gemination process with distinctive function (e.g. word pairs like <papa>, Eng. 'pope' vs <pappa>, Eng. 'food'). Despite this strong similarity between the two systems, we will show how the acquisition path of Italian L2 in our group of Romanian children may be markedly diverse from their age-matched Italian peers.

In doing this, we will analyse the error patterns and fluency measures in the children's productions as these represent major evidence for the emergence of a phonological system (for Italian: Zanobini *et al.*, 2012; for British-English: Dodd, Holm, Hua & Crosbie, 2003; for a comparison between English and Dutch speech sound development: Priester, Post & Goorhuis-Brouwer, 2011).

We will also attempt to verify possible relationships between direct language measures of language ability and phonological skills with selected measures of language exposure[3] collected by means of parent's reports via questionnaires.

[2] In Italian, these three consonants undergo gemination in intervocalic position.

[3] Although this last point has become the topic of a very recent and vivid debate (see Carroll, 2017a; Carroll, 2017b for a more detailed discussion).

3. *Materials and methods*

3.1 Materials

A Non-Word Discrimination Test (NWDT) and a Non-Word Repetition Test (NWRT) based on the same CV.CV non-words targeting, among others, also Italian phonemes absent in Romanian (that we consider as "critical" consonants), were administered to a group of children speaking Romanian as L1. We choose non-words because of "the potential usefulness of processing-based measures generally, and nonword repetition tasks specifically, in providing culturally nonbiased assessments of linguistic abilities" (Weismer, Tomblin, Zhang, Buckwalter, Chynoweth & Jones, 2000: 874). In fact, the non-words repetition (or discrimination) is a task of speech production (or perception) less dependent from previous lexical knowledge, thus engaging only the phonological memory and/or the articulatory system, but not the lexical/semantic system (Baddeley, Gathercole & Papagno, 1998).

The NWDT is based on the opposition, in ′CV.CV non-word pairs, of Italian consonantal phonemes: the difference among the contrasting phonemes involves one phoneme in each pair whose opposed one differs for a maximum of 3-4 distinctive features (Jakobson, 1966; Muljacic, 1972). Examples of nonword pairs are: /nabi, ɲabi/, /ʎaki, laki/, /nafi, napi/, /daffi, dafi/, /tisa, tissa/, /biti, bitti/ etc.. The NWDT also includes non-word pairs contrasting for sonority and gemination. The purpose of the NWDT is to determine whether the Romanian L1 children could perceive any difference in the two words by asking them to indicate for each proposed pair of non-words whether the two non-words are same or different.

In the NWRT the child is asked to listen and to repeat single non-words in a sort of "parrot game" (for more details on the two tests: Galatà, Zmarich, 2011a, 2011b). The same pre-recorded non-words, uttered by a professional speech therapist, have been used in both the NWDT and the NWRT.

In order to collect more natural speech samples to be added to the phonetic and phonological analysis as well as to evaluate more ecological parameters usually found in spontaneous speech, an additional Narrative Task (NT) has been administered to the children in order to elicit their oral production. This additional task included two painted story strips containing six scenes each that the child had to describe orally. These were "The Nest story" (Paradis, 1987; Mauro, Burelli, 2002; Marini, Marotta, Bulgheroni & Fabbro, 2015) and the "Flower pot" story (Huber, Gleber, 1982; Marini, Andreetta, del Tin & Carlomagno, 2011). For this task, the children were asked to describe the two stories to the experimenter[4].

[4] It is worth mentioning here that we administered the two stories with the aim to collect as much spontaneous speech as possible. We tried to stimulate the children to continue with the story description even in those cases where they provided very short descriptions or even when they did not want to tell them at all. This attempt of ours had, on one side, the desired effect of getting the child engaged to talk thus allowing us to collect more spontaneous speech; on the other side, this operation prolonged pauses and recording time drastically. For this second reason, for example, we could not compare the Narrative Fluency (NF) index as number of words per minute as proposed by Marini *et al.* (2015).

Additionally, the children's parents were further asked to fill-in a questionnaire. The parents' responses provided with the questionnaires (Qs) addressed the child's linguistic biography and the family's socio-demographic factors expected to be relevant for reaching fluency in Italian L2 (Galatà, Zmarich, 2011a, 2011b).

3.2 Participants

The current study focuses on a group of 17 bilingual children (Romanian-Italian) aged between 61 and 83 months (mean age 5;10) attending Italian kindergartens in the town of Padova in the Veneto area (a region in the north-eastern part of Italy). The children are all born from Romanian parents, having Romanian nationality, immigrated to Italy. The children received Romanian language input at home in a family context through their parents and relatives. On the other hand, Italian language input can be considered as a mixed input consisting of a formal one, as the one provided in an educational setting (at kindergarten) taking place only as they enter the Italian school system (between 36 and 48 months of age), and of an informal one provided in the family setting (at home). Technically speaking, the participants may be considered as "early sequential bilinguals" (Marini, 2014; Meisel, 2004; Bettoni, 2001; McLaughlin, 1978).

