

ORTHOGRAPHIC PERFORMANCES
IN A PORTUGUESE PRIMARY SCHOOL:
A LONGITUDINAL STUDY
IN THIRD AND FOURTH GRADES

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Abstract. This study aims to understand if children's spelling errors vary according to their orthographic performances and their grade level. It also aims to understand the way in which children's awareness of orthography rules relates to their performance. The participants were forty-three children (24 boys and 19 girls) attending the third grade and, the following year, the fourth grade in a Lisbon public school. They were given a spelling task in third grade and again in fourth grade and their spelling errors were compared. In fourth grade, the types of error of good and poor spellers were compared. Interviews were conducted to determine if the level of awareness of orthographic rules differed according to the children's orthographic performance. The results show that the number of errors decreased from the third to the fourth grade and that there are differences in the types of error made by participants with higher and lower orthographic performances. There were no statistically significant differences between these two groups concerning their awareness of orthographic rules.

Key Words: orthographic errors, orthographic performance, orthographic representations, explicitation levels, spelling.

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Chinese

[Translation Shek Kam Tse]

有关葡萄牙小学三、四年级学生正字表现纵向研究

摘要：本研究旨在了解儿童拼写错误是否根据其正字表现以及年级水平而变化，并了解儿童正字规律意识与其表现的关系。研究参与者为43位在里斯本公立学校就读三年级的学生（24男童，19女童），他们在接着的一年升入四年级。研究者在学生就读三年级和四年级两个阶段都分别布置了拼写任务，并对其拼写错误。在四年级对好的和差的拼字者的错误类型作比较。研究者进一步对参与学生进行采访，调查对正字规律意识水平是否因儿童的正字表现而不同。研究结果显示拼写错误从三年级向四年级减少；正字表现较高和较低者所犯错误类型存在不同；两组在正字规律意识方面没有显著差异。

关键词：正字错误，正字表现，正字表示法，显化水平，拼写

Dutch

[Translation Tanja Janssen]

TITEL. Orthografische vaardigheden in een Portugese basisschool. Een longitudinaal onderzoek in het derde en vierde leerjaar.

SAMENVATTING. Doel van dit onderzoek is na te gaan of spelfouten van kinderen variëren al naar gelang hun orthografische vaardigheden en hun leerjaar. Daarnaast heeft het ten doel inzicht te krijgen in de wijze waarop bewustzijn van orthografische regels gerelateerd is aan spelvaardigheid. Aan het onderzoek namen 43 kinderen deel (24 jongens en 19 meisjes) uit het derde leerjaar, en daarna, het vierde leerjaar op een openbare school in Lissabon. In het derde jaar kregen zij een spellingstaak en opnieuw in het vierde leerjaar en hun spelfouten werden vergeleken. Voor het vierde leerjaar werden spelfouten van sterke en zwakke spellers met elkaar vergeleken. Interviews werden afgenomen om te bepalen of de mate van bewustzijn van orthografische regels verschilde al naar gelang de orthografische vaardigheden van de kinderen. Resultaten laten zien dat het aantal spelfouten afnam van het derde naar het vierde leerjaar en dat er verschillen zijn in het type fouten dat kinderen met een goede en zwakke spelvaardigheid maakten. Er waren geen statistisch significante verschillen in bewustzijn van orthografische regels tussen deze twee groepen.

TREFWOORDEN: Orthografische fouten, orthografische vaardigheid, orthografische representaties, spelling.

Finnish

[Translation Katri Sarmavuori]

