

# Speech Processing and Intelligent Assessment in Second Language: Struggling Immigrant Students and Home Language Parallel Instruction

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**Abstract-** Purpose: In this study, home language (L1), parallel instruction in L1, and grades were the factors examined to identify differentiated writing performance of young second language learners.

**Method:** A total of 102 children, aged between 8-17 years old, (M=13; DP=2,7), learners of Portuguese as a Second Language (L2), belonging to 6 language groups were compared on a narrative essay composition to identify types of writing (in L2 context) and the effects involved. Home language, parallel instruction in L1 and grades were controlled to examine those effects. The written outputs were measured using the score in six components adapted from an English L2 writing assessment (Alberta Education).

**Results:** Analyses of variance showed only significantly differences for home language variable ( $F(5,58) = 1,769$ ;  $\eta^2 = .132$ ). Covariance analyses revealed impact of parallel instruction for L2 performance improvement  $F(1,62) = 4,573$ ;  $p < .05$ ,  $\eta^2 = .069$ ). The groups whose home language had common features as the language of testing revealed lower scores showing no advantage of language overlap as commonly argued.

**Conclusions:** Specific groups of students have more difficulties during writing in L2 and the home language instruction should be prominently integrated as parallel teaching methodology into early literacy instruction of immigrant groups at school.

**Keywords-** children; cultural & linguistic diversity; education; language; writin.

## I. INTRODUCTION

Studies in Second Language (L2) area have been centered, in the last two decades, firstly on English as a L2 and as a foreign language, and secondly on studying learning issues of other L2 languages, such as Chinese and Spanish [1], [2], [3]. The L2 learning process is of utmost importance to understand the characteristics of school immigrant populations and their achievement when operating in different writing systems [4],[5]. This question leads to other crucial effect: the teaching methodologies for writing in specific L2 that are not English [6], [7], [8], [9]. There are several materials and teaching tools

for learning English as a second language that cannot be transferred to the learning of other languages, such as Romance languages [10], [11], [12], [13]. On the other hand, transference of diagnostic methods from languages other than English to linguistic minorities in English speaking countries should be reviewed [14]. Research in L2 matters focused on languages other than English barely when applying to linguistic distance between English and other different languages, especially considering limitations native Americans have to achieve success in other languages learning [14], [15]. The present study here examines another perspective: linguistic distance between languages such Portuguese and English in order to understand constraints in L2 learning and teaching that is not English L2 scenario, focusing L2 writing.

This study focuses just on the essay writing measure and intend to answer to two specific educational goals: to identify writing characteristics in order to help to determine different L2 writers groups (a different home language influences L2 writing, lexicon choices, errors degree and variety), and to evaluate the writing proficiency on learners of Portuguese as a L2 considering two main variables: home language (cognitive mapping related) and parallel instruction. The writing test is the only measure, in the larger study addressing other competencies such as L2 writing or oral comprehension, that focuses the L2 writing production and was based on the following elements: linguistic vocabulary, linguistic grammar, linguistic syntax, linguistic strategy, socio-linguistic, and discourse. This rationale was adapted from Alberta Education tools (“English Second Language Testing”) applied to the writing assessment, considering different levels of education [16]. The three hypotheses of this study are grounded on the impact of these related variables: home language type, instruction in L1 and grades (as well as previous schooling in their countries of origin). Firstly, in this paper, we examine existing literature on the linguistic distance issue, with main focus on romance languages’ learning, and studies of last decades concerning the questions of the study – diversity on characteristics of L2 writers and their proficiency, moderate effects of home language and parallel instruction with implication for instruction methods; secondly, we explore empirically the relevance of writing processes and strategies used by different immigrant students, in the Portuguese

language, as perceived across a variability of authentic texts performed by L2 writers, noticing specific features of comprehensibility and intelligibility.

## II. PORTUGUESE AS A L2: LIMITED RESOURCES FOR ASSESSMENT ON L2 WRITING AND GENERAL L2 ACQUISITION

With regard to English as a second language (ESL) there are several measures previously tested in large-scale contexts (with large sample sizes), whereas for languages such as Portuguese or Iranian as second languages, the situation demands careful attention to psychometrics and variability when weighting students' responses [2], [17]. The Portuguese idiom is widely present in classrooms worldwide, especially at universities, as a second or foreign language [2] and there is considerable research in the US and Brazil on the teaching of Portuguese as foreign language particularly [18], [19], [20], [21], [22], [23]. In the last decades, enrolments in Portuguese foreign language courses have increased, after languages such as Spanish, Japanese, Chinese, Russian and Italian [2]. Teaching methods in the context of Romance languages as a L2 are not in a significant number and more assessment instruments need to be validated to enable successful learning in young students with migratory experience [14], [15]. The core objective is to provide tools and scientific knowledge to promote the academic stability and involvement of minorities in L2 writing - the new non-native writers - and also new knowledge for educational professionals and for the research community. Concerning the L2 writing, the variety of home languages, maintained instruction in L1, different ages and several exposures to L2 will determine poor and advanced writers. Proficiency in different and more than one language is important to evaluate the literacy skills transference across languages and to understand how specific amount of L1 is activated during writing tasks, in specific writing system [4]. That variability should be included in the scientific rationales that underlie the production of instruments for evaluation and teaching of L2 writing. In the evaluation context, the appropriate prompt for L2 writing test have impact in the quality of writing concerning content and language errors. For writing prompts, general topics show to be more positive than specific topics to empower quality of writing, better coherence and inference, and lower language errors.