Table 1 - *Distribution of the ROU participants according to age-group, mean age in months and gender*

Group	*Age group (in years)*	*Mean age in months (SD)*	*Males*	*Females*	*Total*
1	5;0-5;5	63.0 (1.6)	2	3	5
2	5;6-5;11	69.6 (2.2)	3	2	5
3	6;0-6;5	73.0 (1.4)	1	3	4
4	6;6-6;11	82.0 (1.0)	1	2	3
		Total	7	10	17

Some of the children were assessed at their homes in a quiet room, while some others were assessed during the kindergarten hours in a separate room. None of the children had, as reported by the parents' questionnaires, hearing or language problems. Table 1 provides an overview of the distribution of the children involved in the present study. As shown in the table, the children have been grouped according to four age-groups (expressed in years and months) in order to compare their performances to the above mentioned tests with those from Italian peers provided in the BVL 4-12 (Marini *et al.*, 2015).

3.3 Procedures

Both the NWDT and the NWRT have been administered via PRAAT's ExperimentMFC procedure by randomizing the items within each test (Boersma, Weenink, 2016). A pre-test session preceded both tests to make sure the child un-

derstood the assignment. The presentation of the stories in the NT has been randomized as well.

In order to assess the children's reliability in answering the NWDT, to verify the children understood and recalled the assignment while doing the test and to exclude they were answering by simple guessing, extra pairs prompting for a very clear "same" as well as a "different" response were included as control items in the test. All of the children answering correctly to at least two thirds of the control items were considered as reliable: all of the children included in the present study were reliable. The children's answers (same/different) to the NWDT have been exported, collected and coded in a unique matrix. The analysis has been carried out both on the overall mean of the correct responses for each child as well as on the mean of the correct responses grouped by age. For ease of comparison between the NWDT's results and those from the NWRT and the NT we will however report the percent errors.

The NWRT, the NT and all of the interactions between child and experimenter were audio recorded for offline transcription, coding and analysis.

For the NT and NWRT, the speech samples of each child have been first acoustically segmented and orthographically transcribed via PRAAT. For the transcription of the speech samples and for the identification of the utterances[5] in the NT, the criteria proposed by Marini *et al.* (2011) and Marini *et al.* (2015) have been followed in order to be able to compare the current data with those present in the BVL 4-12 (Marini *et al.*, 2015).

The pre-processed speech samples for the NT and the NWRT have been further coded via PHON (Rose, MacWhinney, 2014; Rose, Stoel-Gammon, 2015) by matching the children's actual productions to the expected adult target (e.g. IPA actual ~ IPA target). This allowed us to analyse the children's speech samples according to the classical analysis in terms of error patterns and allowed us to qualify and quantify all types of errors and phonological processes (see next paragraphs). The extraction of the raw measures to be used for the calculation of the direct measures of language ability has been carried out both in PRAAT via scripting and in PHON via specific queries.

3.4 Direct measures of language ability and proficiency

After transcribing and coding the data as described in the previous paragraph, different direct measures of speech and language ability were calculated separately for the NT[6] and the NWRT. These are:

[5] There is so far still no consensus on the criteria that define and allow the segmentation of a conversation into utterances. Most of the studies on young talkers, whose speech is highly fragmented and low in fluency, adopt a quantitative approach to temporally identify the utterances of a speech sample: segments separated by pauses below 2 seconds are considered as a single utterance. An "utterance" can be thus defined as a sequence of words, even without having grammatical structure, preceded and followed by a silence (pause) or a conversational turn (Devescovi, D'Amico, 2001).

[6] Where otherwise stated, the indexes calculated for the NT have been calculated without distinction between the two stories.

- Units produced (UP) indicates the total number of words in units (well-formed and not, disfluent words included)[7] produced by each child in the NT.
- Verbal Productivity (VP) indicates the total number of phonologically well-formed words (in units) produced by each child in the NT and it is therefore different from the total number of words (UP). This measure accounts for the child's linguistic development and abilities and it is expected to grow as a function of age and literacy. The VP index has been calculated separately for both stories in the NT and the average values for each age group have then been compared with normative data from age-matched Italian children in the BVL 4-12 (Marini *et al.*, 2015).
- Mean Length of Utterance in words (MLU_w) provides a measure of morpho-syntactic complexity and represents a predictive index for the linguistic abilities of bilingual children. MLU_w is expressed as number of phonologically well-formed words as measured by VP, divided by the number of utterances as defined in note 5 (see also Marini *et al.*, 2011: 1380). As for VP, MLU_w has been calculated separately for both stories in the NT and averaged values per age group have been compared with normative data from the BVL 4-12.
- Articulation Rate (AR) is "*a measure of how quickly a speaker transmits information when speech continuity is uninterrupted*" (cfr. Logan, 2015: 124) and thus represents a measure of articulatory rapidity. AR is expressed as number of syllables per second (syll/sec) of the uttered sequence in relation to the duration of the entire phonic chain (delimited by empty pauses) excluding hesitations and disfluencies (cfr. Zmarich, Magno Caldognetto & Ferrero, 1996)[8]. This index is computed for the NT only. Due to the lack of reference data for age-matched Italian peers, we compare our data with those reported in Logan, Byrd, Mazzocchi & Gillam (2011) for a group of typically developing children from the United States (mean age 6;10, range 5;6-7;7) keeping in mind though that we are dealing with two languages with different temporal organization[9].
- Percentage of Disfluencies (%Disf) represents the number of disfluencies on the total number of words produced. Following the classification by Yairi, Ambrose (2005) we considered as disfluencies the repetition of parts of words, repetition of monosyllabic words (excluding repetition of words with emphatic intent), dysrhythmic phonation (lengthening or blocking of speech sounds), interjections, repetition of polysyllabic words and of utterances, revisions and interrupted utterances.

