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Second language education context and home language effect: language dissimilarities and variation in immigrant students' outcomes

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ABSTRACT

Heritage language speakers struggle in European classrooms with insufficient material provided for second language (SL) learning and assessment. Considering the amount of instruments and pertinent studies in English SL, immigrant students are better prepared than their peers in Romance language settings. This study investigates how factors such as age and home language can be used in the teaching environment to predict and examine the development outcomes of SL students in verbal reasoning and vocabulary tasks. Hundred and six Portuguese participants, SL learners, between 8 and 17 years old, were assessed in vocabulary frequency, verbal analogies and morphological extraction tasks. In alphabetic languages (Romance languages), immigrant students (in a SL learning situation) with a strong linguistic distance (a home language with a very different orthographic foundation) are expected to struggle in language learning in spite of being aware of strategies that can improve their skills. The storage and combination of morphemes can be a demanding task for individual speakers at different levels. Cognitive mapping is strongly based on linguistic features of L1 development. Results show that home language, not age, was a significant predictor of variation in student's outcomes. Speakers of alphasyllabary languages (Indo-Aryan languages as L1) were the poorest performers, the 'linguistic distance' of their languages explaining the performance' results.

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1. Introduction

Initial studies in the second language (SL) research field, in terms of a linguistic-cognitive model (Hulstijn, Young, Ortega, et al., 2014) dealing with issues related to models of production output and native speaker behaviour, focused strongly on age. Recent research (Abu-Rabia & Shakkour, 2014; Chiswick & Miller, 2005; Cummins, 2014; DeKeyser et al., 2010; Yeh, 2010; Zhang, 2013), though, deals with additional variables (e.g. home languages) that generate specific analysis of linguistic features. That analysis involves first language (L1) transfer and related cognitive strategies. Individuals have strategies

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with which to assimilate inputs they understand to produce the 'full-independent output' in the SL (MacWhinney, 2005). This also implies the reporting of errors or lack of acceptable grammar (Selinker & Douglas, 1985). Transfer (and cross-transfer) emerges strongly with languages in distant contact (e.g. Chinese and Portuguese) and learners are always accommodating new data and new language structure (Selinker & Douglas, 1985). Cognitive strategies, as choices and thoughts with full awareness of option in the learner's point of view, determine styles and rhythms of transfer. The language of origin determines the variability in phonetics and specific variations of awareness regarding linguistic rules (Braunstein et al., 2012; Elabsy, 2013; MacWhinney, 2005). Cognitive strategies (combined actions of planning, monitoring and correction during the language task decision processing) identify specific and conscious regulation in language learning and language use contexts, which are different according to home language. Each cognitive strategy would thus have a different effect in mind mapping. Cognitive strategies are analysed in order to achieve with easier and faster operationalization in language learning and language use. Cognitive strategies are related to cognitive mapping in each language or in a bilingual mode.

Cognitive mapping is strongly influenced by the mother tongue and concerns the specific neuronal system (involved in language coding and decoding), crystallized after a certain age and based on linguistic features of L1 development. L1 development refers to the acquisition of structures and lexicon, as well as to the cognitive strategies in the home language before any other SL has been acquired. Recent scientific research has been looking at third language acquisition and this may help to understand the cognitive mapping (based on heritage language influence) of students during the process of language learning (Hall et al., 2009; Swain, Lapkin, Rowen, & Hart, 1990). According to Davies (2003), and in regard to the theoretical arguments on cognitive involvement in SL, there is a 'language-specific system' that is especially related to particular stages of processing in a new language (similar to Chomsky's language acquisition device, 1978) and a 'problem-solving system'. SL learners use both systems but in a different way, related to variations in age of onset (in SL). The decision-making process in one system is the most effective option for SL decoding and solving. Near-natives deal with both systems separately, which is recognized as a high level of proficiency and a significant mastering of executive functions. Cognitive efforts in these tasks in experimental trials (in the SL) would be expected to differ according to the speakers' age. The home language variable and the amount of exposure and linguistic input must also be taken into account.

The present study examines the performance of 106 learners of Portuguese as a SL (immigrants) in specific tasks of verbal analogy, vocabulary and morphological extraction. A learner's limited vocabulary probably results from limited receptive (e.g. comprehension of words or analogies) and expressive language abilities (e.g. morphemes manipulation). This has an impact on language development and will lead to knowledge gaps in early stages of SL learning. The main contribution of this study is related to the educational implications after different profiles of language speakers have been examined to determine specific cognitive processing according to two factors: home languages of the students and age. Immigrant students, in the SL learning condition, would perform differently in analytic reasoning (verbal analogy and morphological extraction tasks) and in vocabulary tasks, in a Portuguese language evaluation context. That difference would be explained by their home language systems and linguistic distance. We expected

Romance language speakers to be at an advantage considering their familiarity with alphabetic and transparent languages like Portuguese. On the other hand, Indo-Aryan language speakers are expected to show deficits in SL performance. In terms of age, younger subjects are expected to perform better compared to older peers in the same SL tasks taking into account previous evidence that confirms their cognitive predisposition to develop linguistic skills more easily. Tasks related to analytical reasoning are expected to be more demanding for younger participants. This paper begins with a literature review on specificities related to Portuguese as a SL as well the evidence showing that specific languages are related to particular mapping and strategies during SL processing. Vocabulary, morphological extraction and verbal analogy will be discussed in order to understand previous background of testing using the same tasks we used in this study. This will be followed by a description of the methodology used in our empirical study on the variables of age and home language factors in SL learning. Finally, we will discuss the results and the performance of the different national groups of students.

2. Language specificities and their influence on SL learning

Home languages and age are deemed well-adjusted variables (with a balanced predictive value) considering the fact that transparency and opacity of languages are predictors of difficulty or delay in cognitive processing (Chiswick & Miller, 2005; DeKeyser et al., 2010; Fontoura & Siegel, 1995; Odlin, 1989; Yeh, 2010). Fast processing of phonological information depends on phonological transparency, which relies on the type of orthography of languages. Orthography is a great predictor associated with reading performance (Levin & Ehri, 2009; Fernandes, Ventura, Querido, & Morais, 2008). Processing in the SL area is related to the connections that the learner makes between form and meaning during real-time comprehension (and interpretation) task. It is not necessarily related with noticing effect but involves a large internal context where noticing and awareness are commonly involved to process the input information (Van Patten, 2004). That connection focuses on the internal mechanisms (Van Patten, 2004) and depends heavily on the cognitive strategies adopted. When looking at the phonological system of the Portuguese idiom, there is deep complexity in the sound system, mainly in vowel traits (Bassetti, 2006; Cardoso-Martins, Resende, & Rodrigues, 2002; Levin & Ehri, 2009; Romannelli & Menegotto, 2015; Tessel, 2013).

Barcroft (2007) maintained that the phonetic range of languages in an English learning context is irrelevant. On the contrary, we contend that this assumption has serious limitations when applied to other language contexts, when taking into account the range of specific systems like Portuguese, and is a predictor of decoding and comprehension difficulties (Fernandes, Ventura, Querido, et al., 2008; Ziegler et al., 2010). Portuguese is a writing system sharing common features with other Romance languages that exhibit more transparent features than those encountered in Germanic languages such as English (Levin & Ehri, 2009; Spencer & Hanley, 2004). That transparency is strongly based on the vowels presented in Romance writing systems which give more phonological information (Ziegler et al., 2010). Portuguese acquisition might become easier among Romance language speakers involved in a SL context (Bassetti, 2006; Hall et al., 2009, pp. 181–182; Ziegler et al., 2010). But not in the same way for speakers of languages whose are from other families, be they Indo-European or not, such as Indo-Aryan

(e.g. Urdu) or Afro-Asian (e.g. Arabic) idioms (Cyrino, 2010; Mira & Paredes, 2005; Farukh & Vulchanova, 2014; Odlin, 1989; Shum, Ki, & Leong, 2014).

Another issue, still lacking in the literature, is the difference between learning European Portuguese, African Portuguese and Brazilian Portuguese as a SL (García & Souza, 2014, pp. 147–148; Leufkens, 2013; Soares da Silva, 2010). The Brazilian and European variants are very distinct because, on the one hand, the vowel system of European Portuguese (Portugal) is wider than Brazilian Portuguese (Barbosa, 2000) due to more options observed for vowel phonics (more diversity of vowel acoustic traits) and considering the mute vowels (vowels with no phonic realization) (Teixeira, Oliveira, & Moutinho, 2013; Zampieri & Gebre, 2012); on the other hand, other features are also different, as is the case of rhythm concerning syllables and specific prosodic contrasts in intonation, which have more weight in Brazilian Portuguese (Barbosa, Duarte, & Kato, 2005; Frota & Vigário, 2000). We believe that these limited options (less different phonetic realizations) in vowel characteristics of the Brazilian variant may make this an easier variant than European Portuguese for a SL learner (Bailey, 2013). Comparative studies looking at the diversity of language speakers in SL learning situations are less recent than they should be because the literature was mainly produced in the 1970s and 1980s. Odlin (1989) focused on a comparative analysis of cross-transfer (transfer of different properties across languages) properties between languages such as Spanish, Russian and English, in particular explaining the word omission occurrence in SL. The errors and word omissions of Russian speakers have different causes that could be not used to explain Spanish speaker's errors and lapses. The analysis of incorrect answers is different or irrelevant for the mistakes of monolingual speakers. Despite emphasizing transfer across first and SL language, we recognize that students can rely on intense learning engagement and the younger they are, the more benefits they withdraw in terms of comprehension of linguistic traits, regardless of their home language. Attempts to build knowledge and proficiency in separate storage (MacWhinney, 2005) for L1 and SL have become crucial for research in several areas including neuropsychology (Barac et al., 2014; Braunstein et al., 2012; Hillert, 2014; Macedonia, 2013; Tessel, 2013; William, 2013). In the field of education, the main goal is to develop research applications for classroom use. These applications are related to the collection of data and to assessment instruments in the SL field which have no bias for language pedagogy and educational policy which promotes the transfer of research outputs to school practice and syllabus.