## III. SIMILARITIES AND CROSS-TRANSFERENCE: THE CASE OF ROMANCE LANGUAGES AND "LINGUISTIC/SPEECH DISTANCES".

Research in second language domain is dual field: "linguistic-cognitive" and "sociocognitive" or "sociocultural", differentiated by quantitative and qualitative methods of analysis [24]. In the first model - linguistic-cognitive - however, there are few data concerning Romance languages' (as second languages) learning and the effects of home languages in L2 learning. Emotional and social availability is more linear to understand irrespective of the diversity of immigrant students, but linguistic and cognitive implications need to be observed in-depth. As in [24] authors concluded that both types of research have advantages, sharing new evidence

and methods gathered from one another. Additionally, we believe that education and L2 research will benefit if scientific communities become more cohesive, working in their specific issues with similar traits. The European educational systems, particularly of Romance and Germanic languages speaking countries, should be aware of the lack of resources, which implies that few European countries are able to be in the frontline of education of new languages [25], [26], [15]. English speaking countries have more resources for teaching and assessment than other Romance language speaking countries. More attention should be paid to Romance languages, such as Portuguese, Catalan and Italian, given that numerous SL learners are learning them in schools [26], [2], [27], [28], [29], [30]. . The phonetics of these languages' systems has more amplitude, which enables native speakers to be more comfortable when learning new (even opaque) languages. On the contrary, Romance languages' beginners with different home languages (such as English or Urdu) struggle to decode and comprehend the phonetics and phonology of a Romance language like Portuguese. On the one hand, as in [31], that diversity of style and rhythm in speaking affect L2 vocabulary learning, on the other hand, we do not agree with the assumption that amplitude (in phonetics) has no impact on English native speakers' L2 acquisition.

Phonetics is strongly related to the writing skills of L2 learners in Romance language settings. Considering the phonological system of the Portuguese idiom, the sound system is deeply complex, mainly regarding the vowels' characteristics [32]. The Portuguese writing system has a transparent feature that enhances its acquisition by other Romance languages speakers [33]. The same does not apply to speakers of languages whose origin is other Indo-European or no Indo-European families, such as Indo-Aryan or Afro-Asiatic idioms. Studies comparing specific traits of language speakers in a second language learning situation are less recent, because the references that we found in literature date essentially to the 70s and 80s. As in [34], the focus on the contributions of previous research in contrastive analysis explained the cross-transfer between languages, such as Spanish, Russian and English. In the past decades, contrastive analysis focused upon the omissions of words in sentences, and authors realized that the explanation for Russian speakers' omissions could not be applied to the errors made by Spanish speakers. Moreover, the analysis of incorrect answers is different or irrelevant regarding the mistakes made by monolingual speakers. Students with different home languages operating in Romance language systems develop specific profiles (language groups characteristics) that offer new insights for educational practitioners and researchers, encouraging them to respond according to each 'type' of student. Assessment should be highlighted as the first step of observation. As in [3], was ascertained recently that decoding structures and meanings would be possible for specific different language learners, such as Chinese students, if they could associate, through cognitive strategy, grammar principles never heard or learned through training (mainly with visual stimuli) and not through proficiency or great exposure: the "meaning-to-form" and "form-to-meaning" model. This is also related to the interdependence model, a theory developed in the 90s and

precisely verified in Portuguese students learning English [21] in Canada: Portuguese students were struggling with reading readiness but performed well in specific English tasks due to transference and interdependence hypothesis. Portuguese speakers' master complex systems (due to their native Portuguese language) and are aware of grapheme-phoneme conversion rules [21, p. 149], which facilitate (predict) the transference to, and decoding of, opaque languages, such as English. Other factors that should be involved include cognition (the strategies that mother tongues provide since birth) and neural structures. However, testing that processing and those factors is the central problem.