[7] Contracted articles as well as contracted prepositions have been split and counted as two separate words following Marini *et al.*'s (2015) instructions: e.g. Ita. "del" = "di" + "il"; Ita. "col" = "con" + "il"; Ita. "nella" = "in" + "la" etc.

[8] This index is different from Marini *et al.*'s (2015) speech rate where it is calculated as the number of phonologically well-formed words produced per time of narration in minutes (words per minute).

[9] The authors also report on results from previous studies on the same index (see Logan *et al.*, 2011: 131, Table 1) stating that for typically developing children from 3 to 6 of age, values in the range from 2.9 to 4.2 syllables per second are found.

– Percentage of Incorrect Words (%IW), calculated according to Zanobini *et al.* (2012) as the number of incorrect words with reference to the adult target divided by the total number of words produced. This index has been further split in $\%IW_{str}$ accounting for incorrect words referred to the phonotactic structure (simplification of the syllabic structure) and $\%IW_{sys}$ accounting for incorrect words referred to the phonological system (simplification of phonemic oppositions).
– Percentage of Phonological Errors (%PE), expressed as the number of substituted or omitted phonemes on the total number of phonemes present in the phonological target. We preferred this type of measure and not the %PE calculated by Marini *et al.* (2015)[10] because it allowed us to compare the performance of the children in the NT with their performance in the NWRT.

For the NWDT the error rates (in %) in the discrimination of critical and non-critical consonants (+! Cs and -! Cs, respectively) have been calculated. The Romanian children's performances to the NWDT in the age groups 5;0-5;5 and 5;6-5;11, were compared to 2 groups of age-matched Italian children grown up in the same area (respectively: group 1, 20 children, mean age: 62.4 months, SD 1.4; group 2, 8 children, mean age: 67.3 months, SD 1.4) tested with the very same NWDT.

3.5 Extra-linguistic variables

In line with Carroll (2017b), who considers doubtful the possibility to obtain an accurate measure of the children's language use or exposure to a specific language as accounted from parents' reports, we decided at this stage, to pick one of the extra-linguistic variables that we could objectively verify. For this reason and in order to overcome the fact that parents are not always able to quantify the amount of speech they use with their children (Carroll, 2017b) in a reliable way, we used a derived measure accounting for the amount of formal exposure to Italian (expressed in months) as received by the children during their schooling hours. This measure has been obtained by subtracting the age of admission to kindergarten to the children's chronological age (something similar has been done in Goldstein, Bunta, Lange, Rodriguez & Burrows, 2010 to determine the age of acquisition of English in Spanish-English children). Since we also had information on whether the children attended nursery school, we added 12 months to this index[11]. For example, if a child has been recorded at 61 months of age, entered kindergarten at age 36 and attended also nursery school, the months of formal exposure (MFE) to Italian was computed as: 61 - 36 + 12 = 37 MFE. We are aware and acknowledge that this

[10] In Marini *et al.* (2015) the %PE is calculated by dividing the phonological errors (phonological paraphasias, neologisms and false starts in a narrative speech sample) by the number of units (e.g. each word, non-word, or false start uttered by the speaker including phonological errors) and multiplying this value by 100 and is meant as a measure of lexical processing.

[11] For sake of clarity, all of the children entered kindergarten between 36 and 48 months of age, with just one child entering kindergarten at 67 months of age.

measure does not solve the issue of the quality and quantity of exposure to Italian and that its computation may be questionable (as well as its validity). However, with reference to the quantity of exposure, we know from the questionnaires that these children did spend at least 8 hours a day at kindergarten, while with reference to the quality we expect these children received input in "formal" (e.g. standard) Italian as spoken from their kindergarten teachers and nursery school caregivers[12]. Furthermore, there is a high probability that these children most likely would also have had informal contact with Italian through their peers and friends at school, although this kind of contact is difficult to quantify and qualify. Notwithstanding, we think this index can provide us with some general indication for future in-depth analyses.

The question we ask is whether the MFE is able to predict the children's performances and skills with particular reference to the phonetic and phonological development. We expect that children who received more formal exposure to Italian score better on measures of segmental accuracy (e.g. amount of phonological errors in the production tasks) than those who received less exposure. To this aim, we performed regression analyses with MFE as a predictor and the phonetic and phonological measures as dependent variables. The same was done for the age of the children.

4. *Results and discussion*

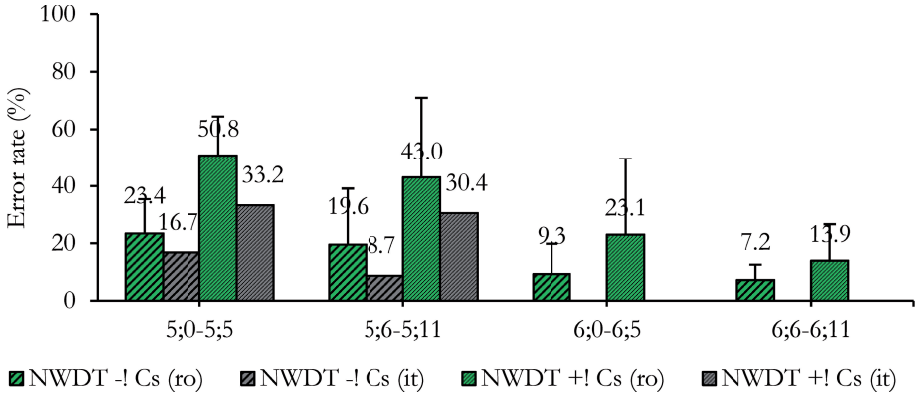
We will start this section by addressing the phonological measures collected by means of the NWDT, the NWRT and the NT. We will first report the results for the NWDT and compare them with the NWRT and the NT where appropriate and possible. We will then compare the two narrative indexes computed over the two stories in the NT with normative data available in the BVL 4-12 (Marini *et al.*, 2015) and we will conclude this section with a short discussion on the SR and %Disf measures.