TITTELI. ORTOGRAFISET SUORITUKSET PORTUGALIN PERUSKOULUSSA: KOLMANSIEN JA NELJÄNSIEN LUOKKIEN PITKITTÄISTUTKIMUS

ABSTRAKTI. Tämän tutkimuksen tarkoituksena on ymmärtää, vaihtelevatko lasten kirjoitusvirheet heidän oikeinkirjoitussuoritustensa ja luokka-asteensa mukaan. Sen tarkoituksena on myös ymmärtää tapaa, jolla lasten tietoisuus oikeinkirjoitussäännöistä on yhteydessä heidän suoritukseensa. Osallistujia oli 43 lasta (24 poikaa ja 19 tyttöä) kolmannelta luokalta, joita seurattiin seuraavana vuonna neljännellä luokalla Lissabonin peruskoulussa. Heillä oli oikeinkirjoitustehtävä kolmannelta luokalla ja edelleen neljännellä luokalla ja kirjoitusvirheitä verrattiin. Neljännellä luokalla hyvien ja huonojen kirjoittajien virhetyyppejä verrattiin. Haastatteluilla selvitettiin, eroaako oikeinkirjoitussääntöjen tietoisuus lasten oikeinkirjoitussuoritteesta. Tulokset osoittavat, että virheiden määrä väheni kolmannelta luokalta neljännelle luokalle ja että hyvät ja huonot kirjoittajat tekevät erityyppisiä virheitä. Näiden kahden ryhmän välillä ei ollut tilastollisesti merkitseviä eroja oikeinkirjoitussääntöjen tuntemukseen nähden.

AVAINSANAT: Oikeinkirjoitusvirheet, oikeinkirjoitussuoritus, oikeinkirjoitusrepresentaatiot, selitystasot, oikeinkirjoitus.

French

[Translation Laurence Pasa]

TITRE. LES PERFORMANCES ORTHOGRAPHIQUES DANS UNE ÉCOLE PRIMAIRE PORTUGAISE : ÉTUDE LONGITUDINALE EN CLASSE DE TROISIÈME ET QUATRIÈME ANNÉE

RÉSUMÉ. Cette étude tente de voir si les erreurs d'écriture des enfants varient selon leurs performances orthographiques et leur niveau de classe. Elle vise également à comprendre le lien entre la conscience qu'ont les enfants des règles orthographiques et leurs performances. La population se compose de quarante-trois enfants (24 garçons et 19 filles) en troisième année et, l'année suivante, en quatrième année dans une école publique de Lisbonne. On leur a donné une tâche d'écriture en troisième année, puis de nouveau en quatrième, et leurs erreurs ont été comparées. En quatrième année, les types d'erreur des bons scripteurs et des faibles scripteurs ont été comparés. Des entretiens ont été conduits afin de déterminer si le niveau de conscience des règles orthographiques a différé selon la performance orthographique des enfants. Les résultats montrent que le nombre d'erreurs a diminué du tiers en quatrième année et qu'il y a des différences dans les types d'erreur commises par les sujets dont la performance orthographique est la plus élevée ou la plus faible. Statistiquement, il n'y a pas de différences significatives entre ces deux groupes concernant leur conscience des règles orthographiques.

MOTS-CLÉS : erreurs orthographiques, performance orthographique, représentations orthographiques, niveaux explicatifs, écriture.

German

[Translation Ulrike Bohle]

TITEL. Rechtschreibleistung in einer portugiesischen Primarschule: Eine Longitudinalstudie in einer dritten und vierten Klassenstufe

ZUSAMMENFASSUNG. Die Studie untersucht, ob Rechtschreibfehler von Kindern mit ihrer Rechtschreibleistung und mit der Klassenstufe variieren, sowie den Zusammenhang zwischen orthographischer Bewusstheit und Rechtschreibleistung. Untersucht wurden 43 Kinder (24 Jungen und 19 Mädchen), die im ersten Untersuchungsjahr eine dritte, im darauf folgenden Jahr eine vierte Klasse einer öffentlichen Schule in Lissabon besuchten. In der dritten und in der vierten Klasse wurde ihnen eine Rechtschreibaufgabe gestellt und ihre Rechtschreibfehler wurden verglichen. In der vierten Klasse wurden zusätzlich die Fehlertypen von starken und schwachen Schülern miteinander verglichen. Um herauszufinden, ob der Grad der orthographischen Bewusstheit sich je nach der orthographischen Performanz unterscheidet, wurden Interviews durchgeführt. Die Ergebnisse zeigen einen Rückgang der Fehlerzahl von der dritten zur vierten Klassenstufe sowie unterschiedliche Fehlertypen bei Schülern mit hoher gegenüber solchen mit niedriger Rechtschreibleistung. Hinsichtlich ihrer orthographischen Bewusstheit zeigten beide Gruppen keine statistisch signifikanten Unterschiede.