As in [14], individuals with migratory experience are not all in the same situation (several levels of proficiency are verified, as well as different prior knowledge and school background) when it comes to starting second language learning. Immigrants come from countries that might be an important variable to predict the rhythm of SL learning at schools in the country of destination: home language (L1). Depending on different geographical areas of origin, family languages are very different in phonological and writing systems. As in [14], English speakers are referred as being more comfortable acquiring Western European languages than languages from Asia. Regarding the Portuguese language, the scenario is similar, but the Portuguese writing system is more difficult than the English appears to be at a first sight for foreign individuals. In [14] was conducted an interesting study about linguistic distance and its effect in the choice of country of destination by immigrants around the world. Another effect studied was linguistic distance in new learning of a dominant language. Hebrew and Arabic are, for example, closer languages and learning is facilitated in these cases by the expected similarity between languages, despite the fact that the oral resemblance can mask the difference between the two writing systems. Based on the goal of linguistic distance measurement, symmetry was evaluated and indexed to compare languages and their levels of learning difficulty after weeks of training (based on previous studies and respective evidence organizing the index, [14], p. 5). Authors concluded that English is more difficult to be acquired by Japanese and Mandarin speakers, the Norwegian and Swedish being the least distant from English, attaining higher scores of proficiency after specific and similar periods of formal instruction. Interestingly, Mandarin speakers performed quite well comparing to other speakers in our tests [35], whereas in specific tasks other than writing, Romance language speakers had similar or lower scores compared to Chinese students.

In summary, the previous literature indicates limitation for assessment instruments and for instruction applied to the L2 teaching and learning in non-English speaking countries, mainly referring to the European context, as well as differences of attainment among learners according to diversity of home languages. The linguistic distance and the cognitive mapping depending on the structure of each home language (and considering the possibility of maintained parallel instruction in L1) account as predictors for the L2 learning success. In the current study we examined several writing compositions of different language groups, in school age, to detect types of errors and to compare groups of learners in performance.

#### IV. METHOD

The specific questions of this study: to determine writing characteristics in order to help to understand different L2 writers groups (a different home language influences L2 writing, lexicon choices, errors degree and variety) (1); to evaluate the writing proficiency on learners of Portuguese as a L2, according to specific variables (2). Based on these questions, three hypotheses were examined:

Hypothesis 1: linguistic distance (different home languages among the participants' group) might explain difficulties in Portuguese in a second language context.

Hypothesis 2: parallel instruction in a second language would have a positive effect on second language learning (and also for bilingualism development).

Hypothesis 3: better writing outputs are expected in higher school levels.

##### A. Participants

Concerning parallel instruction, only Mandarin speakers received first language instruction in Portugal, offered as an addition to the regular school curriculum. There were no disabled individuals and mostly were right-handed (laterality was identified). All of them attended schools in the same geographical area: Lisbon.

With regard to nationalities: China: 23; Brazil: 1; Ukraine: 5; Romania:5; São Tomé and Príncipe: 3; India: 3; Guinea: 5; Moldova: 15; Morocco: 1; Nepal: 5; Gabao:1; Russia: 7; Kazakhstan: 1; Angola: 3; Uzbekistan: 2; Pakistan: 2; Cape Verde: 3; Colombia: 3; Germany: 1; Cuba: 1; Israel: 1; Ecuador: 1; Bulgaria: 1. 23% came from China, the most representative nationality in this study group. As for mother tongues, 28 languages were observed. We categorized them according to language families: 31 speakers of Mandarin, 30 speakers of Romance languages, 14 speakers of Slavic languages, 11 speakers of Creole languages, 10 speakers of Indo-Aryan languages, 2 speakers of Afro-asiatic languages.

Proficiency levels: the schools informed about the proficiency level of each student but only a few evaluated them according to the European Common Framework for Languages (2001). 21 out of 102 were informed: 8 were identified as A1 level, 10 as A2, 1 at B1 and 2 as B2.

Considering the independent variables involved in our hypotheses, ANOVAs were carried out to compare pupil's home language type and other different variables, confirming statistically differences across groups. The results were:  $F(6,93) = 16.275$ ,  $p = .000$ , for parallel instruction; and  $F(6,99) = 3.352$ ,  $p = .036$ , for grades.

##### B. Design and Materials

Fifteen tests constructed in a Diagnostic Test (battery) in a validation process, in the research context of a L2 investigation project. The collection of data in Portuguese schools scheduled for 2014, began in May 2013. The main target of this diagnostic test was reading, writing and comprehension skills. The assessment study was constructed on the following selected levels: verbal analogy, phonetics perception, foreign

accent, story recall, cognates, morphological manipulation, and writing. Here the analysis focuses only the writing and the preliminary data based on a sequence of three images and descriptors (example only from Grade 1, other grades and respective prompts and scores– with the same images sequence- were addressed concerning different grade levels of the participants):

[http://www.learnalberta.ca/content/eslapb/writingsamples/docs/grade1\\_2.pdf](http://www.learnalberta.ca/content/eslapb/writingsamples/docs/grade1_2.pdf).