4.1 Phonological measures of language ability in the NWDT, NWRT and NT

The children's responses to the NWDT across the four age groups are summarized in Figure 1. The figure also shows the performances of two age-matched groups of Italian peers (age-group 5;0-5;5 and 5;6-5;11) to the same NWDT.

[12] We should further state that these children are exposed to a high amount regional speech that, in Veneto as in many other Italian regions, is still strongly pervasive also in formal contexts.

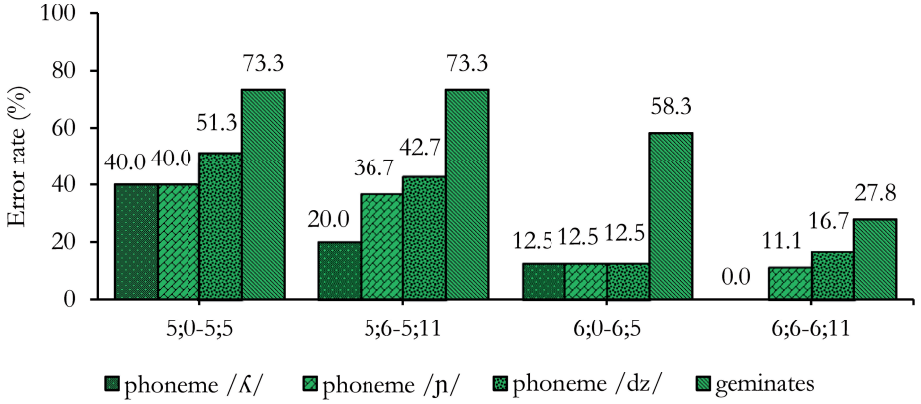
Figure 1 - *Accuracy in the discrimination of non-critical vs critical consonants in the NWDT (ro: Romanian native speakers *in* Italian; it: Italian native speakers *in* Italian)*



Looking more closely at the results, our Romanian children do better at discriminating non-critical consonants as compared to those that we considered critical: for example, the first age group of Romanian children reaches on average an error rate of 50.8±12.0 SD in the discrimination of critical consonants vs 23.4±13.6 SD for those consonants that are not. Looking at the other three age groups, although the error rate decreases with age, this tendency is maintained with the error rate for critical consonants (e.g. consonants not present in Romanian, the children's L1) almost doubling that for non-critical consonants (e.g. consonants shared between Romanian and Italian). However, comparing the Romanian children to the Italian age-matched peers in the first two age groups, we notice that also the Italian children do show some slight difficulty in the discrimination. This is not a surprise, since the consonants that we are considering here as critical for our Romanian children are somehow difficult for the Italian children. We should keep in mind for the discussion that follows, that these consonants are among the latest ones to be acquired by Italian children (Bortolini, 1995; Zanobini *et al.*, 2012). This result confirms the hypothesis that Romanian children would have had a general difficulty with consonants absent in their L1.

If we look at the NWDT's results for the critical consonants into more detail (e.g. by splitting the results for /dz/, /ɲ/ and /ʎ/ as well as for the gemination of consonants), we notice that the major difficulty for the Romanian children is represented by those pairs of non-words involving a contrast between geminates and non-geminates (see Figure 2). The discrimination of geminate consonants reaches the highest error rates in all of the four age groups followed by /dz/.

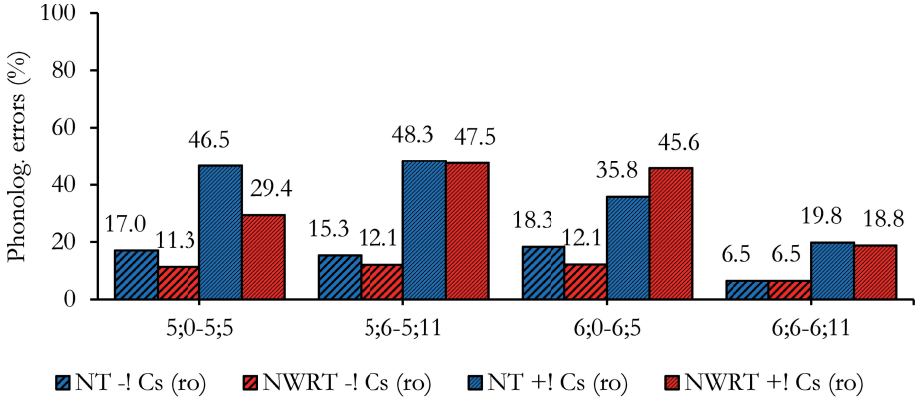
Figure 2 - *NWDT's criticalities for Romanian children*



Overall, by comparing the results in the two figures, there is an improvement (e.g. decreasing error rates) in the discrimination ability for all the consonants considered (both critical and non-critical ones) as the age of the children increases: one could hypothesize that the children's maturation and higher exposure to L2 lead to a better discrimination.