AQ7 AQ8 AQ9

2.1. *What languages inform about the cognitive strategies of students: mapping during SL processing*

Event-related potentials point to new advances in SL processing and stress the importance of different languages associated with different cognition (Fillipi et al., 2011; Gullberg & Indefrey, 2006). Decoding and encoding strategies during the solving of tasks in foreign language frameworks are understood by researchers in the field of neurophysiology to determine human behaviour (Lev-Ari & PeperKamp, 2013) and the plasticity effects (age effect and neuronal maturity) involved in SL acquisition, explaining aspects that underlie MacWhinney's competition model theory (2005). SL acquisition implies competitive information and cues that enhance or block language comprehension through strategies of mapping, chunking and coding. In general, storage development (integration and organization of information acquired, coded in different categories as they are

perceived) evolves by chunking and by code switching as adjustments the new learner acquires to combine frames and formulas inside the target language. As learning increases, vocabulary frequency and complexity develops to an extent that varies according to the linguistic distance (Chiswick & Miller, 2005) between first and dominant languages. That distance is explained by the difference in orthographic foundation between home and SLs. Education in a SL demands another component included in MacWhinney's model: resonance. Chunking and switching have different functions in childhood and adulthood. The same occurs with resonance, which might explain how individuals perform grammar decoding based on first language cues proficiently. In English, preverbal positioning (subject becomes before the verb) is an important cue to understanding what options individuals have in decoding, whereas in Portuguese that information function (preverbal positioning) is different (Carvalho & Bacelar, 2006). AQ10 McWhinney summarizes the differences among Indo-European languages and emphasizes the importance of resonance in cognition, focusing on SL learning.

To understand cognitive processing in the SL we need to specify which cognitive abilities we are dealing with to develop materials that would address those specificities and to study measurement procedures. According to the interpretation of oral tests and clusters of Woodcock–Munoz battery tests (2005), seven dimensions of cognition have to be measured: comprehension-knowledge, fluid reasoning, long-term storage, visual-spatial processing, auditory decoding, processing speed and short-term memory. For each factor (or dimension) we have a variability of measures that are related to different levels of complexity. Linguistic and cognitive traits expected to be activated (and to be measured) in particular languages will determine some predictive performance to initiate learning in different alphasyllabary (e.g. Urdu) or morphosyllabary (e.g. Mandarin) languages, among others (Rydland, Aukrust, & Fulland, 2012; Shum et al., 2014). Mandarin AQ12 has an important position in compounding strategy based on morphemes, which develops metacognitive processing in language and general problem-solving. Inter-word relationships, derived from word associations and inflection, are properties that are more marked in other languages besides Mandarin (Shum et al., 2014). This determines how language processing is intrinsically explained by features of the linguistic system. Portuguese idiom has an alphabetic system with a specific vowel structure (due to the multiple phonetic realizations of each vowel feature [Bassetti, 2006; Cardoso-Martins et al., 2002; Teixeira et al., 2013]) that is difficult to process by speakers of alphasyllabary idioms (Carvalho & Bacelar, 2006). Previous studies (Bailey, 2013; Defior, Martos, & Cary, AQ13 2002) have determined that Portuguese is a transparent language, evidence from the studies by Defior et al. (2002), Grant, Gottardo, and Geva (2012) and from the study by Bailey (2013) maintains that Portuguese language orthography is less consistent compared to the Spanish one, which is shallower at the level of grapheme conventionality. Accent markers (different intonation and different semantics) in Portuguese language and their variants pose an added difficulty to learners of Portuguese SL. This is due to the diversity of accent features in European Portuguese, which is different from that of Brazilian Portuguese (reported in Portuguese and Brazilian studies) (Barbosa, 2000; Frota & Vigário, 2000; García & Souza, 2014; Teixeira et al., 2013). The plurality of accent characteristics and the diversity of vowel systems across Portuguese variants might be a problem for the English SL learner. And vice-versa, considering high contrastive phonemes and accents between languages such as the case of English and Portuguese (Bailey, AQ14

2013; Carvalho & Bacelar, 2006; Salton, Ross, & Kelleher, 2014; Schepens, Dijkstra, Grootjen, & van Heuven, 2013; Soares da Silva, 2010).

Grant, Gottardo, and Geva (2012) analysed the first language factor in reading comprehension in a SL context (English language learners) considering groups of Spanish, Portuguese and Cantonese speakers. Despite test validity issues in that study, the third group of participants evaluated in reading comprehension tests – Cantonese speakers – is perceived as the group with more linguistic specificities. Additionally, this group is viewed as having a high probability of failure in learning English SL, as Chinese – Cantonese – does not follow the individual sound criteria in the same way as alphabetic languages (Shum et al., 2014). Chinese students are expected to be outperformed by their peers with alphabetic home languages in an alphabetic context of testing (Shum et al., 2014; Zhang et al., 2013). This study also outlines the importance of developing investigation on English language learners attending to their different home languages and the impact in the reading outcomes. Consistency in grapheme–phoneme correspondence is a predictor for reading and vocabulary comprehension. In other language contexts, systems like Urdu consist of vocabulary and script (from right to left) based on distant languages such as Persian and Arabic which determine visual and cognitive brain mechanisms adopted for longevity (Barac, Bialystok, Castro, & Sanchez, 2014; Davidson, Raschke, & Pervez, 2010). New language acquisition strongly modifies the way these speakers think and decode (Nag & Perfetti, 2014; Nag, Snowling, Quinlan, & Hulme, 2014; Shum et al., 2014). In the context of Romance language learning, the Chinese speakers make use of information morphemes, whereas alphasyllabary speakers (e.g. Urdu, Hindi) follow phonologic and orthographic cues (Nag & Perfetti, 2014). A dual mode of thinking and comprehending might result in different performance rhythms.

AQ15

2.2. *Educating in the SL: resources and assessment*

Education in the SL is tied to methods and strategies of teaching and learning. Which methods should we develop? The idea that methods applied in L1 instruction can be successfully transferred to SL learning support is a serious misconception. SL teaching demands specific resources to activate the learning environment. Electronic resources and digital databases with comprehensive activities and devices would help specialized education in SL (Elabsy, 2013). On the one hand, resources and valuable information across grades and levels of education would be differentiated; on the other, differentiation would be based on specific activities for specific language speakers. Some resources (e.g. thinking aloud activities) would be appropriate for Slavic students but would have no academic impact in Mandarin speakers. Segmenting and blending tasks, such as reading and writing activities, should be carefully designed for specific students working on their home language and education in the country of origin. A diverse range of SL learners demands diversity of materials. In our previous empirical research study (Figueiredo & Silva, 2010) the blending tasks were shown to be the most difficult activity in contrast to the simplicity put forward in these activities (Gillon, 2004). The difficulty would especially be experienced by Slavic speakers, who spend much more time and effort on phonemic blending of Portuguese. Gillon's perspective could be applied to an English SL context but not to other languages such as Romance idioms, which imply other cognitive processing and investments. On the one hand, Slavic speakers might be constrained by their alphabet

and grammar rules. But, on the other hand, Mandarin speakers spend more time on the same activity due to other factors. According to Wang, Koda, and Perfetti (2003) Mandarin speakers struggle in SL because they need more phonological and orthographical cues to develop sensitivity to a new language system. Activities related to homophone identification would be important for Mandarin students, considering their limited decoding in terms of phonetic similarities. Conversion strategies are highly developed to ensure successful attainment in language learning. In the same study, we concluded that younger children experience more of a delay during specific activities related to time and effort. The delay is not unrelated to strong results as older peers solved the tasks in less time and more accurately. These data are in direct contrast with previous evidence in a study by Karrass, Braungart-Rieker, Mullins, and Lefever (2002): 'Therefore, infants who spend more time in an attentive, interested state are expressing less emotion and thus have more cognitive resources available for language learning' (p. 520). In fact, Portuguese children with experience of immigration showed the lowest performance in the general number of tasks (alphabetic ordinance, minimum pairs, reading and spelling, onset and rhyme, alliteration and syntax judgements, Figueiredo, 2013; Figueiredo & Silva, 2010).

More investigation is needed to produce and underpin changes in testing to be introduced in teacher training. These issues are neglected in Portuguese schools and are treated as peripheral to language teaching in the education system. Scientific evidence presents valid instruments with activities that could be accommodated in several classroom contexts: memory for sentences and texts (e.g. reading and recall of utterances and meanings), picture vocabulary, oral vocabulary (e.g. of identification of synonyms and antonyms), listening comprehension (e.g. cloze tests) and verbal analogies (Schrank, Fletcher, & Alvarado, 1996). Previous studies have made important advances in the field of testing in the SL mainly in relation to the English context. Wang and Lam (2009) developed a broad study with Chinese speakers in English as a SL and Chinese in first language situations, producing valid measures with a comprehensive (completed assessment for well-informed intervention) and educational purpose. Also in the Chinese research field, in terms of SL learning, very recent studies (Shum et al., 2014) have produced data regarding evaluation procedures for school intervention with language learning. Research findings support the importance of the creation of new insights for validated instruments. Important is also the replication of tests for other languages and populations (Sugarman et al., 2007) in order to facilitate the standardization of assessment rules and the understanding of new evidence across several countries and language education approaches. In this study we focused specifically on three measures in the sub-lexical domain: verbal analogy, vocabulary correspondence and morphological extraction.

2.2.1. *Verbal analogy – testing reasoning*

Verbal analogy tests are used to measure the comprehension capacity in logical word associations. Vocabulary can be simple or highly complex when complete assessment is carried out at different levels of proficiency. A greater range of vocabulary will help in understanding correctly and in completing the verbal analogy test appropriately. According to a Woodcock–Munoz Revised Language Survey (2005), the verbal analogy test is held in complex task settings and is important for assessing two of the seven cognitive factors

involved in language strategies: comprehension-knowledge and fluid reasoning (Roomaney & Koch, 2013). Verbal analogies also cover the assessment of broad ability and linguistic competence in the dominant language. Previous studies (Ismail & Koch, 2012; Taboada, 2012; Woodcock, Munoz-Sandoval, Ruef, & Alvarado, 2005; Yeh, 2010; Zhao et al., 2011) have used the verbal analogy tests in SL learners and their findings have showed common results: high scores in verbal analogy test are correlated to high level of proficiency in a specific language. Additionally, verbal analogy tests were administered to assess cognitive abilities of second-generation individuals at school so as to observe their disadvantage comparing with native peers in the transition to secondary school (Ludemann & Schwerdt, 2013, p. 463). On the one hand, verbal analogy tests demand significant amount of vocabulary knowledge of learners in a new language; on the other hand, children commonly have difficulty in this type of language tasks considering the verbal analytic reasoning involved (Goswami, 2001). Even considering a pre-tested training, no gains were observed in children's performance in analogy tasks (García-Madruga et al., 2013, p. 169).

In our study, the verbal analogy test identifies normative cases of limited proficiency but with particular features that will lead to identifying the profiles of different migrant groups of students. Verbal analogy tests are used less in experimental trials than other types of tests in the SL area (Lakin & Lai, 2012; Zhao et al., 2011). Verbal analogy tests are crucial in the analysis of reasoning abilities in the language of instruction, mainly in terms of the strategies involved in the decoding of alphasyllabary, morphosyllabary and alphabetic speaking languages (Zhao et al., 2011). Further analysis of performance in reasoning tasks should be developed to examine cognitive association ability at the semantic and conceptual level in new linguistic structures (SL).