### C. Factorial Exploratory Analyses

In order to analyze the underlying factor structure of the Diagnostic Test, the responses of the participating students were examined through exploratory factor analyses. Items that exhibited factor structure loadings of .40 or greater were used to define a factor. The Kaiser–Meyer–Olkin sampling adequacy measurement was .80 and the Bartlett’s test presented an optimal index ( $p = .000$ ). Five factors with eigenvalues above 1.00 were extracted, after three items excluded from the battery test: “rime”, “onset” and “words transference” (these items revealed communalities with values below .50 and factor structure loadings below .40). All five factors accounted for 65% of the total variance (see Table 1). 19 items were identified and with high factor loadings (>.40) on the rotated matrix as presented in Table 1.

TABLE I. EXTRACTED FACTORS, FACTOR LOADINGS AND EXPLAINED VARIANCE

Tasks denomination	Factor I Verbal reasoning	Factor II Recall	Factor III Oral comprehension	Factor IV Phonological manipulation	Factor V Unfamiliar sounds
<i>Measures</i>					
Naming task	0.546				
Semantic associations	0.761				
Verbal analogy	0.477				
Extraction	0.729				
Vocabulary match	0.748				
<b>Writing</b>	<b>0.688</b>				
Cognates	0.758				
Metaphor language	0.724				
Syllable awareness				0.648	
Writing comprehension	0.776				
Reading recall		0.516			
Accent detection					0.802
Non-words					0.664
Conversion non-words	0.447				
Blending				0.693	
Retelling		0.840			
Words recall		0.804			
Oral comprehension			0.711		
<i>Comprehensibility</i>			0.679		
% of explained variance	0.36	0.8,7	0.8	0.7	<b>0.65</b>

Ten items loaded on the Factor 1. This factor was labeled “verbal reasoning, writing and vocabulary”. Some examples of items in this factor are: picture naming task and writing essay task. Three items loaded on the Factor 2 that was labeled as “recall” (words and contents). Example of item in this factor: memory recall after texts reading. Two items loaded on the Factor 3 labeled as “oral comprehension”. Example of item in this factor: listening comprehension. Two items loaded on the Factor 4 and was labeled as “phonological manipulation”. Some examples of items in this factor are: phonemic blending and syllable division. Two items loaded on the Factor 5. This factor was labeled as “unfamiliar sounds”. Some examples of items in this factor are: accent detection and non-words detection.

Factor scores produced by this 5 component solution were computed by calculating the mean scores to display dependent measures for subsequent analyses. The writing task integrates the Factor I (Cronbach’s alpha: .81) and will be focused specifically for this study.

### D. The writing measure

This specific task, item of Factor I, had a short question format. This study focuses just on the essay writing test and has two goals: characterization of writing (and writers) features (on the texts performed by the L2 learners) and proficiency evaluation. The writing test intends, in the larger study rationale, to evaluate specific errors, lexicon choices, semantics features, and length of writing narratives, considering a specific and simple sequence of images [16], performed by different language groups involved in Portuguese as L2. Those features will help to constitute characteristics groups (profile) for each language group, as well proficiency levels on L2 writing.

The selection of the writing test proposed by Alberta [16] was based in the fact that school-aged children are allowed to be evaluated considering that other tests available, such those from TOEFL, do not address completely the younger ages. To understand the writing measure rationale, the written responses were evaluated considering linguistic vocabulary (lexicon used: utility, descriptive, subject-specific words; academic words are not considered in this study), linguistic grammar (evidence of verbs and respective tenses, plurals, prepositions, articles, adverbs; domain over word order and morphemes’ characteristics, and also subject-verb agreement and awareness of variety of word forms), linguistic syntax (cohesion, simple or complex sentences), linguistic strategy (spelling and association with oral pronunciation), socio-linguistic (relating texts and images to own feelings and states of mind, use of templates with less or more detail), and discourse (connection of ideas and events with time and sequence markers) [16]. See all dimensions and respective correlations in Table 2.

Using those dimensions to assess writing tasks reduces the variability in weighting the written text of students [36] mainly when considering that language learners are measured in other languages that differ from English. The main question concerning scoring writing tasks is to ensure that scores are related to the defined objectives (objective for each dimension, e.g., linguistic strategy measures content different from sociolinguistic, even they are dimensions related) and to an

analytic single factor (examining the consistency across the 6 related traits).

We measured all components based on a scale of 0: non-proficient, 1: elementary level; 2: satisfactory level; 3: proficient level. Considering the criteria of the sample selection, very few students were expected to be in the last level. The total score, considering percentile analyses, for the six dimensions (proficient) was 18, which corresponds to level 3 (proficient level). For example, a score of 6 (classification frequently observed in this study, 1 attributed for each dimension) corresponds to 1 (elementary).