Taking into account only the production level (as measured in the NT and in the NWRT) and separating the results for critical and non-critical consonants, the trend found for the discrimination in the NWDT is confirmed. As shown in Figure 3, the amount of phonological errors (%PE) for the children in our sample is higher for the set of critical consonants as compared to those that are not.

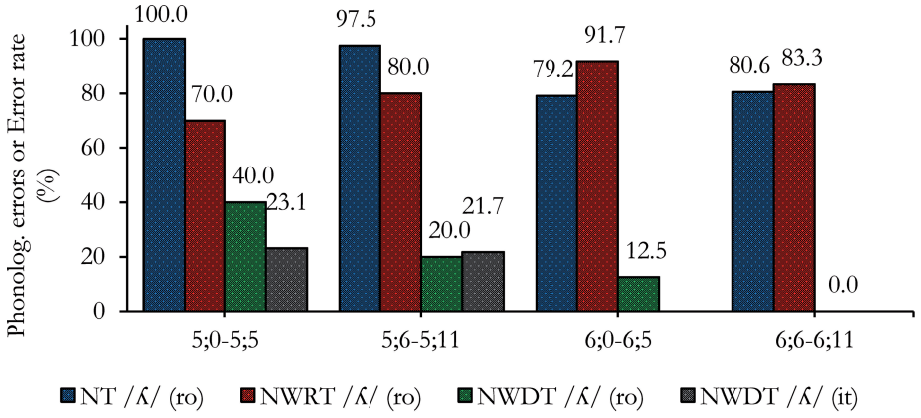
Figure 3 - *Accuracy in the production of non-critical vs critical consonants in the NT and the NWRT*



If we further compare the children's performances (e.g. error rates) in the discrimination of non-word pairs involving contrasts with critical consonants with their ability to produce them spontaneously in the NT and upon repetition in the NWRT,

two different trends do emerge[13]. For the phoneme /ʎ/ we see that a good ability in successful discrimination does not match with their ability to correctly produce it. This emerges clearly if we examine the error rates for the children's productions in the NT and the NWRT compared to their discrimination ability in the NWDT in Figure 4. For sake of comparison, we report the error rates available for the Italian children of the first two age groups in the NWDT. The NT shows the lowest accuracy in the production of /ʎ/, especially in the first two age groups with Romanian children producing incorrectly 100% and 97.5% of the expected adult targets. Surprisingly, the two oldest age groups seem to have more problems with this consonant in the NWRT where the error rates are a bit higher than those found for the NT: 91.7% and 83.3% in the NWRT vs 79.2% and 80.6% in the NT, respectively. One possible explanation for this difference in production may be found in the fact that the phoneme /ʎ/, other than being what we called a critical consonant, is also one of the late consonants for 50% of the Italian children at 48 months of age (Bortolini, 1995). These children probably still need to acquire specific articulatory habits that will allow them to utter this specific consonant.

Figure 4 - *Accuracy for phoneme /ʎ/ per age group compared across the different tasks*



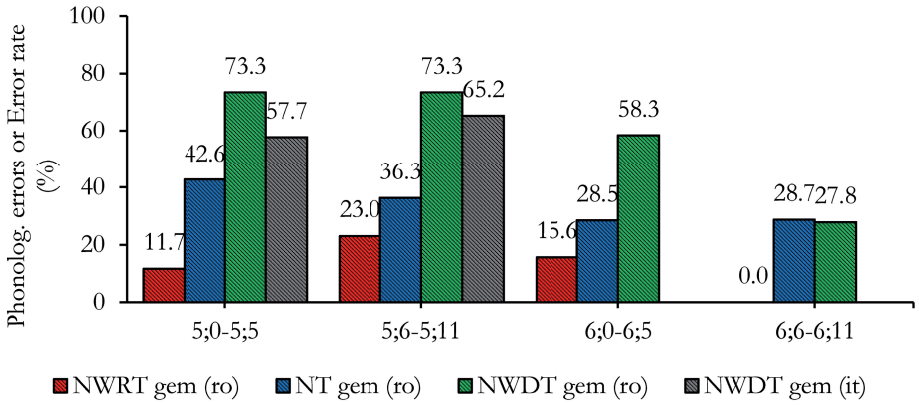
Doing the same comparison across the three tasks for the consonants' length contrast (e.g. geminate consonants) the picture is reverted. Despite the children's ability to produce the expected length of geminate consonants as recorded in the two production tasks (NT and NWRT), the same does not hold for their ability to discriminate them. This is at least the case for the children in the first three age groups (see Figure 5). The Romanian children's performance is however not different from the perfor-

[13] We will report here only on phoneme /ʎ/ and on geminates because for the consonants /dz/ and /ɲ/ the data available specifically for the NT are very sparse. Narrative tasks as the ones proposed here are not, as also highlighted by Zanobini *et al.* (2012), necessarily able to elicit all of the consonants equally. This is even truer for those phonemes having a low frequency of use in spoken Italian, with /dz/ and /ɲ/ being among the less frequent in spoken Italian (Bortolini, Degan, Minnaja, Paccagnella & Zilli, 1978; Tonelli, Panzeri & Fabbro, 1998; Calvani, 2003).

mance obtained by their Italian peers in the age groups 5;0-5;5 and 5;6-5;11. This should not appear surprising as the Italian children are all from the Veneto region where in the dialect (as well as in the Italian) spoken in this area, the consonants' length does not have distinctive function and where geminate consonants are produced with de-gemination (cfr. Zamboni, 1988). As already found in a previous work by Galatà, Meneguzzi, Conter & Zmarich (2012), the Romanian children seem to be insensitive to the length contrast and they produce the length contrast with a duration that is intermediate between geminate and non-geminate consonants[14]. On this point, however, more detailed acoustic analysis is needed in order to confirm what has here been reported based on the phonetic transcription only.