2.2.2. *Vocabulary – measuring frequency and regularity*

Another goal of our study was to test and assess the ability to make correct correspondences between words of different frequency, difficulty and regularity in order to identify proficiency levels in vocabulary decoding (Nation, 1994, 2009). Nation has developed an electronic test – Lextutor – to measure and expand vocabulary knowledge by evaluating and estimating several levels and amounts of word-frequency in English. Nation's research (2009) and Nation and Malarcher (2007) supported a comprehensive analysis of vocabulary learning and teaching and advanced activities, strands, teacher techniques, criteria and learning strategies (guessing based on context, learning with visual stimuli, reasoning from word units, and dictionary usage). Nation (2009) established a noteworthy study with 4000 useful English words based on an analysis of English course books from primary to tertiary school levels. The word counting depended on criteria of occurrence (frequency) to determine target words in English. In addition, vocabulary learning and testing could be emphasized with a computer-based format. SL learners would need an average vocabulary to develop text comprehension based on words and meaning computation. What vocabulary is significant to SL learners in a specific language? How much of the lexicon is needed to be proficient in a SL? We argue that the target language will determine the significance and amount of vocabulary necessary, in particular for SL learners, taking into account the variety of vocabulary that different speakers have in their mental speech. By focusing on a documented word-frequency index across languages we can create a word-test to examine the quality of correspondences that SL learners

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achieve in a scaffolding structure of word-level difficulty. Additionally, teachers and educationists should have access to *corpus* information related to research in vocabulary acquisition, selection and testing (McCarthy, 2008; Pulido, 2006) as long as frequency lists provide accurate information on basic and complex words for SL learners (Tidball & Treffers-Daller, 2008).

2.2.3. *Morphological extraction – cognitive sensitivity*

Morphological extraction or morphophonological transformation is a widely used measurement (August et al., 2001) which evaluates the ability to make changes and extractions from a given derived word in an appropriate sentence context. Derivational morphological awareness is tested through the phonological and orthographical variation effect. One of the main goals of this evaluation is to detect the cross-linguistic influence during the extraction procedure. Phonological change could interfere, for example, with pronunciation but not with spelling. The accuracy needed to identify this phenomenon will result in positive performance and inform us about cognitive options. The extract test is applied to several groups of SL learners and with strong evidence of morphological analogies that examine receptive vocabulary ability, as well as verbal analogy tasks. Wang and Lam (2009) developed a study with extract tests, among other measures, to assess Chinese students in English SL and in Mandarin native language settings. They concluded that their performance was similar to that of their native peers (English speakers). This suggests a high level of phonological awareness towards English. Can this result be replicated in a Romance language context focusing on a distinct phonological system? Morphophonological analogy tasks explore to what extent students are able to compound words into small lexical units in order to convert to a new word in the dominant language. The combination of words depends on vocabulary and grammar control (McBride-Chang et al., 2005). These AQ19 are cognitively demanding structural tasks that will predict the trajectory of learning and an increase in phonological and morphological awareness. It is important to evaluate the diversity of speakers in the same SL setting to understand how the derivational morphological knowledge changes and to compare the effect on home languages. Wang and Lam concluded that sensitivity to derived forms (prefixes and suffixes) has a greater impact as a predictor for English word acquisition than the awareness of compound structures. In addition, what would the sensitivity to language structures that rely on other grammar criteria such as word order be (e.g. in Portuguese, Italian and Spanish)? Syntactically dominant cues in English are different from rules and case marking in other Indo-European and Non-Indo-European languages such as Japanese (MacWhinney, 2005). Besides, the Chinese language is essentially based on compounding strategies (Shum et al., 2014) and extract tests in foreign languages that enhance them have positive acceptance by immigrant Mandarin student speakers. Syntactic and semantic information is gradually developed while morphological manipulation and blending are stimulated. Conscious choices during sentence comprehension involve decoding of dominant cues and case roles in a specific SL. The strength of cues in languages will generate a competition model for language processing and a resonance effect when systems have similar features (MacWhinney, 2005). When acquiring knowledge in the new language, children will depend on their comprehension and decoding skills gathered first from their native language cues. Only before new cognitive mapping begins are the foreign linguistic cues assimilated and the native language cues neutralized. Over time morphological

sensitivity could play a more crucial role in the increase of word knowledge and enhancement of reading comprehension in the SL (Chik et al., 2012; Wang & Lam, 2009).

3. Method

3.1. *Hypotheses*

This study is part of a larger post-doctoral empirical research programme currently in process in Portuguese schools to assess cognitive and linguistic profiles of immigrant students – SL learners. The main goal is to develop a comprehensive format of 15 tests adapting specific assessment landmarks of previous international studies in SL testing. The present study reports preliminary data regarding the performance of 106 learners of Portuguese as a SL in particular tasks of verbal analogy, vocabulary and morphological extraction. A learners' limited vocabulary is in all probability the result of limited receptive and expressive language abilities. This has an impact on language development and suggests a lack in early stages of SL learning. We are interested in the examination of differentiated profiles of language speakers processing in Portuguese language tasks to determine cognitive specific processing according to age effects and also considering different home languages. Based on these two variables primary outcomes will be discussed in the following hypothesized conditions (H):

H1. Younger subjects (7–12 years old) would show higher scores compared to older peers (13–17 years old) in SL tasks taking into account evidence that confirms their cognitive predisposition to develop easier linguistic skills.

H2. Verbal analogies would be expected to be more difficult for young ages focusing on their low understanding of similarities at a conceptual level.

H3. SL learners would perform differently in analytic reasoning and vocabulary tasks in a Portuguese language evaluation context. That difference would be explained by their home language systems and linguistic distance.

H4. Romance language speakers would achieve better results considering their familiarity with alphabetic and transparent languages; otherwise Indo-Aryan language speakers would show deficits in SL performance.

To a certain extent these conditions were confirmed (related to home languages effects and diversity) and others were not verified (particularly concerning the influence of age).

3.2. *Participants*

The participants consisted of 106 L2 learner of Portuguese (participants mostly came to Portugal after 2010, late arrivals), mean age = 13 years old (SD = 2.7), 57 males and 46 females (from basic and high school levels). Almost all the students were born outside Portugal (only 10 individuals were born in Portugal but emigrated before schooling). The first school instruction was mainly in the home countries (57 immigrant children, in school age, began their schooling in the home country; the other immigrant participants – SL learners – entered in Portugal before school age and were evaluated during the first years of school, in Portuguese establishments, at the testing time). All students came from lower to middle socio-economic backgrounds (we have identified all the current jobs of parents/tutors). Concerning the L1 instruction variable, we observed that only 18 (18%)

receive L1 instruction in Portugal, offered as additional tuition to the regular school curriculum. Also we identified that the individuals affirming to receive L1 parallel instruction were solely Chinese (Mandarin speakers). There are no disabled individuals and they are all right-handed (laterality was also identified). All students are from schools in the same geographical area: the Lisbon district.

This sample is intentionally heterogeneous, with regard to nationality and home languages. 23 nationalities and 28 different languages were observed. In terms of categorization (we have determined the language groups by the identification based on family languages origin) by language: 33 (31.1%) Mandarin speakers, 32 (30.2%) Romance language speakers, 14 (13.2%) Slavic language speakers, 11 (12.3%) Creole speakers, 10 (9.4%) Indo-Aryan language speakers, 2 (1.9%) Afro-asiatic language speakers. Attending to the length of residence (LOR) in Portugal, most of the participants has a LOR ranging between 3 years (2010) and few months (2014) (mean = 2009 (4 years); SD; 2.9). 21 has a LOR in Portugal of 3 years, 11 students has a LOR of 2 years, 18 has a LOR of 1 year and nine arrived during 2013, few months before starting to include the empirical study. LOR and age (age of testing) were correlated and there were no significant differences. There is homogeneity (and normality) in this sample regarding the two variables.

3.3. *Tests and procedure*

Data collection in Portuguese schools began in May 2013 and continued over 2014. Reading, writing and comprehension skills were the main target of the all test. Oral production was not evaluated at this stage of the empirical research. In several school classes context, approximately 30 children were pre-tested at the start of the school year on their comprehension of all questions of each task administered. This was to ensure the feasibility of the all test before the first application at schools. The questions format was short and open-ended, as is the scale format. Preliminary data will be reported taking into account three tasks partly adapted from previous literature in SL testing. The scoring format is based on the original classification criteria of the tests. After the total score for each participant, groups are compared according to specific independent variables (such as age and home language). In this first study of SL adaptation testing procedure we observed psychometric properties of the tests and only the morphological extract test showed limited internal consistency (0.53). This could be argued based on principles of testing construction for the Portuguese population and Romance language speakers. The original extract test version in English presented a Cronbach's alpha coefficient of 0.93.

Verbal analogy test: Six items (based on Verbal Analogies Test n.° 2 of Woodcock–Munoz Language Survey-Revised – WMLS-R, 2005) with internal correlation consistency (Cronbach's alpha) of 0.60. Score: 1 point for each correct answer (total score: 6 points). Example of sample items: example 1. 'Estrela está para céu assim como peixe está para _____' (fill in the missing word by logic association: example 1. 'Star is for sky as fish is for _____.').

Vocabulary selection and matching Test: Fifteen items (based on the structure of Lextutor, Nation, 1994) with a Cronbach's alpha 0.85. Score: 1 point for each correct correspondence (total score: 15 points). Example 1 of sample items: 'Baixo, jantar, amor, janela,

regra, sociedade/de estatura pequena, norma, refeição' (connect three of the following words to their synonyms in the second word group: 'short', 'dinner', 'love', 'window', 'rule', 'society'/ small in stature, evening meal, norm). For the vocabulary test we analyse lists of words according to CORLEX (national index of word-frequency) and selection was determined based on different levels of difficulty and frequency. Some of the words in this task are easier to decode than others at a semantic level. Words similar in spelling but distinct in semantics were also proposed to generate ambiguity (distractor). Several errors are due to spelling similarity (error of transference). AQ20

Morphological extraction test: Four items (based on August et al., 2001) with Cronbach's alpha 0.53. Score: 2 points for each completed match, 1 point for each partial answer (total score: 8 points). Example 1 of sample items: 'Palavra: Amizade/Frase: Os colegas da escola são meus _____' (example 1: Word: friendship/Sentence: Colleagues from school are my _____").