*E. Procedure*

Students were tested individually in the Portuguese language for approximately 60 minutes. Examinees were given several booklets to visualize and answer. The tests battery were administered as from May 2013 in schools, after the authorization of the schools’ administrators and after concluding the selection of immigrant population that met the main criteria (7-17 years old, immigrants or with no schooling experience in Portugal before emigration, with language proficiency between A1 and B1 levels – European Common Framework - considering Portuguese language, diversity of languages spoken, state school students). Only one of the tests batteries is reported in the present study: writing composition task. In general, all prompts (e.g., verbal analogy test) from the

tests battery were disposed on paper and on a computer screen one at a time, to listen and register the sounds and texts.

Participants received no feedback after the experimental trial. Schools will receive information about this study 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 (the coding of incomplete answers to a task, different correct options for questions scenarios, counting errors, and classification of errors will be established). All data were treated with the SPSS program (version 21).

V. RESULTS

The reliability of the writing test with regard to the six dimensions (should be considered as an analytic scoring with multiple traits) showed a Cronbach’s alpha of .95, confirming the high internal consistency of this task considering the six components related. A Correlational Analysis was performed to examine whether there were significant relationship between the items that integrate the full test. The coefficient values showed to be highly significant for all correlations (r’s ranging from .71 and .86, p<.000). Table 2 shows the correlations and detailed information of the writing test consistency.

TABLE II. CORRELATION ANALYSIS FOR THE SIX ITEMS OF WRITING TASK ACCORDING TO THE ANSWERS OF ALL GROUPS

	Vocabulary	Grammar	Syntax	Strategy	Sociolinguistic	Discourse
<i>Linguistic dimensions</i>						
Vocabulary		.79**	.74**	.71**	.79**	.74**
Grammar	.79**		.71**	.71**	.78**	.72**
Syntax	.74**	.71**		.77**	.81**	.86**
Strategy	.71**	.71**	.77**		.74**	.74**
Sociolinguistic	.79**	.78**	.81**	.74**		.77**
Discourse	.74**	.72**	.86**	.74**	.77**	

*A. Data 1. Writing performance and first languages*

Hypothesis 1: linguistic distance (different home languages among the participants’ group) might explain difficulties in Portuguese in a second language context.

*1) One-Way Analysis of Variance*

We initially produced a one-way analysis of variance to examine descriptive statistics for the writing performance according to the L1 variable. Table 3 shows the means, standard deviations and effect size for the groups determined by home language type. Through the univariate ANOVAs we examined the effect sizes for the groups mean differences, using the L1 type, instruction in L1 and grades as independent variables. Concerning the L1 variable, the groups differed significantly (considering only the results for effect size,  $\eta^2$ ) in the results obtained for the writing task:  $F(5,58) = 1,769, p >.05, \eta^2 = .132$ . The  $\eta^2$  value showed to be substantial only for

the L1 variable (differences according to the home language type), considering the benchmarks of Cohen for statistical value of  $\eta^2$  (Cohen, 1988).

*2) Percentile Analysis*

For a completed and detailed analysis on the children’ performance in the writing essay task, based on percentile analysis, we examined how discriminated the immigrant school children of our sample would be according to specific variables: home language type, instruction in the first language, and grades. We summarized the results by estimating 2 positions with the percentiles (P) 25 (low-performers) and 75 (high performers). Considering the P25, we identified proficiency deficits in specific groups of L2 writers. The below P25 was expected to find serious limitations that identify students at risk in second language acquisition, specifically in narrative writing.

TABLE III. PERFORMANCE IN THE WRITING TEST FOR THE L1 GROUPS, L1 PARALLEL INSTRUCTION GROUPS AND GRADE GROUPS: MEANS, STANDARD DEVIATIONS, AND EFFECT SIZES

		Writing task results		F	$\eta^2$
		M	SD		
Language speakers					
Mandarin	8.08	4.16	1.79	<b>0.132</b>	
Romance	9.54	5.09			
Slavic Lang.	8.69	3.47			
Creoles	10.50	5.48			
Indo-Aryan	6.80	5.82			
Involved in L1 instruction			4.57	0.047	
Not involved	8.47	4.84			
Involved	10.9	3.73			
Grades			0.67	0.033	
1 <sup>st</sup> cycle	7.91	2.32			
2 <sup>nd</sup> cycle	8.26	4.59			
3 <sup>rd</sup> cycle	9.29	5.33			
High School	12.25	7.05			

For hypothesis 1, we intend to identify what language groups might be considered at risk for L2 learning in the Portuguese context. Speakers of Mandarin and of Afro-Asiatic languages (like Arabic) performed similarly (P25: between 5 and 6) to speakers of other languages such as Romance or Slavic, from Indo-European group (see detailed data in Table 4). On the other hand, speakers of Indo-Aryan languages (a very representative sample in Portuguese schools, also expected in general European schools) showed problems in the writing task (P25: no correct answer was identified, no dimension was classified positively in the writing answers of those speakers). With regard to the percentile 75, Romance languages' speakers performed better than the Chinese sample.