SCHLAGWÖRTER: Rechtschreibfehler, Rechtschreibleistung, orthographische Repräsentationen, Erklärungsniveaus, Rechtschreiben

Greek

[Translation Panatoya Papoulia Tzelepi]

Τίτλος. Ορθογραφική επίδοση σε ένα Πορτογαλικό δημοτικό σχολείο: Μια διαχρονική μελέτη στην Τρίτη και Τετάρτη τάξη

Περίληψη. Ο σκοπός αυτής της μελέτης είναι να κατανοήσει αν τα ορθογραφικά σφάλματα των παιδιών ποικίλουν ανάλογα με τις ορθογραφικές τους συμπεριφορές και το επίπεδο της τάξης τους. Επίσης επιδιώκει να κατανοήσει πώς η επίγνωση των ορθογραφικών κανόνων σχετίζεται με τις συμπεριφορές τους. Οι συμμετέχοντες ήσαν 43 παιδιά (14 αγόρια, 19 κορίτσια) μαθητές της Τρίτης και στην συνέχεια της Τετάρτης τάξης σε ένα δημοτικό σχολείο της Λισαβόνας. Τους δόθηκε ένα test ορθογραφίας στην Τρίτη και πάλι στην Τετάρτη τάξη και τα ορθογραφικά τους λάθη συγκρίθηκαν. Στην Τετάρτη τάξη, το είδος των σφαλμάτων των καλών και των αδύνατων στην ορθογραφία, συγκρίθηκαν επίσης. Πραγματοποιήθηκαν συνεντεύξεις για να διαπιστωθεί εάν το επίπεδο επίγνωσης των ορθογραφικών κανόνων διέφερε ανάλογα με την ορθογραφική επίδοση των παιδιών. Τα αποτελέσματα δείχνουν ότι ο αριθμός των λαθών μειώνεται από την Τρίτη στην Τετάρτη τάξη και ότι υπάρχει διαφορά στον τύπο των σφαλμάτων ανάμεσα στους καλύτερους και πιο αδύνατους στην ορθογραφία. Δεν υπάρχει στατιστική διαφορά μεταξύ αυτών των δύο ομάδων ως προς την επίγνωση των ορθογραφικών κανόνων.

Λέξεις κλειδιά: ορθογραφικά σφάλματα, ορθογραφική επίδοση, ορθογραφικές αναπαραστάσεις

Italian

[Translation Manuela Delfino, Francesco Caviglia]

TITOLO. Le prestazioni in ortografia in una scuola primaria portoghese: uno studio longitudinale nelle classi terza e quarta.

SOMMARIO. L'obiettivo di questo studio è capire se gli errori di ortografia dei bambini variano in base alla loro prestazione in prove di ortografia e alla loro classe. Questo studio si pone anche l'obiettivo di capire il modo in cui la consapevolezza da parte dei bambini delle regole ortografiche sia collegata ai loro risultati. I partecipanti erano 43 bambini (24 maschi e 19 femmine) iscritti alla classe terza e, l'anno successivo, alla classe quarta di una Scuola pubblica di Lisbona. Quando erano nella classe terza ai bambini è stato dato un compito di scrittura che gli è stato proposto nuovamente nell'anno successivo e si è fatto un confronto tra gli errori di ortografia. Nella classe quarta si è fatto un confronto tra gli errori degli alunni bravi nelle prove di ortografia e di quelli più deboli. Sono state fatte delle interviste per determinare se il livello di consapevolezza delle regole ortografiche vari in base alle performance ortografiche dei bambini. I risultati mostrano che il numero di errori decresce tra la terza e la quarta classe e che ci sono differenze nel tipo di errori fatti dai partecipanti che hanno alte o basse prestazioni nelle prove centrate esclusivamente sull'ortografia. Non ci sono differenze statisticamente significative tra i due gruppi in base alla consapevolezza delle regole ortografiche.