Students were asked to complete a full battery of tests, where the three tasks above fits in, over approximately 60 minutes, in a classroom evaluation context (a group session but participants were tested individually). These tests, besides the previous three tasks mentioned above, were about: picture naming, semantic associations, phonetics perception (foreign accent, after listening texts with different Portuguese dialect), story and words recall (after reading and after listening), cognates identification, word transference and dichotic hearing, listening comprehension, phonemic blending, syllable, onset and rime identification, writing composition and metaphor comprehension. The tasks were administered in schools from May 2013, after receiving authorization from schools and the selection of immigrant population, as being SL learners, that responded to the main criteria (7–17 years old, immigrants or with no schooling experience in Portugal before emigration, with proficiency between A1 and B1 levels taking into consideration Portuguese language, diversity of languages spoken, public schools). All prompts were given on paper and on computer one at a time, to listen and register the sounds and texts. In the specific tasks reported in this study no computer was needed. Examinees received no feedback after the experimental trial. Schools will receive study information at the end of the empirical investigation. School practitioners and researchers will be introduced to the guidelines of the total rating and respective written rationales to handle a number of scoring challenges (incomplete answers to a task, different correct options for question scenarios …). Treatment of data was accomplished by using the SPSS program (version 21).

4. Results and discussion

4.1. *Index of difficulty*

Using percentile analysis, levels of difficulty were estimated for each test according to the summary of participant answers. Results showed (see Table A1, Appendix) three distinct indicators for percentiles 25, 50 and 75. Results will be discussed based only on P25 and P75: elementary and proficient levels taken into account. Twenty-five per cent of students presented up to four correct items in the verbal analogy test whereas 75% identified over five analogies. In the vocabulary selection and matching test SL learners were positioned less than eight matching words, in P75 a performance of 14 correct identifications was observed. Finally, the morphological extraction test revealed a performance in P25

below two morphologically correct changes and in P75 over 5 extractions (Table A1). Percentile analysis was carried out to examine the association between age differences and performance in the three tasks. Following data are estimated depending on two specific variables: age and home language.

4.2. *Age effects in verbal analogy test*

H1. Younger subjects (7–12 years old) would show higher scores compared to older peers (13–17 years old) in SL tasks taking into account evidence that confirms their cognitive predisposition to develop easier linguistic skills.

H2. Verbal analogies would be expected to be more difficult for young ages focusing on their low understanding of similarities at a conceptual level.

Main findings: The hypothesis 1 was rejected. The hypothesis 2 was confirmed. Results revealed that adolescents 16–17 years old were the best performers in verbal analogies test. Children failed at this task.

Results showed diversity of profiles according to advanced age in the *verbal analogy* test: the youngest individuals (7–9 years old) reported less analogies (P25 = 2.8) and the oldest participants (16–17 years old) were more successful in the same task with more analogies correctly identified (P25 = 4) despite being similar groups in their observed performances in percentile 75 (5 analogies positively identified).

In relation to analogies, children only perform verbal reasoning based on a 'successful way' (Goswami, 2001) and do not immediately get the similarity principle in order to understand the relationship between events inside sentences. These results were in accordance with the main findings of García-Madruga et al. (2013) concerning that children failed in verbal analogies identification even after previous training received. The youngest individuals would not be able to decode high-order verbal analogies even in their home language. But a low-order (verbal analogies) presupposes only simple equation relations that novice learners would perform (Goswami, 2001). In this task, compared to the general results summarized in Table A1, children performed significantly lower than four associations. Verbal analogy is an important cue to human understanding and child competency changes when they show the ability to accomplish a high level of verbal analogies which is to be expected around adolescence. Despite having more vocabulary knowledge, until adolescence, a child performs poorly in analogical reasoning and makes associations by comparison only (Goswami). In the case of novice SL learners, external factors such as age and exposure to SL predict outcomes for vocabulary size and awareness of semantic and morphosyntactic rules (Paradis, 2011). Vocabulary size is expected to be related to analytic reasoning but not in a predictive way towards decoding abilities which replicates research done by Lervag and Aukrust (2010). The external factors, as previously mentioned, could be explained by stronger evidence such as a proficiency variation in contradiction to Paradis's hypothesis that child-internal variables predict the variance in language outcomes of immigrant children in advance. In fact, home languages and age are external but determine internal factors: internal mental structure and cognitive mapping. Each home language configures cognitive mapping and strategies for reasoning in language and problem-solving in general. Paradis only outlines first language transfer and cognitive maturation depending on age constraints as main internal factors.

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But home languages define cognitive structures and ways of thinking and not only in explaining cross-transfer.

4.3. *Age effects in vocabulary selection and matching test*

H1. Younger subjects (7–12 years old) would show higher scores compared to older peers (13–17 years old) in SL tasks taking into account evidence that confirms their cognitive predisposition to develop easier linguistic skills.

Main findings: The hypothesis 1 was confirmed. Data revealed that adolescents 16–17 years old were the poorest performers. Youngest children (7–9) outperformed the other groups.

In *vocabulary selection and matching test* the situation was reversed because the adolescents aged between 16 and 17 years old responded less appropriately (P25 = 6 match) than children between 7 and 9 years old (P25 = 7.8 words) with high matching across the word correspondence task. Adolescents aged between 13 and 15 years old performed the most accurately, far ahead of their peers: in percentile 25 at least ten words were correctly identified. In general and with the exception of adolescents aged between 13 and –15, all students achieved lower than eight correspondences (level calculated for P25 in index of difficulty estimated for all groups, Table A1). Looking at all the answers estimated in percentile 75, there are no differences (see Table A2, Appendix).

Vocabulary knowledge is inter-related with strong comprehension skills in the SL, mainly in the initial phase of SL learning. Although age is a factor, the knowledge of vocabulary would determine these differences across the age groups observed. According to Lervag and Aukrust (2010) decoding demands more effort in inconsistent orthographies like English and would be faster in languages such as Spanish and German. Portuguese would be seen as a consistent system (Bailey, 2013; Defior et al., 2002; Fernandes et al., 2008; Teixeira et al., 2013; Ziegler et al., 2010) so the hypothesis would be based on facilitated learning for immigrant individuals in Portuguese speaking countries. On the other hand, vocabulary knowledge is not an impact factor in decoding tasks (e.g. word decoding) as corroborated by reading growth (Lervag & Aukrust). Ability to decode words is not necessarily related to vocabulary size which is the only robust predictor of SL initial learning. Different abilities and predictors (decoding and vocabulary storage) might explain the positive results for younger children in the vocabulary task and the reverse performance (low indicators) in the verbal analogy test. In the specific case of 13–15 years old adolescents, the higher performance in the vocabulary selection task might be justified by the vocabulary knowledge in Portuguese language. The same factor as previously mentioned for children as learners of Portuguese as a SL. In the adolescence, vocabulary depth (related to the type of language systems in contact) is a crucial factor interacting with other skills in the SL acquisition (Pasquarella, Grant, & Gottardo, 2012). Taking into account specific distribution analyses conducted to understand if other factors would be predicting these results for the youngest adolescent group, we observed that there were no statistical differences ($p = .339$) between students considering age variable and length of residence in Portugal (in a similar proportion, the four groups of children and of adolescents arrived in Portugal between 2010 and 2014). Considering differences of home languages and the continued instruction in home languages, there was statistical difference ($p = .021$) across the variety of age groups only for the first factor. There are

several adolescents speakers of Romance language and of Mandarin. The same scenario was observed for older children (10–12 years old). Also adolescents and older children share the highest number of students (Chinese) with instruction in their home language. Attending to the results with less correctness from the Chinese students and the better performance from the Romance language speakers, in the vocabulary task, the great number of Romance language speakers in the youngest adolescents group might be addressed as the explaining factor for the performance of adolescents in vocabulary selection task.

4.4. *Age effects in morphological extraction test*

H1. Younger subjects (7–12 years old) would show higher scores compared to older peers (13–17 years old) in SL tasks taking into account evidence that confirms their cognitive predisposition to develop easier linguistic skills.

Main findings: the hypothesis 1 was partially rejected. Data revealed few differences among age groups, but older participants (16–17 years old) had highest performance in P75.

In the *morphological extraction test*, all age groups showed similar behaviours in the morphological changes task. There are only more statistical descriptive differences in percentile 75 – proficient level – suggesting that older participants had a greater advantage in this task. This might be associated with stronger ability to make abstractions at a cognitive level.

Morphological extraction based on derived words requires more cognitive loading and executive effort which is associated with older ages (DeKeyser, Alfi-Shabtay, & Ravid, 2010). The advanced age enhances reasoning strategies in structure problems such as morpheme extraction (Shum et al., 2014; Leong, Tse, Loh, & Wah, 2011). Overall morphological awareness depends strongly on 'print exposure' provided by textbooks in the foreign language (Zhang & Koda, 2008). Younger children are generally sensitive to morphemes and small units which compound in the mother tongue. But compounding is shown to be easier than derivation processing for SL learners as has been the conclusion of previous studies (Zhang, 2013). Consistent orthographies will help in morphological awareness, essentially on the derivational level. And, explain how first language variables would form a more complete argument than age when addressing the complete interpretation of results in this task. AQ22

4.5. *Home languages and the verbal analogy test*

H3. Immigrant students (SL learners) would perform differently in analytic reasoning and vocabulary tasks in a Portuguese language evaluation context. That difference would be explained by their home language systems and linguistic distance.

H4. Romance language speakers would achieve better results considering their familiarity with alphabetic and transparent languages; otherwise Indo-Aryan language speakers would show deficits in SL performance.

Main findings: H3 was confirmed because immigrant students performed differently; H4 was not partially confirmed because Romance language speakers achieved results with gaps. But Indo-Aryan language speakers showed deficits in SL performance.

In the *verbal analogy test*, Mandarin, Creole and Afro-Asian language speakers were shown to be more proficient in logic association in the verbal reasoning task (P25 = 4 correct analogies) as opposed to Indo-Aryan speakers where there were more cases of incorrect fit (only one analogy in P25). Even speakers of Romance languages such as Spanish showed gaps in analogy identification. Slavic speakers (from Eastern European) are similar to the first groups (see Table A3, Appendix). Chinese speakers in this study were the only group receiving L1 instruction as additional support in their schooling.