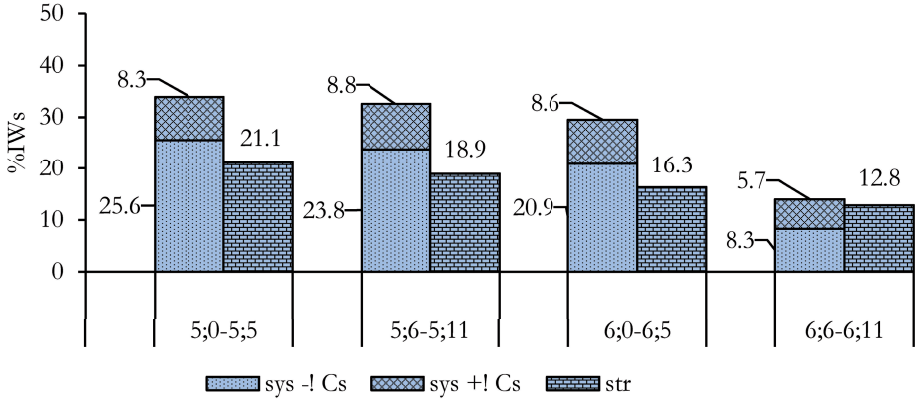
Analysing the amount of incorrect words (%IW) produced by the Romanian children in the NT, we find that the words deviant form monolingual production are: a) in 29.0% (±11.6 SD) of the cases due to the phonological system (simplification of phonemic oppositions, $\%IW_{sys}$); b) in 17.9% (±6.1 SD) of the cases to the phonotactic structure (simplification of the syllabic structure, $\%IW_{str}$). If we compare the two types of errors across the four age groups as done so far (see Figure 6), we notice that the amount of incorrect words affected by substitutions or deletion of phonemes according to the adult target decreases in function of age (and indirectly, in function of an increased exposure to the Italian language). In comparison to the amount of errors affecting the words' syllable structure (e.g. $\%IW_{str}$), the simplification of phonemic oppositions remains always higher.

Figure 5 - *Accuracy for geminate Cs per age group compared across the different tasks*



[14] For the length contrast we considered as errors all cases of: a) de-gemination, where a geminate was expected according to the adult target; b) substitution and/or cancellation of phonemes according to the adult target (also for those cases where the length contrast is correctly realized through phonemes' substitution).

Figure 6 - *Percentage of incorrect words (%IW) per age group and type of error with reference to the phonological system (sys) and the phonotactic structure (str) for non critical (-!) and critical (+!) consonants (Cs) produced by the Romanian children in the NT*



To highlight the differences in our group of Romanian children as compared to what we would or could expect from Italian children, we separated the $\%IW_{sys}$ in incorrect words to be ascribed to the presence of critical consonants for the Romanian children (sys +! Cs), to others that are not (sys -! Cs) and that might be common to Italian children (see the stacked bars in Figure 6). As can be observed from the stacked bars in Figure 6 across the four age groups here considered, respectively 8.3, 8.8, 8.6 and 5.7 percent of the words classified as incorrect contains at least one of the critical consonants for our Romanian children.

Overall, if we compare the Figures from 1 to 6 and focus on the decrease in the phonological errors, we notice that as the children grow older their phonological skills improve.

4.2 Measures of linguistic productivity in the NT

We will now discuss and compare the two narrative indexes VP and MLU_w with normative data available in the BVL 4-12 (Marini *et al.*, 2015) for age-matched Italian peers (cfr. Table 2).

When administering the two stories to the children, we had the impression that some of them were happier with the "Flower pot" story than with "The Nest story"[15]. Therefore, we tested for differences in the total number of words produced in each story as measured by the UP index. A paired-samples t-test disconfirmed our impression by revealing non-significant differences in the children's UP between "The Nest story" (M = 76.88±30.05 SD) and the "Flower pot" story (M = 77.18±31.8 SD); $t(-0.057) = 16, p = 0.955$).

[15] They said the first one was a "funny story"; for *The Nest story* they said it was a "sad story".

Table 2 - *Narrative indexes (VP and MLU) and summary statistics (mean and standard deviation) for the two NTs ("The Nest story" and the "Flower pot") per child and age group*