PAROLE CHIAVE: errori ortografici, prestazioni in ortografia, rappresentazioni ortografiche, livelli di consapevolezza, spelling.

Polish

[Translation Elżbieta Awramiuk]

TITUŁ. Umiejętności ortograficzne w portugalskiej szkole podstawowej: długoterminowe badania w trzeciej i czwartej klasie

STRESZCZENIE. Niniejszy artykuł koncentruje się na zrozumieniu, czy dziecięce błędy w pisaniu różnią się w zależności od sprawności ortograficznej i stopnia edukacji. Chcemy także wyjaśnić, w jaki sposób świadomość ortograficzna dzieci wiąże się z ich sprawnością ortograficzną. W badaniach uczestniczyło 43 dzieci (24 chłopców i 19 dziewczynek) uczęszczających do trzeciej klasy i – w następnym roku – do klasy czwartej publicznej szkoły w Lizbonie. Wykonali oni zadania pisemne w klasie trzeciej i czwartej, a zebrane wyniki zostały porównane. W klasie czwartej porównano typy błędów uczniów dobrych i słabych. Przeprowadzono też wywiady, by sprawdzić, czy poziom wiedzy o regułach ortograficznych wiązał się z ortograficznymi umiejętnościami dzieci. Wyniki pokazują, że wiele błędów znika między klasą trzecią a czwartą i istnieją różnice w typach błędów między uczniami słabymi i dobrymi. Nie było statystycznie istotnych różnic między dwiema grupami pod względem znajomości zasad ortograficznych.

SŁOWA-KLUCZE: błędy ortograficzne; sprawność ortograficzna; wyobrażenia na temat ortografii; poziomy znajomości (ortografii); pisownia

Portuguese

[Translation Sara Leite]

TÍTULO. DESEMPENHOS ORTOGRÁFICOS NUMA ESCOLA PORTUGUESA DO 1.º CICLO: UM ESTUDO LONGITUDINAL NO TERCEIRO E QUARTO ANO

RESUMO. Com este estudo procurou-se aferir se os erros ortográficos das crianças variam consoante os seus desempenhos ortográficos e o ano escolar em que se encontram. Procurou-se, ainda, compreender a relação entre o conhecimento que as crianças têm das regras ortográficas e o seu desempenho. Os participantes foram quarenta e três crianças (24 meninos e 19 meninas), que frequentavam o terceiro ano do ensino básico e, no ano seguinte, o quarto ano, numa escola pública de Lisboa. Foram submetidos a uma tarefa de ditado no terceiro ano e novamente no quarto ano, e os seus erros ortográficos foram comparados. No quarto ano, compararam-se ainda os tipos de erros entre as crianças com melhor e com pior desempenho ortográfico. Realizaram-se entrevistas para avaliar em que medida o grau de conhecimentos sobre as regras ortográficas variava de acordo com os desempenhos ortográficos das crianças. Os resultados mostram que o número de erros diminuiu do terceiro para o quarto ano e que existem diferenças entre os tipos de erros cometidos por participantes com melhores desempenhos ortográficos e por participantes com piores desempenhos ortográficos. Não se verificaram diferenças estatisticamente significativas entre ambos os grupos no que respeita ao seu conhecimento sobre as regras ortográficas.

PALAVRAS-CHAVE: erros ortográficos, desempenho ortográfico, representações ortográficas, níveis de explicitação, ortografia.

Spanish

[Translation Ingrid Marquez]

TÍTULO. EL DESEMPEÑO ORTOGRÁFICO EN LAS ESCUELAS PRIMARIAS PORTUGUESAS: UN ESTUDIO LONGITUDINAL EN TERCERO Y CUARTO GRADOS