TABLE IV. PERFORMANCE OF SECOND LANGUAGE WRITERS ACCORDING TO HOME LANGUAGE TYPE, HOME LANGUAGE INSTRUCTION, AND GRADES

		P25 Low performers	P50 Average performers	P75 High performers
Language speakers				
Mandarin	5.00	7.00	10.00	
Romance	6.00	9.00	14.00	
Slavic	5.50	8.00	11.00	
Creoles	6.00	12.75	17.00	
Indo-aryan	0.00	6.50	12.00	
Afro-asiatic	6.00	9.50	-	
Involved in L1 instruction				
Not involved	6.00	7.00	11.00	
Involved	7.00	10.50	14.75	
Grades				
No previous school experience in home country	7.50	10.00	13.00	
1 <sup>st</sup> Cycle	4.50	7.00	13.00	
2 <sup>nd</sup> Cycle	4.25	7.00	10.00	
3 <sup>rd</sup> Cycle	6.00	16.00	17.00	
High School	13.00	13.00	13.00	

### B. Data 2. Types of errors and struggling students

According to Alberta principles in L2 testing and to Alberta K-12 English Second Language Proficiency Benchmarks, educational practitioners would benefit from authentic samples of students' writing for their own understanding of the writing competencies and deficits that specific students might have. We followed the instructions of the Alberta samples index and the evaluation rationale to achieve the definition of standards and specificities of writing in Portuguese as L2 was the ultimate goal of this project.

All samples, performed by different language groups, indicated different word-errors and sentence constructions which were analyzed to determine expected writing profiles according to written texts, lexicon choice and types of errors. Indo-Aryan languages' speakers showed less command of Portuguese language rules and their sentences and vocabulary features reflected deficits resulting probably from linguistic distance and cross-transferences. First language transference is not observed here as a negative transfer effect, the intent is to observe the amount of L1 information that is transferred and the consequences for the initial stages of L2 learning [4], [37].

The time and sequence markers were mostly identified with simple conjunctions (with no variety) along with little occurrence of different tenses. Some morphological limitations were perceived, but, generally, subject-verb agreement was frequently accurate. Complex sentences were avoided, probably due to the limited proficiency of Portuguese grammar. Descriptive vocabulary was frequently detected.

### C. Data 3. Writing performance and instruction in mother tongue

Hypothesis 2: instruction in a second language would have a positive effect on second language learning (and also bilingualism development).

#### 1) One-Way Analysis of Variance

Through the univariate ANOVAs we presented the differentiated performance results for the writing task according to the L1 parallel instruction variable. The effect sizes were also explored for the groups mean differences but did not differ significantly considering the L1 parallel instruction variable:  $F(1,58) = 2,885$ ,  $p > .05$ ,  $\eta^2 = .047$ . Table 3 shows the means, standard deviations and effect size for the groups determined by home language type.

#### 2) Analyses of Covariance

After the results observed for univariate ANOVAs, a series of Analyses of Covariance (ANCOVA) were performed to answer the new question: does the effect of the three initial variables (L1 type, L1 instruction, and grades) on the writing test remain with low significant results after controlling for the age variable?

Results showed that after controlling the effects for the age variable, significant group differences improved significantly only for the L1 parallel instruction on learners' performance on the writing task:  $F(1,62) = 4,573$ ;  $p < .05$ ,  $\eta^2 = .069$ .

### 3) Percentile Analysis

Percentile estimates confirmed previous statistical results that revealed that writing results were better in the group that received instruction in the home language (mostly Chinese students) in P25 and P75 (7.25 and 14.75 of the classification, respectively) compared to the group who declared receiving no instruction in the home language (P25: 6, P75: 11 of classification, see more detailed data on Table 4).

#### D. Data 4. Writing performance and grades

Hypothesis 3: better writing outputs are expected in higher school levels.

##### 1) One-Way Analysis of Variance

Through the univariate ANOVAs the performance results were displayed for the writing task according to grades. The effect sizes were also explored for the groups mean differences but did not differ significantly considering the grade variable:  $F(3,58) = .668, p > .05, \eta^2 = .033$ . Table 3 shows the means, standard deviations and effect size for the groups determined by home language type.

##### 2) Percentile Analysis

The percentiles obtained for Basic and High School (different groups inside Portuguese Basic School) showed that 1st cycle (3rd and 4th grades) had the highest performance in P25, with a classification of 7, even higher than high school students (6). There was more variety of writing results in the percentile 75 because the more advanced school levels showed better classification (1st grades with 9.75; high school with 18, the maximum, see Table 4).