age group	*ID*	*VP (nest)*	*VP (pot)*	*mean VP*	MLU_w *(nest)*	MLU_w *(pot)*	*mean* MLU_w	*mean* MLU_{wNorm}
5;0-5;5	1	89	119	104.0	3.7	4.8	4.2	4.5
	2	32	52	42.0	3.6	3.3	3.4*	3.8
	10	73	40	56.5	2.4	2.9	2.6**	2.8*
	12	17	29	23.0*	1.9	2.4	2.2**	2.8*
	17	48	46	47.0	2.5	3.3	2.9*	3.2*
		51.8 (29.4)	57.2 (35.6)	54.5 (30.2)	2.8 (0.8)	3.3 (0.9)	3.1 (0.8)*	3.4 (0.8)
5;6-5;11	4	28	39	33.5	1.8	1.6	1.7**	1.9**
	8	59	64	61.5	4.5	3.8	4.2	4.5
	9	43	41	42.0	2.7	3.2	2.9*	3.5*
	13	35	56	45.5	4.4	4.3	4.3	4.7
	14	58	49	53.5	3.1	2.7	2.9*	3.3*
		44.6 (13.8)	49.8 (10.4)	47.2 (10.7)	3.3 (1.2)	3.1 (1.0)	3.2 (1.1)*	3.6 (1.1)
6;0-6;5	5	51	60	55.5	2.8	4.0	3.4*	3.8
	6	77	76	76.5	5.1	5.1	5.1	5.3
	15	13	24	18.5**	1.4	2.4	1.9**	2.0**
	16	32	25	28.5*	2.1	2.5	2.3**	3.2**
		43.3 (27.3)	46.3 (26.0)	44.8 (26.3)	2.9 (1.6)	3.5 (1.3)	3.2 (1.4)*	3.6 (1.4)
6;6-6;11	3	101	121	111.0	4.4	4.8	4.6	4.9
	7	59	46	52.5	3.9	4.2	4.1	4.5
	11	48	53	50.5	4.0	5.3	4.7	4.8
		69.3 (28.0)	73.3 (41.4)	71.3 (34.4)	4.1 (0.2)	4.8 (0.6)	4.4 (0.3)	4.7 (0.2)

Data compared to BVL 4-12 (Marini *et al.*, 2015): * ≤ 1 SD; ** ≤ 2 SD.

Moving to VP, a paired-samples t-test revealed no significant differences for the children's VP between "The Nest story" (M = 50.76±24.33 SD) and the "Flower pot" story (M = 55.29±27.87 SD); $t(-1.227) = 16$, $p = 0.238$). Analysing the mean values for each child in Table 2, we see however that there is a very high inter-subject difference with mean values ranging from a very low 18.5 VP for child 15 in the age group 6;0-6;5, to a relatively high 111.0 VP for child 3. According to the normative data used here as reference, almost all the children's VP indexes in the NT are within 1 standard deviation. The only exceptions are: a) the aforementioned child with a very low VP index falling 2 SD below the norm; b) two children with a VP index below 1 SD (23.0 and 28.5, respectively). Considering the overall group means per age, we find VP values that are within the norm if compared to age-matched Italian peers.

Looking at the mean values of MLU_w over the two stories, only 7 children out of 17 scored with values that fall within the norm. Of the remaining children, 5 reported a MLU_w falling below 1 SD, the other 5 below 2 SDs. The children in our sample, with the exception of the three children in the oldest age group, produce short utterances as expressed by the MLU_w. According to Marini *et al.* (2015), MLU_w values below what would be expected may highlight a reduced capacity of the phonological working memory. This is in line with Hipfner-Boucher, Milburn, Weitzman, Greenberg, Pelletier & Girolametto (2015) reporting similar results for narrative abilities in subgroups of English language learners and monolingual peers. However, we should here recall that the MLU_w (as well as the VP) is computed by considering the number of phonologically well-formed words. In fact, the stacked bars in Figure 6 highlight among the Romanian children the presence of words classified as incorrect because they contain at least one of the critical consonants (specifically /ɲ/, /ʎ/ and the gemination of consonants).

In a previous study (see Galatà *et al.*, 2012) in which we compared the production (e.g. repetition) of a selected number of non-words containing the challenging consonants in a group of 10 Romanian children to age-matched Italian peers, we showed the higher difficulty for the Romanian children in the correct realization of these consonants. Note, for example, that as shown in Table 2 in the column referring to MLU_{wNorm} the inclusion of these words, considered as ill-formed because of the presence of challenging consonants for the Romanian children, produces an increase in this measure with some children being classified as falling below 1 SD instead of 2 SD (see for example the children with ID 10 and 12). This is also confirmed by a paired-samples t-test, which shows an overall statistically significant increase in the values associated to the MLU_w index ($MLU_w = 3.37 \pm 1.05$ SD; $MLU_{wNorm} = 3.74 \pm 1.01$ SD; $t(-8.07) = 16$, $p = < .001$). Unfortunately, this conclusion needs to be further investigated by checking if the assumption that considers these challenging consonants as acquired in Italian age-matched peers holds.

Articulation rate (AR) and disfluencies frequency (%Disf) in the NT are reported for the four groups of Romanian children in Table 3. The overall mean AR of 3.3±0.6 SD for the studied children is comparable with the value of 3.9±0.4 SD reported by Logan *et al.* (2011) and Logan (2015) for a Narration task in children being one year older (average age of 6;10). Analysing the amount of disfluencies as indexed by %Disf, Logan *et al.* (2011) report for the same children a value of 8.9±4.2 SD. In our case we found lower values with an overall mean of 5.6±2.4 SD (range 2.6~9.3) which makes our data more similar to those reported by Yairi, Ambrose (2005) for the conversational speech of the 42 "control" children (5.75 and 6.35 for age-group 5;0-5;11 and 6;0-6;11, respectively)[16].

[16] The amount of disfluencies in Yairi, Ambrose (2005) is obtained as the sum of *Stuttering Like Disfluencies* (SLD) and *Other Disfluencies* (OD).