In a previous study (Figueiredo, Martins, & Silva, 2014) home language instruction was shown to be an important factor in Portuguese SL learning in terms of the results (learners achieved higher scores in specific tasks in their home language). Chinese participants engaged in a mother tongue tuition programme probably have an advantage in their SL learning which explains positive attainment in this evaluation context. Attending to the role of the L1 additional learning, considering the Chinese cases, the good indices in SL performance were explained by both variables observed: home language and extended literacy in L1. Cummins (1991, 2013, 2014) explores the implications of the L1 extended instruction for bilingual education and determines the benefit from having simultaneous tuition in L1 and in SL. Based on *interdependence hypothesis* of Cummins (1991), the cross-lingual relationships between features of L1 and SL are reflective and promote decoding of SL input. More recent studies in other languages than English (Beacco & Byram, 2002; Ellisa, Gogolin, & Clyne, 2010; Schwartz, Moin, & Leikin, 2012; Schwartz & Shaul, 2013) have demonstrated that continuing development of L1 literacy within a SL education enhances the bilingual skills of students, specifically accelerating the lexical growing. Other studies (Abu-Rabia & Shakkour, 2014) have also concluded that training in the first language is important to bilingual proficiency improvement and to retroactive transfer which enhances SL acquisition. This also maintains expertise in less consistent orthographies such as home languages like Hebrew and Arabic. Considering the language group variable, not only the extended L1 instruction, the positive results of Asian (Chinese) speakers at the present study were not supported in other studies mentioned by Cummins research (1991) about Asian students in Canada and in the USA. In those studies speakers of Japanese and Chinese are evidence of lower effect of interdependence hypothesis, considering the orthography dissimilarity between those languages and English. Specific hypotheses supported by studies focused on English as SL should be replicated in Romance languages context. Results could vary considering other languages in contact (L1 and SL) until now not explored at this level (dissimilarities between writing systems and other language variables). Results showed for the Indo-Aryan speakers group in verbal analogy test, in the present study, were in accordance to the findings of Taboada (2012) that corroborates the lower scores of Asian speakers. Here referring to other Asian speakers of languages other than Mandarin, in verbal analogy task.

According to previous data (Figueiredo & Silva, 2010) Afro-asiatic and Creole language speakers were not expected to provide accurate answers in this test. On the one hand, Creole language speakers are from African countries where Portuguese is the official idiom and they generally, but unexpectedly, show a lack in language proficiency compared to other language groups. This is due to previous school education in African countries where standards and methodologies in the language teaching field can be problematic (Clegg & Afitska, 2011; Tikly, 2011; Williams, 2014). On the other hand, Creole speakers have an advantage when understanding vocabulary and when

completing the analogy relations in Portuguese due to similarities that the home language and SL share. This is not only in terms of Portuguese lexical properties being on a linguistic level to Creole languages, but also in terms of similar concepts. Afro-asiatic speakers are expected to experience fewer gains in this task due to home languages with very distant linguistic foundation. Ismail and Koch (2012) used verbal analogies of WMLS-R (2005) and concluded that African speakers (from South Africa) showed low scores in this test as simple analogies became too high-order to solve in a foreign language. In recent research languages such as Arabic, Hebrew and Mandarin have been studied to understand the home language effect in foreign language learning. This research focuses mainly on whether Afro-asiatic languages are integrated in categories of home languages that require extended periods of instruction and strong difficulty in learning English as SL. Further investigation should be done in terms of Romance languages and consistent orthography learning (Lervag & Aukrust, 2010) looking at similar home languages like Arabic and others that are considered a challenge for individuals and for teaching methods.

4.6. *Home languages and vocabulary selection and matching test*

H3. Immigrant students would perform differently in analytic reasoning and vocabulary tasks in a Portuguese language evaluation context. That difference would be explained by their home language systems and linguistic distance.

H4. Romance language speakers would achieve better results considering their familiarity with alphabetic and transparent languages; otherwise Indo-Aryan language speakers would show deficits in SL performance.

Main findings: H3 and H4 were confirmed because immigrant students performed differently and Romance language speakers achieved the highest results; otherwise Indo-Aryan language speakers showed deficits in SL performance.

Chinese speakers (Mandarin language) showed less correct answers for the *vocabulary selection and matching test* (P25 = 6.5 correct matching cases) whereas Romance language speakers were shown to be more proficient in vocabulary selection and identification. This task is mainly related to selection of correct words among several choices. The Indo-Aryan group (speakers of languages such Urdu and Hindi) experienced more difficulty with only four words correctly identified in percentile 25 followed by the Afro-Asian group (speakers of Arabic, mostly) with six well-matched words.

Arguments previously addressed for analogy tasks could be applied to understanding the group differences in vocabulary identification.

4.7. *Home languages and morphological extraction test*

H3. Immigrant students would perform differently in analytic reasoning and vocabulary tasks in a Portuguese language evaluation context. That difference would be explained by their home language systems and linguistic distance.

H4. Romance language speakers would achieve better results considering their familiarity with alphabetic and transparent languages; otherwise Indo-Aryan language speakers would show deficits in SL performance.

Main findings: H3 was confirmed and H4 were partially confirmed because immigrant students performed differently and Romance language speakers achieved the highest results. But Indo-Aryan language speakers showed deficits in SL performance, parallel with Mandarin speakers.

In the *morphological extraction test*, Chinese (Mandarin speakers) students and Indo-Aryan unexpectedly displayed similar results with 1 or 0 morphologically correct changes in P25. Romance language speakers responded more completely with three correct extractions at least (P25) and with six appropriate modifications on level P75 (in terms of proficiency level).

Our results are similar to the study of Zhang (2013) that outline the difficulty of Mandarin and Urdu language speakers in derivation decoding/construction. Indo-Aryan language speakers showed lower achievement in general tasks and when compared to the difficulty index calculated for all participants, particularly in percentile 25 (see Table A1). Lexical schemas for these language groups are differently stored according to the specificities of the home language. Unfamiliar language like Portuguese will display limitations in morphemes. Mainly, decoding in derived words even when Portuguese is considered to have consistent orthography that assumes facilitated SL learning (Lervag & Aukrust, 2010). In another study (Ramirez, Chen, Geva, & Kiefer, 2009) cross-transference was shown to achieve more salient outcomes when the home language is a Romance language such as Spanish and students are embedded in English learning. Morphological awareness functions strongly from Spanish to English and not vice-versa particularly with regard to the type of 'narrow' orthography of the home language. Opposed to this, very unfamiliar (and deep, from a morphological perspective) languages such as Indo-Aryan or Afro-asiatic will be predictors of low performance in correlated tasks such as vocabulary and morphological modification tasks, in shallow systems such as Portuguese, Spanish or Italian which share a similar foundation to Greek and Latin (Ramirez et al., 2009). Cross-linguistic transfer of morphological awareness was observed from Spanish to English, but not from English to Spanish. These results suggest that morphological awareness is important for word reading in Spanish, a shallow orthography with a complex morphological system. They also suggest that morphological awareness developed in a child's L1 is associated with word reading in English as their SL.

Indeed, alphasyllabary (speakers of Indo-Aryan languages) and morphosyllabary (speakers of languages such Mandarin) language speakers showed gaps in Portuguese morphological comprehension. This suggests a new perspective on a student's SL learning and new directions to recent studies that analyse to what extent alphasyllabary children make use of phonological and orthographic information gathered from their mother tongue to decode in the SL. Do alphasyllabary individuals use strategies to learn alphabetic properties and different complexity features in the context of Portuguese? Can cognitive mapping involved in alphasyllabary and morphosyllabary language decoding predict the trigger in activation strategies in the alphabetic language context? According to Shum et al. specific (and distant) language speakers, not just specifically in terms of the Indo-Aryan languages, have a strong influence in explaining imperfections and gaps in word order and temporal sequencing. Regarding reasoning task, Chinese participants presented positive behaviour in the verbal analogy task identifying a higher number of verbal analogies in Portuguese which suggests greater receptive vocabulary skills for this specific group. Their cognitive preparation (Mandarin activates right and left hemispheres,

diminishing the lateralization effect in the crystallization of mental structures during language acquisition after a certain age, Fillipi et al., 2011) might explain the stronger performance against their peers. However receptive vocabulary would not necessarily predict vocabulary size because Chinese participants were shown to have limitations in the extract base test. This does not match the theoretical framework of Yeh (2010) which maintains that mastery of Chinese native speakers in compounding words and morpheme manipulation are associated with strong growth in vocabulary.

Chinese speakers tend to be accurate in analogies based on radicals of language (Yeh, 2010) through a compounding strategy of chunking small units. But a morphological paradigm of Portuguese language dominance would be a constraint factor for Chinese SL learners. Further analysis is recommended in order to understand the behaviours of such speakers (morphosyllabary) in Romance languages as a target of SL learning. Chinese natives are experts in verbal analogy tasks in English as a foreign language which anticipates high scores in morpheme combination, affixation and derivational awareness among other constructs evaluated in a previous study (Yeh). Contrary to Grant et al. study (2012) assumptions, we observed that specific language speakers (like Chinese) outperformed peers in a Portuguese SL setting. This leads us to conclude that a language group in fact predicts achievement and cognitive differences in SL. The consistency of the Portuguese system would be the first factor that we estimate as blocking Mandarin decoding in vocabulary and morphological extraction tests due to grapheme–morpheme conventions in Portuguese which are unfamiliar to young morphosyllabary learners.

4.8. *Linear regression analysis*

Linear regression analysis was carried out to identify whether or not the correlations between age (previously correlated to LOR to ensure homogeneity between the variables) variables and SL performance as well as home language variable and SL performance were significant. Main findings: results showed that the home language variable has predictive value as opposed to the age factor where no significant predictive power was shown. The home language influence hypothesis was confirmed by regression analysis estimates. Gains in Portuguese SL greatly depend on home language type because previous results have indicated different profiles of language speakers that predict facilitation or difficulty in learning. The results are summarized in Table A4.

5. Conclusion

The main goal of this study was to examine how factors such as age and home language can be used in the teaching environment to predict and to examine the development outcomes of SL students in verbal reasoning and vocabulary tasks. Based on that two factors, fours hypotheses were generated and tested. Concerning the main findings of our study for age effects and according to the hypotheses 1 and 2, older adolescents (16–17 years old) were the best performers in verbal analogies test against young children (7–9 years old) that failed at this task. But the reverse situation was observed for the vocabulary test where the same adolescents' group were the poorest performers. Youngest children (7–9) outperformed the other groups for this test. In the morphological extraction test,

there were few differences among age groups, but older participants (16–17 years old) had highest performance in the percentile 75. Based on the hypotheses 3 and 4, testing the home language influence, were confirmed that immigrant students (SL learners) performed differently verbal analogy test, in Portuguese. Contrary to expected, the Romance language speakers achieved good results but with gaps, otherwise Indo-Aryan language speakers showed deficits in SL performance. For vocabulary test, was also confirmed that immigrant students performed differently but Romance language speakers achieved in fact the highest results. Otherwise Indo-Aryan language speakers remained disadvantaged. Finally, for the extraction test, immigrant students performed differently but Indo-Aryan language speakers and Afro-Asian group both showed poor results.