## VI. DISCUSSION

The current study involves evaluation practice and the analysis of the processing strategies of immigrant students from several levels of education until the age of 17. Conventional rules used in other second languages, such as English or Chinese, are not the same rules to be adopted in Romance languages like Portuguese. A set of multiword, variability of grammar structures and discourse segments should be addressed carefully in a linguistic and also cognitive analysis. To this end, for the writing evaluation we adapted a test from Alberta Education ([education.alberta.ca](http://education.alberta.ca)) and administered it to a large sample of Portuguese L2 learners in order to identify specific traits of written texts and specific profiles. At first, in the present study, we explored and identified, in brief, selected errors in the several samples. Secondly, we explored and discussed, through a sequence of statistical analyses (factorial, ANOVAs, covariance analyses, correlational analyses and a percentile analysis) presented in the previous section, the differentiated performances with regard to the influence of home languages (hypothesis 1), of first language instruction (hypothesis 2), and of grades (hypothesis 3).

#### A. Types of errors and poor writers

The written texts allow us to identify Indo-Aryan speakers as students at risk in language learning and suggest placement issues in language support programs. Speakers of Indo-Aryan

languages showed less command of Portuguese language structures and their sentence frames indicated several deficiencies that are due to linguistic distance and cross-transfer (in the perspective that L1 transfer is not negative transfer, but indicating significant amount of L1 information to decode in L2, in first stages of L2 writing). We found some limitations in this test related to the length of the performances (texts), but all students were encouraged to write free texts with specific episodes and names for people, places and objects in their compositions. Short texts were more frequent in this evaluation task and reflected the level of exposure to L2.

Results (on the analysis of samples and errors) suggest that the diversity of vocabulary and grammar rules was limited for majority of participants. Also, in the cross-transfer domain, we identified specific cases of foreign words (from learner's mother tongue) that were not edited by the writers during the composition, which proves the influence of the home language (with no awareness of that) during the writing-processing task. Subject-verb agreement appeared to be easily acquired by L2 participants in the Portuguese language system. In general, the writing samples of our evaluation study had a simple structure with very few compound sentences (mainly simple conjunctions) and deficit at control over the words and grammar. The more unstructured texts had more descriptive than utility words, as the temporal markers were solely the most evident forms used to organize the narrative events. The errors examined are explained by the storage development that different language users adopt.

As in [37], the competition model, the storage development in a second language evolves by chunking, code switching and adjustments in second languages where errors are stages. Chunking is the combination of words and frames that will be stored in the mental lexicon and changes as the learning advances. Adults and children will process chunks differently and the universal process of syllables and small units' acquisition in a first language, during childhood, will not necessarily be replicated in L2 acquisition. Mapping is distinct in the heads of children and adults. We suppose that older adolescents face more constraints in chunking than younger learners (rejecting hypothesis 3 of the study).

The competition model [37] is useful to comprehend our results because "(...) in production, forms compete to express underlying instructions or functions. In comprehension, functions or interpretation compete on the basis of cues from surface forms" (p. 6). In fact, the relevance of cues is determinant to the competition effect in new acquisitions accomplished in Portuguese language learning. The participants in this study could feel threatened in their coding and decoding processing when identifying the information of functions, such as number or gender, and the extent to which that contributes to the meaning of words and the production of acceptable texts. In English, the preverbal positioning is a relevant cue to understand what options individuals have during decoding, whereas in Portuguese that information has a different function [19].

As in [37], is addressed briefly the differences between Indo-European languages and the importance of resonance in cognition focusing on second language learning. The order of

words is important in the English writing system but not in the same manner for Romance languages like Italian or Spanish, which are essentially prepositional. Different positioning is fully considered in other languages, such as Arabic. These characteristics are important for the resonance effect that underlies the cognitive processing involved in second language acquisition. Individuals have strategies to register (storage) the comprehended inputs to produce “full-independent output” in L2, which implies reporting errors and lack of grammar acceptability.

### *B. Hypotheses and predictors*

Regarding hypothesis 1 there is the assumption that, when placed in a context of second language instruction (Portuguese, in this case), speakers of very distinct language systems (phonologic, semantic, syntactic levels) would struggle and face more disadvantages in the new language acquisition [14], [38], [39]. Accordingly, speakers of Indo-Aryan languages are expected to have more cognitive and proficiency limitations in Romance language decoding, such as the Portuguese language. To explore the effect of the first language and the type of mother tongues spoken by the students (alphabet, language family, grammar principles, phonetics, cognates) on writing performance, the results obtained (mainly the Percentile Analyses) partially reject our hypothesis. Considering the argument of linguistic distance [14], Indo-Aryan speakers denoted more limited proficiency during the writing task, as expected. The results are consistent with those obtained as in [4], [14], [40]. However, Afro-asiatic and Chinese students presented higher results, similar to Romance languages’ speakers. Linguistic distance could not be solely the reason (Hulstijn, Young, Ortega et al., 2014). The type of home language would be the predictor, not the distance between phonological and writing systems [38].