Table 3 - *Mean and standard deviation of the fluency indexes AR and %Disf in the NT of the Romanian children divided per age group*

age group	*AR*	*%Disf*
5;0-5;5	3.6 (0.4)	6.1 (2.2)
5;6-5;11	3.1 (0.9)	5.1 (2.4)
6;0-6;5	3.3 (0.8)	6.8 (3.1)
6;6-6;11	3.4 (0.3)	4.4 (2.2)

4.3 Months of formal exposure to Italian and chronological age as predictors of segmental accuracy

The results of the regression analyses performed on the phonetic and phonological indexes are presented in Table 4.

The results of the regression analysis yielded a marginally significant effect of MFE on $\%IW_{sys}$ ($p < 0.1$) and a significant effect on %PE in the Narrative Task ($p < 0.05$), and a significant effect of age on $\%IW_{sys}$ ($p < 0.05$) and a marginally significant effect on %Error in the Non-Word Discrimination Test ($p < 0.1$). No significant effect was found in all other cases.

Table 4 - *Effects of months of formal exposure (MFE) and of chronological age on segmental accuracy measures*

	Extra-linguistic variables	
Segmental accuracy measures	MFE	Chron. age (months)
$\%IW_{sys}$ (NT)	$R^2 = .204$, $F(1, 15) = 3.852$ $p = .068$	$R^2 = .277$, $F(1, 15) = 5.752$ $p = .030$
%PE (NT)	$R^2 = .298$, $F(1, 15) = 6.362$ $p = .023$	$R^2 = .152$, $F(1, 15) = 2.693$ $p = .121$
%PE (NWRT)	$R^2 = .049$, $F(1, 15) = 0.770$ $p = .394$	$R^2 = .014$, $F(1, 15) = 0.217$ $p = .648$
%Error (NWDT)	$R^2 = .013$, $F(1, 15) = 0.204$ $p = .658$	$R^2 = .227$, $F(1, 15) = 4.415$ $p = .053$

5. *Conclusions*

The proposed study offers an insight into the main difficulties that a Romanian pre-schooler faces in the acquisition of Italian as L2.

As hypothesized, strong difficulties in the acquisition of L2, as well as the influence of the underlying L1 system, emerged at both the phonetic (through the Articulation rate, the Percentage of Disfluencies) and phonological level (through the Verbal Productivity, the Mean Length of Utterance in words, the Percentage of Incorrect Words and the Percentage of Phonological Errors). The results from the segmental analysis considering the Romanian children's performances in the Non-Word Repetition Test (NWRT) fully confirm our expectations since Romanian

children have more difficulty in the production of those non-words containing sounds that are absent in the Romanian language (mean error rate for non-critical Cs: 10.9±7.2 SD; mean error rate for critical Cs: 36.7±16.0 SD). However, a significant improvement in the correctness of the responses was found as the children grew up in age and as the verbal productivity and fluency increased, a clear consequence of the influence exerted by the maturation of higher cognitive functions. The study thus confirms and supports the effectiveness of the adopted methodology (namely the NWRT), that proved to be extremely suitable in capturing such difficulties, especially for those consonants that we considered as "critical" because absent in their Romanian L1 and language spoken at home (e.g. /ɲ/, /ʎ/, /dz/ and the gemination process).

The presence of these criticalities was also found to inflate the amount of incorrect words (follow the discussion relating to Figure 6) with direct effects on the measures of linguistic productivity: Mean Length of Utterance in words (MLU_w) and Verbal Productivity (VP). In fact, for MLU_w we found different children scoring below 2 SD as compared to their monolingual age-matched peers in the BVL 4-12 (Marini *et al.*, 2015). The same issue may have lowered VP, which in turn, seems to be less affected as opposed to MLU_w remaining in both cases on average with respect to what was expected from their age. However, the increase in MLU_w with chronological age of the children proved to be more rapid in the last group, allowing them to reach average performances comparable to those found for Italian monolinguals age-matched peers in the BVL 4-12.

The articulation rate and the number of disfluencies do not deviate significantly from the data we took as reference: the children's speech is characterized by the presence of numerous silent pauses and hesitations between one uttered sentence and another.

The regression analysis taking into account the amount of formal exposure (MFE) and the chronological age of the children did not provide a strong evidence in explaining the investigated measures of segmental accuracy. Some standardization procedure on the measures needs probably to be carried out, but this will be left to future in-depth investigation that will better explore the influence of other extra-linguistic variables, as well as to assess the speech performances of Italian children by means of the same variables.

The study furthermore contributes to highlight how factors depending on individual variables and on the degree of exposure to L2 may influence the linguistic competences shown by the children which result in a high inter-subject variability among the children analysed.

There are obvious limits in the present study that need to be addressed further in the future. Firstly, the limited number of children in our sample does not allow us to generalize over the results and this brings us to the second limitation of the study: the need to complete the analysis also for the other children we recorded within the wider project that includes both Romanian and Italian children also for younger age bands. Once this has been done, a more appropriate comparison of the data

from our Romanian children learning Italian L2, with particular reference to the phonetic and phonological development, will be possible by comparing these data to age-matched typically developing Italian monolingual children (as done here, for example, with data from our Italian control group in the NWDT).

Acknowledgments

To the Italian National Research Council for funding the present research through the project "Migrazioni" (2009-2012). To the children and their families for participating in the study. To two anonymous reviewer who helped improving this paper with their useful comments and suggestions.

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