In alphabetic languages, SL learners with a strong linguistic distance (a home language with a very different orthographic foundation) are expected to struggle in language learning in spite of being aware of strategies that can improve their skills. The results confirm the hypothesis that immigrant students performed differently in analytic reasoning and in vocabulary tasks in a Portuguese language evaluation context. That difference was explained by their home language systems and linguistic distance. This study also supported that Romance language speakers achieved better results considering their familiarity with alphabetic and transparent languages (Hall et al., 2009; Levin & Ehri, 2009), while Indo-Aryan language speakers showed deficits in SL performance. But, speakers of Romance languages such as Spanish showed gaps only during analogy identification task, as well Romance language speakers were frequently compared, in tasks performance, to other group of speakers such as Mandarin. The storage and combination of morphemes can be a demanding task but on different levels according to individual speakers. Cognitive mapping is strongly influenced by the mother tongue and the specific neuronal system is crystallized after a certain age and based on linguistic features of L1 development.

On the one hand, results from this study indicate that Indo-Aryan participants are expected to face difficulty retaining and comprehending Portuguese SL. Opposed, in general, to Mandarin speakers and Romance languages speakers who have more mastery of decoding and comprehension strategies. When looking at Arabic and Hebrew speakers (from the Afro-Asian language group), their knowledge of alphabetic structures and of vowel complexity did not empower their skills considering their limited proficiency during task solving in Portuguese. Ambiguity in their writing and morphological system should be acknowledged by educationist in order to understand specific gaps in knowledge in those subjects in new language learning (Abu-Rabia & Shakkour, 2014). The same rationale should be applied to students of other linguistic backgrounds to predict management inside learning. On the other hand, the hypothesis that verbal analogies were more difficult for young ages was confirmed. But not all the results confirmed the hypothesis that younger subjects had higher scores compared to older peers in SL tasks, in all tasks. The youngest learners were shown to have specific problems in task accomplishment, particularly in the verbal analogies tasks. Conceptual transfer is another aspect observed in this study although verbal analogy and age is a crucial factor in this context when taking into account the ability to perform analytic reasoning.

Focusing on home language as a distinct variable in student profiles, inside classroom, activities should explore which situations might occur during speech perception and to

what extent: assimilation of SL sounds to native phonetic sound system, assimilation of foreign phonetics coded as no speech, or assimilation as speech but with no categorization identified (Aoyama, 2003). We argue that the first situation would be more frequently observed, in the Portuguese language, in African student speakers of Creole with a Portuguese lexical foundation. They would experience great difficulty in distinguishing phonetics due to a similarity between sound systems. Phonetics constraints suggest the probability of more problems in facing discrimination in new languages and this fact should stress activities related to decoding phonetics. Lip-reading activities are important, particularly in Portuguese, because nasality is one of the more difficult traits to decode. As well, prosodic information that involves specific comprehension to comprehend the entire message (Eskenazi, 1999): 'Intonation is the glue that holds a message together. It indicates which words are important, disambiguates parts of sentences, and enhances the meaning with style and emotion.' Prosody should be taught through different tasks for students that have a first language with no familiarity with intonation variety in their native phonological system, reducing difficulty in listening comprehension. Listening is the most popular learning method which has a direct impact on listening strategies that play a crucial role in early stages of SL learning (Vandergrift, 2002). Listening is not only receiving information but adjustment of prior knowledge to new linguistic knowledge through mediated interaction between students and their teachers. Bottom-up and top-down processes are activated during listening comprehension but depend on incoming speech and interaction with native peers. Vandergrift argued that listening strategies would be important for teachers to develop in schools but would not threaten traditional evaluation. Evaluation should be the first step for SL learning to be successful.

Measurement of skills provides indicators of student profiles and of their different limitations in proficiency which leads to appropriate intervention and educational tools (Shum et al., 2014). According to Lukmani (2012), SL testing in the classroom should be set in other terms to avoid space inside curriculum time. Assessment should be carefully executed and take place longitudinally during the first year of exposure to the SL. Typical tests should be reviewed in order to avoid fixed rules and tasks that do not assess independent outputs of SL learners (e.g. changes from active to passive voice). It is mandatory to evolve testing objectives to measure how individuals develop their reasoning over the questions and trial, and making implicit the cross-transfer processes. Sanchez et al. (2013) reflected that community research assessment practices in the USA are not able to give a realistic picture of the cognitive and linguistic behaviours of bilinguals. Findings in the international research revealed evidence of cross-language transfer but not focused on Romance language learning. The evidence is mostly related to English SL learning and with no advances for other languages such as Portuguese that is widely spoken throughout the world. More research in Romance language settings should be undertaken to provide valid data and new tools for teachers, principals, curriculum coordinators and students.

AQ23

This study showed a limitation in one task reliability (extraction test) which requires further examination after the end of the empirical study. This type of task – morphological extraction – is strongly required in SL assessment (August et al., 2001) to understand how learners are organizing morphosyntactic features such as number or tense (Eskander, Habash, & Rambow, 2013) which is provided by morphological awareness. But there is no sufficient evidence of that test application in different immigrant students learning

Romance languages. The phonological and morphological variation effect (Wang & Lam, 2009) could be differently functioning in Portuguese language which could suggest that aspects of Portuguese morphology and vocabulary showed different substance from other idioms like English. This fact affects the sensitivity to derived forms (affixes) and the learners become unable to predict accurately the affixes and to perform features combination (Eskander et al., 2013). Additionally, compounding strategies are probably not familiar to specific language learners as it is for Mandarin speakers (Wang & Lam, 2009).

Further research in the SL area should be improved to empower teaching methodologies inside classroom with a multilingual presence. Focusing the low scores revealed for morphological extraction test and related difficulty of comprehension on task, there are teaching implications in multilingual classroom to consider. More language-focused instructional tuition should be encouraged and based on specific levels such as morphological awareness (Kieffer & Lesaux, 2012). Other specific limitations were observed at the present study considering that Chinese students are the only ones receiving continued instruction in their home language which could be limitative to understand the effects of instruction in L1 for the SL learning, referring Portuguese. Additionally, a limitation was observed regarding the discussion on the performance of younger adolescents (13–15 years old) in the specific task of vocabulary selection. Further research should be encouraged to examine this question and focusing age of testing correlated to length of residence. In general, there are specific tests in SL testing that should be selected in order to differentiate language groups in European classroom, considering the home language effect as main predictor of variation. To determine language groups and their profiling is of upmost importance in understanding diversified school support for those students. General approaches in SL education should be avoided when taking into account the principle of diversity inside the classroom.

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References

Abu-Rabia, S., & Shakkour, W. (2014). Cognitive retroactive transfer (CRT) of language skills among trilingual Arabic-Hebrew and English learners. *Open Journal of Modern Linguistics*, *4*, 1–20. doi:10.4236/ojml.2014.41001

Aoyama, K. (2003). Perception of syllable-initial and syllable-final nasals in English by Korean and Japanese speakers. *Second Language Research*, *19*(3), 251–265. doi:10.1191/0267658303sr222oa

August, D., Kenyon, D., Malabonga, V., Louguit, M., Caglarcan, S., & Carlo, M. (2001). *Extract the base test—English*. Washington, DC: Center for Applied Linguistics.

Bailey, A. (2013). Similar, yet different: Acquisition of Brazilian Portuguese Nasal vowels by Spanish-English Bilinguals. In J. Amaro, G. Lord, A. Pérez, & J. Aaron (Eds.), *Selected proceedings of the 16th Hispanic linguistics symposium* (pp. 128–142). Somerville, MA: Cascadilla Proceedings Project. AQ24

Barac, R., Bialystok, E., Castro, D. & Sanchez, M. (2014). The cognitive development of young dual language learners: A critical review. *Early Childhood Research Quarterly*, *29*(4), 699–714. doi:10.1016/j.ecresq.2014.02.003

Barbosa, P. (2000). Illuminating some methodological issues concerning: Speech timing research from a comparison between European and Brazilian Portuguese. *Cadernos de Estudos Lingüísticos*, *39*, 41–50.

Barbosa, P., Duarte, M., & Kato, M. (2005). Null subjects in European and Brazilian Portuguese. *Journal of Portuguese Linguistics*, *4*(2), 11–52.

Barcroft, J. (2007). Effects of word and fragment writing during L2 vocabulary learning. *Foreign Language Annals*, *40*(4), 713–726.

Bassetti, B. (2006). The language in writing and the writing of language. Some general considerations on the phonemic transparency and opacity in the writing of Portuguese and other matters. [*A língua na escrita e a escrita da língua. Algumas considerações gerais sobre transparência e opacidade fonémicas na escrita do português e outras questões]*. Centre for Languages and Linguistics & Area Studies. Retrieved from https://www.llas.ac.uk/resources/gpg/2662

Beacco, J. C., & Byram, M. (2002). *Guide for the development of language education policies in Europe: From linguistic diversity to plurilingual education*. Strasbourg: Council of Europe.

Braunstein, V., Ischebeck, A., Brunner, B., Grabner, R., Stamenov, M., & Neuper, C. (2012). Investigating the influence of proficiency on semantic processing in bilinguals: An ERP and ERD/S analysis. *Acta Neurobiologiae Experimentalis*, *72*(4), 421–38.

Cardoso-Martins, C., Resende, S., & Rodrigues, L. (2002). Letter name knowledge and the ability to learn to read by processing letter–phoneme relations in words: Evidence from Brazilian Portuguese-speaking children. *Reading and Writing*, *15*(3/4), 409–432.

Carvalho, A., & Bacelar, A. (2006). Cross-Linguistic influence in third language acquisition: The case of Spanish-English bilinguals' acquisition of Portuguese. *Foreign Language Annals*, *39*(2), 185–202. AQ25

Chik, P., Ho, C., Yeung, P., Chan, D., Chung, K., Luan, H., … Lau, W. (2012). Syntactic skills in sentence reading comprehension among Chinese elementary school children. *Reading and Writing*, *25*, 679–699.

Chiswick, B., & Miller, P. (2005). Linguistic distance: A quantitative measure of the distance between English and other languages. *Journal of Multilingual and Multicultural Development*, *26*(1), 1–11.

Chomsky, N. (1978). *Aspectos da Teoria da Sintaxe [Aspects of the Theory of Syntax]*. (2nd ed.). Coimbra: Arménio Amado.

Clegg, J. & Afitska, O. (2011). Teaching and learning in two languages in African classrooms. *Comparative Education*, *47*(1), 61–77. doi:10.1080/03050068.2011.541677

Cummins, J. (1991). Interdependence of first- and second-language proficiency in bilingual children. In E. Bialystok (Ed.), *Language processing in bilingual children* (pp. 70–89). New York: Cambridge University Press.