According to hypothesis 2 of this study, continued instruction in the home language parallel to second language instruction showed to be (covariance and percentile analyses) an advantage for bilingual language development, confirming the hypothesis [4], [41], [42]. The group receiving home language instruction at school showed more writing strategies than peers who did not receive that instruction. The age variable as a covariate showed that parallel instruction in mother tongue has impact for performance improvement. This study replicates principles of interdependence model [43] and these results will be further analysed when the empirical study is concluded in all schools, but they already suggest new insight for second language research with implications for new methodologies to be adopted by schools (maintaining instruction in home languages, empowering writing skills as bilingual [21]).

With regard to hypothesis 3, the association between quality of narrative composition and school grades suggested non-linear results because better results are expected in higher school levels considering older students (more abstractness skills for writing composition), on the other hand this hypothesis was found to be no reliable probably compromised by lack of linguistic structures of individuals that should be learned in early years (of age and school instruction). Contrary to this, and replicating insights from the earlier study as in [44],

the youngest participants had more positive outputs, which might suggest better predisposition and attention to writing processes related to young ages.

The compositions were more complete regarding the dimensions assessed, despite poor vocabulary, predictable as a disadvantage for a child’ knowledge in second language [45], [46]. Considering the values obtained in general, the writing samples showed low performance in Portuguese L2, as expected, considering no long period of exposure to L2. The hypothesis was partially confirmed due to the variety of results across the percentiles and attending to the absence of significant statistical data displayed by analyses of variance. Additionally, previous instruction in schools of home countries would be a positive predictor for L2 development once the learners adopt certain academic abilities that could be transferred [43].

From another perspective, considering the years of schooling in the countries of origin, these immigrant students showed differences that should be outlined [47], [48]. Students with no schooling experience in their home country performed better in P25 (7.5) and P75 (13) than others exposed to Portuguese school instruction only (with a classification between 4.25 and 6 in P25). Similar values were found in those who were exposed to schooling and those who started their education in Portugal with regard to P25, with the exception of high schools students who produced narratives that attained a higher score in P25 (13 points), but the same score (13) in P75, the same as the grade obtained by the group who started schooling in their countries of origin. These results confirmed the influence of exposure to language correlated to previous years of schooling in the country of origin, approached in past studies [5], despite the fact that this variable is not strongly and completely accounted in L2 acquisition factors examination.

Further investigation on writing characteristics, observing grammar acceptability, vocabulary frequency, syntactic norms, and pragmatics should be conducted in Romance languages as a second language. There is major scientific evidence regarding English as a second language and performance of new learners in English speaking countries, mainly from non-European countries [14]. Given the fact that Portuguese is a well-known language in several countries worldwide, and the increase of tuition fees (mainly in universities [2]) in Portuguese language, Romance languages as second languages might be a strong subject for future studies.

The statistical results for all the hypotheses proposed reinforce the need to conduct more studies about the writing predisposition and profiles of immigrant students in this scenario. The scores observed, based on the six dimensions of the writing test, will guide the definition of cut-off and profiles of proficiency. Immigrant students, in romance languages learning contexts, need to have more reliable indicators of proficiency levels not restricted to European benchmarks [49] and the proficiency construct itself should be reviewed. Most cases showed no complete proficient learners in the Portuguese language, as expected. The 25th percentile was established as the minimum to identify low performers and showed values mostly positioned in the 6 classification (with exception of school levels as a variable for differentiated writing

performance), which we defined as “elementary” level (computation of the six components evaluated with 1 point each - see detailed information in the instrument section). One of the main results of this study, with implications for instruction in new languages learning and for adaptation of school populations, was the effect of parallel instruction in home language for the L2 writing performance. More instruction for home languages of students should be encouraged as proven as an advantage for performance improvement.

Further analysis will be made along this project research to determine new marks in L2 studies and new scientific evidence addressing writing and other contexts. Teachers will be provided with examples and evaluation standards of student writing to determine profiles (language groups’ characteristics) and offer new understanding of the writing strategies and specificities of second language learners. Those specificities consider a context of second language different from the English L2 one, and useful validated data for teachers and students from larger contexts and other languages involved in L2 area will be provided. Scientific projects in the field of foreign language learning should create new assessment and learning tools, and even be encouraged to adapt important investigation instruments in English as a L2.

#### ACKNOWLEDGMENT

This research was sponsored by the Foundation for Science and Technology (FCT) and by the Center of Psychology Research of Universidade Autónoma de Lisboa, Lisbon, Portugal.

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