Cummins, J. (2013). Language and identity in multilingual schools: Constructing evidence-based instructional policies. In D. Little, C. Leung, & P. Avermaet (Eds), *Managing diversity in education: Languages, policies, pedagogies* (pp. 3–26). Bristol: Multilingual Matters. AQ26

Cummins, J. (2014). Detangling the lies about english-only and bilingual education. In P. Gorski & K. Zenkov (Eds.), *The big lies of school reform: Finding better solutions for the future of public education* (pp. 53–65). New York: Routledge. AQ27

Cyrino, S. (2010). On romance syntactic complex predicates: Why Brazilian Portuguese is different (Sobre predicados complexos sintáticos nas línguas românicas. *Estudos da Língua (gem)*, *8*(1), 187–222.

Defior, S., Martos, F., & Cary, L. (2002). Differences in reading acquisition development in two shallow orthographies: Portuguese and Spanish. *Applied Psycholinguistics*, *23*(1), 135–148. doi:10.1017/S0142716402000073

DeKeyser, R., Alfi-Shabtay, I., & Ravid, D. (2010). Cross-linguistic evidence for the nature of age effects in second language acquisition. *Applied Psycholinguistics*, *31*(3), 413–438. doi:10.1017/S0142716410000056

Davidson, D., Raschke, V., & Pervez, J. (2010). Syntactic awareness in young monolingual and bilingual (Urdu-English) children. *Cognitive Development*, 25, 166–182. Retrieved from http://dx.doi.org/10.1016/j.cogdev.2009.07.003

Davies, A. (2003). *The native speaker: Myth and reality*. Buffalo: Multilingual Matters. Hardbound.
Elabsy, T. (2013). *Successful reading strategies for second language learners: Theory and practice*. Colorado: Outskirstpress.
Ellisa, E., Gogolin, I., & Clyne, M. (2010). The Janus face of monolingualism: A comparison of German and Australian language education policies. *Current Issues in Language Planning*, *11*(4), 439–460. doi:10.1080/14664208.2010.550544
Eskander, R., Habash, N., & Rambow, O. (2013). Automatic extraction of morphological lexicons from morphologically annotated corpora. In *Proceedings of the 2013 conference on empirical methods in natural language processing* (pp. 1032–1043). Seattle, WA: Association for Computational Linguistics.
Eskenazi, A. (1999). Using automatic speech processing for foreign language pronunciation tutoring: some issues and a prototype. *Language Learning & Technology*, *2*(2), 62–76.
Farukh, A., & Vulchanova, M. (2014). Predictors of reading in Urdu: Does deep orthography have an impact? *Dyslexia*. doi:10.1002/dys.1474
Fernandes, S., Ventura, P., Querido, L., & Morais, J. (2008). Reading and spelling acquisition in European Portuguese: A preliminary study. *Reading and Writing*, *21*(8), 805–821. doi:10.1007/s11145-007-9093-7
Figueiredo, S. (2013). Learning analytics and second-Language context: A digital instrument for measurement of real-time data regarding second language learner's achievement. *International Journal of Technology Enhanced Learning*, *5*(2), 178–194.
Figueiredo, S., Martins, M., & Silva, C. (2014). New methodologies for second language assessment: Measuring and identifying profiles in migrant school contexts. *IATED Digital Library*, 5607–5614. ISBN: 978-84-616-8412-0.
Figueiredo, S., & Silva, C. (2010). *Affective factors and cognitive achievement in the language learning* (Ph.D. dissertation). Portugal: University of Aveiro.
Filippi, R., Richardson, F., Dick, F., Leech, R., Green, D., Thomas, M., & Price, C. (2011). The right posterior Paravermis and the control of language interference. *The Journal of Neuroscience*, *31*(29), 10732–10740. doi:10.1523/JNEUROSCI.1783-11
Fontoura, H., & Siegel, L. (1995). Reading, syntactic, and working memory skills of bilingual Portuguese-English Canadian children. *Reading and Writing*, *7*(1), 139–153.
Frota, S., & M. Vigário (2000). Aspects of comparative prosody: Rhythm and intonation in EP and BP". ["Aspectos de prosódia comparada: ritmo e entoação no PE e no PB"]. In *Actas do XV Encontro da Associação Portuguesa de Linguística* (pp. 533–555). Braga: APL.
García, M., & Souza, A. (2014). Lexical similarity level between English and Portuguese. *Estudios de Linguística Inglesa Aplicada*, *14*, 145–163.
García-Madruga, J., Elosúa, M., Gil, L., Gómez-Veiga, I., Vila, J., Orjales, I., … Duque, G. (2013). Reading comprehension and working memory's executive processes: An intervention study in primary school students. *Reading Research Quarterly*, *48*(2), 155–174.
Gillon, G. (2004). *Phonological awareness: From research to practice*. New York, NY: Guilford Press. AQ28
Goswami, U. (2001). Analogical reasoning in children. In D. Gentner, K. Holyoak, & B. Kokinov (Eds.), *The analogical mind: Perspectives from cognitive science* (pp. 436–470). London: The MIT Press. AQ29 AQ30
Grant, A., Gottardo, A., & Geva, E. (2012). Measures of reading comprehension: Do they measure different skills for children learning English as a second language? *Reading and Writing*, *25*, 1899–1928. doi:10.1007/s11145-012-9370-y
Gullberg, M., & Indefrey, P. (2006). *The cognitive neuroscience of second language acquisition*. Oxford: Blackwell. AQ31
Hall, C., Newbrand, D., Ecke, P., Sperr, U., Marchand, V., & Hayes, L. (2009). Learners' implicit assumptions about syntactic frames in new l3 words: The role of cognates, typological proximity, and L2 status. *Language Learning*, *59*(1), 153–202.
Hillert, D. (2014). *The nature of language: Evolution, paradigms and circuits*. San Diego: Springer. AQ32
Hulstijn, J., Young, R., Ortega, L., Bigelow, M., DeKeyser, R., Ellis, N., … Talmy S. (2014). Bridging the gap: Cognitive and social approaches to research in SL learning and teaching. *Studies in Second Language Acquisition*, 1–61. doi:10.1017/S0272263114000035

Ismail, G., & Koch, E. (2012). Investigating item and construct bias in an English verbal analogies scale. *Southern African Linguistics and Applied Language Studies*, *30*(3), 325–338. doi:10.2989/16073614.2012.739407

Karrass, J., Braungart-Rieker, J., Mullins, J., & Lefever, J. (2002). Processes in language acquisition: The roles of gender, attention, and maternal encouragement of attention over time. *Journal of Child Language*, *29*(3), 519–543.

Kieffer, M., & Lesaux, N. (2012). Development of morphological awareness and vocabulary knowledge in Spanish-speaking language minority learners: A parallel process latent growth curve model. *Applied Psycholinguistics*, *33*(1), 23–54.

Lakin, J., & Lai, E. (2012). Multigroup generalizability analysis of verbal, quantitative, and nonverbal ability tests for culturally and linguistically diverse students. *Educational and Psychological Measurement*, *72*(1), 139–158.

Leong, C., Tse, S., Loh, K., & Wah, K. (2011). Orthographic knowledge important in comprehending elementary Chinese text by users of alphasyllabaries. *Reading Psychology*, *32*(3), 237–271. doi:10.1080/02702711.2010.495605

Lervag, A., & Aukrust, V. (2010). Vocabulary knowledge is a critical determinant of the difference in reading comprehension growth between first and second language learners. *Journal of Child Psychology and Psychiatry*, *51*(5), 612–620. doi:10.1111/j.1469-7610.2009.02185.x

Leufkens, S. (2013). The transparency of creoles. *Journal of Pidgin and Creole Languages*, *28*(2), 323–362. AQ33

Lev-Ari, S., & PeperKamp, S. (2013). Low inhibitory skill leads to non-native perception and production in bilinguals' native language. *Journal of Phonetics*, *41*(5), 320–331.

Levin, I., & Ehri, L. (2009). Young children's ability to read and spell their own and classmates' names: The role of letter knowledge. *Scientific Studies of Reading*, *13*(3), 249–273.

Ludemann, E., & Schwerdt, G. (2013). Migration background and educational tracking. *Journal of Population Economics*, *26*(2), 455–481.

Lukmani, Y. (2012). Current research in language assessment and its implications for language teaching. *Language and Language Teaching*, *1*(1), 5–12. AQ34

Macedonia, M. (2013). Three good reasons why foreign language instructors need. *Neuroscience*, *3*(4), 1–20. doi:10.5296/jse.v3i4.4168

MacWhinney, B. (2005). A unified model of language acquisition. In J. Kroll, & A. Groot (Eds.), *Handbook of Bilingualism: Psycholinguistic approaches* (pp. 49–87). Oxford: Oxford University Press. AQ35

McBride-Chang, C., Chob J., Liud, H., Wagnerc, R., Shud, H., Zhoud, A., … Musec, A. (2005). Changing models across cultures: Associations of phonological awareness and morphological structure awareness with vocabulary and word recognition in second graders from Beijing, Hong Kong, Korea, and the United States. *Journal of Experimental Child Psychology*, *92*(2), 140–160.

McCarthy, M. (2008). Accessing and interpreting corpus information in the teacher education context. *Language Teaching*, *41*(4), 563–574.

Mira, J., & Paredes, J. (2005). Interlinguistic similarity and language death dynamics. *Europhysics Letters*, *69*(6), 1031. AQ36

Nag, S., & Perfetti, C. (2014). Reading and writing: Insights from the alphasyllabaries of South and Southeast Asia. *Writing Systems Research*, *6*(1), 1–9.

Nag, S., Snowling, M., Quinlan, P., & Hulme, C. (2014). Child and symbol factors in learning to read a visually complex writing system. *Scientific Studies of Reading*, *18*(5), 1–9. AQ37

Nation, P. (1994). *Lextutor*. Retrieved from http://www.lextutor.ca/tests/

Nation, P. (2009). *4000 Essential English words. Books 1–6*. Seoul: Compass Publishing. AQ38

Nation, P., & Malarcher, C. (2007). Reading for speed and fluency, books 1, 2, 3 & 4. Seoul: Compass Publishing.

Odlin, T. (1989). *Language transfer: Cross-linguistic influence in language learning*. Cambridge: Cambridge University Press. AQ39

Paradis, J. (2011). Individual differences in child English second language acquisition: Comparing child-internal and child-external factors. *Linguistic Approaches to Bilingualism*, *1*(3), 213–237.

Pasquarella, A., Grant, A., & Gottardo, A. (2012). Comparing factors related to reading comprehension in adolescents who speak English as a first (L1) or second (L2) language. *Scientific Studies of Reading*, *16*, 475–503. dio:10.1080/10888438.2011.593066

Pulido, D. (2006). Vocabulary in a second language: Selection, acquisition, and testing. *Studies in Second Language Acquisition*, *28*(1), 143–144.

Ramirez, G., Chen, X., Geva, E., & Kiefer, H. (2009). Morphological awareness in Spanish-speaking English language learners: Within and cross-language effects on word reading. *Reading and Writing*, *23*, 337–358. doi:10.1007/s11145-009-9203-9

Romannelli, S., & Menegotto, A. (2015). English speakers learning Spanish: Perception issues regarding vowels and stress. *Journal of Language Teaching andResearch*, *6*(1), 30–42. AQ40

Roomaney, R., & Koch, E. (2013). An item and construct bias analysis of two language versions of a verbal analogies scale. *Psychology*, *43*, 314–332. AQ42

Rydland, V., Aukrust, V., Fulland, H. (2012). How word decoding, vocabulary and prior topic knowledge predict reading comprehension. A study of language-minority students in Norwegian fifth grade classrooms.*Reading and Writing*, *25*(2), 465–482.

Salton, G., Ross, R. & Kelleher, J. (2014, April). *An empirical study of the impact of idioms on phrase based statistical machine translation of English to Brazilian-Portuguese*. Third workshop on hybrid approaches to translation (HyTra), 14th conference of the European chapter of the association for computational linguistics, Gothenburg, Sweden, 26–30.

Sanchez, S., Rodriguez, B., Soto-Huerta, M., Villarreal, F., Guerra, N., & Flores, B. (2013). A case for multidimensional bilingual. *Assessment Language Assessment Quarterly*, *10*(2), 160–177.

Schepens, J., Dijkstra, T., Grootjen, F., & van Heuven, W. J. B. (2013). Cross-language distributions of high frequency and phonetically similar cognates. *PLoS ONE*, *8*(5), e63006. doi:10.1371/journal.pone.0063006

Schrank, F., Fletcher, T., & Alvarado, C. (1996). Comparative validity of three English oral language proficiency tests. *Bilingual Research Journal: The Journal of the National Association for Bilingual Education*, *20*(1), 55–68.

Schwartz, M., Moin, V., & Leikin, M. (2012). Lexical knowledge development in the first and second languages among language-minority children: The role of bilingual versus monolingual preschool education. *International Journal of Bilingual Education and Bilingualism*, *15*(5), 549–571. doi:10.1080/13670050.2011

Schwartz, M., & Shaul, Y. (2013). Narrative development among language-minority children: The role of bilingual versus monolingual preschool education. *Language, Culture and Curriculum*, *26*(1), 36–51.

Selinker, L., & Douglas, D. (1985). Wrestling with ´context´ in interlanguage theory. *Applied Linguistics*, *6*(2), 190–204. doi:10.1093/applin/6.2.190 AQ43

Shum, M. S. K., Ki, W. W., & Leong, C. K. (2014). Cognitive and linguistic factors affecting alphasyllabary language users comprehending Chinese text. *Reading in a Foreign Language*, *26*(1), 153–175. AQ44

Soares da Silva, A. (2010). *Measuring and parameterizing lexical convergence and divergence between European and Brazilian Portuguese: endo/exogeneousness and foreign and normative influence*. Advances in cognitive sociolinguistics. Berlin: De Gruyter.

Spencer, L., & Hanley, R. (2004). Learning a transparent orthography at five years old: Reading development of children during their first year of formal reading instruction in Wales. *Journal of Research in Reading*, *27*(1), 1–14.

Sugarman, J., Arteagoitia, I., Coburn, C., Gallagher, C., Montee, M., & Schissel, J. (2007). *Spanish-Language assessments for dual language programs*. Washington: Center for Applied Linguistics. AQ46

Swain, M., Lapkin, S., Rowen, N., & Hart, R. (1990). The role of mother tongue literacy in third language learning. *Language, Culture and Curriculum*, *3*(1), 65–81. AQ47

Taboada, A. (2012). Relationships of general vocabulary, science vocabulary, and student questioning with science comprehension in students with varying levels of English proficiency. *Instructional Science*, *40*(6), 901–923.

Teixeira, A., Oliveira, C., & Moutinho, C. (2013). Machine learning of European Portuguese grapheme-To-Phone conversion using a richer feature set. *DETUA*, *4*(6), 1–6. AQ48 AQ49

Tessel, C. (2013). *Neurophysiological indices of the effect of cognates on vowel perception in late Spanish-English bilinguals* (Ph.D. dissertation). University of New York.

Tidball, F., & Treffers-Daller, J. (2008). Analysing lexical richness in French learner language: What frequency lists and teacher judgments can tell us about basic and advanced words. *Journal of French Language Studies*, *18*(3), 299–313.

Tikly, L. (2011). A roadblock to social justice? An analysis and critique of the South African education roadmap. *International Journal of Educational Development*, *31*(1), 86–94.
Vandergrift, L. (2002). *Listening: Theory and practice in modern foreign language competence*. Retrieved from https://www.llas.ac.uk/resources/gpg/67
Van Patten, B. (Ed.). (2004). *Processing instruction: Theory, research and commentary*. Mahwah, NJ: Lawrence Erlbaum.
Wang, M., Koda, K., & Perfetti, C. (2003). Alphabetic and nonalphabetic L1 effects in English word identification: A comparison of Korean and Chinese English L2 learners. *Cognition*, *87*(2), 129–149.
Wang, W., & Lam, A. (2009). The English language curriculum for senior secondary school in China its evolution from 1949. *RELC Journal*, *40*(1), 65–82.
William, C. (2013). Emerging development of semantic and phonological routes to character decoding in Chinese as a foreign language learners. *Reading and Writing*, *26*(2), 293–315.
Williams, E. (2014). *Bridges and barriers: Language in African Education and Development*. New York: Routledge. AQ50
Woodcock, R. W., Munoz-Sandoval, A. F., Ruef, M. L., & Alvarado, C. G. (2005). *Woodcock-Munoz language survey – Revised, English*. Itasca, IL: Riverside Publishing.
Yeh, Y-F. (2010). *The cross-linguistic morphological awareness transfer: The development of Chinese-speaking adolescents learners' English morphological awareness* (Ph.D. Dissertation). Texas A&M University.
Zampieri, M., & Gebre, B. (2012). Automatic identification of language varieties: The case of Portuguese. In J. Jancsary (Ed.), *Proceedings of the conference on natural language processing 2012* (pp. 233–237). Vienna: Österreichischen Gesellschaft für Artificial Intelligende (ÖGAI).
Zhang, Y. (2013). Linguistic distance effect on cross-linguistic transfer of morphological awareness. *Applied Psycholinguistics*, *34*(5), 917–942.
Zhang, D., & Koda, K. (2008). Contributions of L1 reading subskills to L2 reading development in English as a foreign languages among school-aged learners. *Indonesian Journal of English Language Teaching*, *4*(1), 1–17.
Zhang, J., McBride-Chang, C., Wong, A., Tardif, T., Shu, H., & Zhang, Y. (2013). Longitudinal correlates of reading comprehension difficulties in Chinese children. *Reading and Writing*, *27*(3), 481–501.
Zhao, M., Meng, H., Du, X., Liu, T., Li, Y., & Chen, F. (2011). The neuromechanism underlying verbal analogical reasoning of metaphorical relations: An event-related potentials study. *Brain Research*, *1425*, 62–74. AQ51
Ziegler, J., Bertrand, D., Tóth, D., Csépe, V., Reis, A., Faísca, L., … Blomert, L. (2010). Orthographic depth and its impact on universal predictors of reading a cross-Language investigation. *Psychological Science*, *21*(4), 551–559. AQ52

Appendix

Table A1. Performance differentiated of complete sample in the three tasks. AQ53

		Verbal analogy test	Vocabulary selection and matching	Morphological extraction test
N	Valid	105	104	102
	Missing	1	2	4
Percentiles	25	4.0000	8.2500	2.0000
	50	5.0000	12.0000	3.5000
	75	5.0000	14.0000	5.0000

Table A2. Performance differentiated in the three tasks according to age variable.

Age groups (years)			Verbal analogy test	Vocabulary selection and matching	Morphological extraction test
7–9	*N*	Valid	10	10	8
		Missing	0	0	2
	Percentiles	25	2.7500	7.7500	2.0000
		50	4.0000	11.5000	2.5000
		75	5.0000	13.2500	4.7500
10–12	*N*	Valid	46	46	47
		Missing	1	1	0
	Percentiles	25	3.0000	7.0000	2.0000
		50	5.0000	12.0000	3.0000
		75	5.0000	14.0000	5.0000
13–15	*N*	Valid	33	32	33
		Missing	0	1	0
	Percentiles	25	4.0000	10.2500	1.5000
		50	5.0000	12.5000	3.0000
		75	5.0000	14.0000	5.0000
16–18	*N*	Valid	16	16	14
		Missing	0	0	2
	Percentiles	25	4.0000	6.0000	2.0000
		50	4.0000	12.0000	5.0000
		75	5.0000	14.0000	6.0000

Table A3. Performance differentiated in the three tasks according to home language variable.

Language groups			Verbal analogy test	Vocabulary selection and matching	Morphological extraction test
Mandarin speakers	*N*	Valid	32	32	33
		Missing	1	1	0
	Percentiles	25	4.0000	6.5000	1.0000
		50	5.0000	13.0000	2.0000
		75	5.0000	14.0000	4.5000
Romance language speakers	*N*	Valid	32	32	31
		Missing	0	0	1
	Percentiles	25	3.2500	11.0000	3.0000
		50	4.5000	13.0000	4.0000
		75	5.0000	14.0000	6.0000
Slavic language speakers	*N*	Valid	14	14	12
		Missing	0	0	2
	Percentiles	25	3.7500	8.0000	2.2500
		50	5.0000	11.0000	4.0000
		75	5.0000	14.0000	4.7500
Creoles speakers	*N*	Valid	11	11	11
		Missing	0	0	0
	Percentiles	25	4.0000	10.0000	2.0000
		50	5.0000	13.0000	5.0000
		75	5.0000	14.0000	5.0000
Indo-Aryan language speakers	*N*	Valid	10	10	9
		Missing	0	0	1
	Percentiles	25	1.0000	4.0000	0.0000
		50	3.5000	7.0000	2.0000
		75	5.0000	11.5000	5.0000
Afro-Asiatic language speakers	*N*	Valid	2	2	2
		Missing	0	0	0
	Percentiles	25	4.0000	6.0000	2.0000
		50	5.0000	9.5000	4.0000
		75			

Table A4. Linear regression analysis of vocabulary selection and matching task.

		Coefficients[a]				
		Unstandardized coefficients		Standardized coefficients		
Model		*B*	Std. error	Beta	*t*	Sig.
1	(Constant)	10,659	1.254		8.500	0.000
	Age groups	0.536	0.429	0.124	1.250	0.214
	Language groups	−0.809	0.292	−0.315	−2.765	0.007
	Language (spoken at home) groups	0.247	0.154	0.181	1.606	0.112

[a]Dependent variable: vocabulary (selection and matching).