RESUMEN. Este estudio pretende determinar si los errores ortográficos de los niños varían de acuerdo con su desempeño ortográfico y su nivel escolar. También pretende esclarecer cómo la conciencia infantil de las reglas ortográficas influye en este desempeño. Los participantes fueron cuarenta y tres niños (24 niños y 19 niñas) de tercer grado y, al siguiente año, de cuarto grado en una escuela pública de Lisboa. Se les dio una actividad de ortografía en tercero y otra vez en cuarto, para comparar los errores cometidos. Además, se compararon el tipo de errores que cometieron los estudiantes de cuarto año que se consideraban buenos y malos para la ortografía. Se hicieron entrevistas para determinar si el nivel de conciencia de las reglas ortográficas difería según el desempeño de los niños en este contexto. Los resultados mostraron un menor número de errores de tercero a cuarto y que hubo diferencias en el tipo de errores que cometieron los participantes conocidos por su alta o baja habilidad ortográfica. No hubo diferencias estadísticamente significativas entre los dos grupos con respecto a su conciencia de las reglas ortográficas.

PALABRAS CLAVE: Errores ortográficos, desempeño ortográfico, representaciones ortográficas, niveles de explicitación, ortografía.

1. INTRODUCTION

In contrast to oral language, written language and, more specifically, orthography, requires formal learning of standard rules. The understanding of the inherent processes behind orthography learning can assist us in adjusting educational strategies that promote spelling development. One of the aspects to consider is how the different writing systems – that are used to encode oral into written language – influence learning how to spell. Downing (1973) compared the writing systems used in fourteen countries and concluded that there are differences in the writing systems that influence spelling development. Two of the characteristics that differentiate the writing systems are the following:

1. Alphabetical systems (e.g., the Portuguese language) are more difficult to learn than syllabic systems (e.g., the Japanese kana) and still more difficult than logographic systems (e.g., Chinese) when it comes to abstraction and reflection skills about oral and written language, despite the fact that alphabetic codes demand less memorization than logographic systems.

2. The relationship between speech and writing is mediated by complex rules. For example, in transparent or shallow systems one grapheme corresponds only to one phoneme, as in Finnish (Seymour, Aro & Erskine, 2003), in opaque systems, as in Chinese, writing gives no indication of the pronunciation and in intermediate systems (the majority of the alphabetical systems), the phoneme– grapheme correspondence is irregular. That is, in intermediate systems one letter may be converted into more than one phoneme or one phoneme may be converted into more than one letter. According to Fernandes, Ventura, Querido and Morais (2007), in European Portuguese 18 consonantal phonemes are represented by 29 graphemes.

The complex rules that govern alphabetical systems imply that knowledge of phonology alone is not sufficient for a standard written representation of speech; it is also necessary to take into account other structural aspects of language. Specifically, we need to take into account morphology (Fayol & Jaffré, 1999; Jaffré & Fayol, 1997; Perfetti, 1997), lexicon criteria (Barbeiro, 2007), grammar (Bousquet, et al., 1999; Jaffré & Fayol, 1997) and syntax (Barbeiro, 2007; Jaffré & Fayol, 1997; Mousty & Alegria, 1999). In addition, orthography reveals "hidden" ways of coding language that phonology cannot unravel. For example, as in the case of homophonous words, where spelling is going to distinguish what can be confused orally (Jaffré & Fayol, 1997), e.g., *cozer/cozer* [boil/sow] ([kuzér]) or *conselho/congelho* [advice/township] ([kõselu]).

These variations suggest that learning the rules that link oral to written language demands a high level of conscious reflection that encompasses three aspects: a reflection about oral language, a reflection of written language and a reflection about the relations between both (Alves Martins & Niza, 1998). This conscious reflection, in an alphabetical system, requires the analysis of the sounds of language to the phoneme level, or, in other words, the development of phonemic awareness. According to Gombert (1990) phonological awareness is the ability to identify and deliberately manipulate the phonological components of linguistic units and the ability to manipulate them – in this case, to the phoneme level. In short, the ability to perceive that words are made up of sounds - the phonemes - and that those phonemes have corresponding graphemes.

Several authors have recognized the role of phonological awareness in learning how to spell and it is now widely accepted that the ease with which children learn phoneme - grapheme correspondences is strongly dependent on their phonological awareness (Nunes, Bryant & Bindman, 1997). In addition, Morais and Teberosky (1994), refer to other factors that influence learning how to spell, such as oral dialect (writing a word as it is spoken) and experience with print. Both exposure to print outside of school and formal education have a positive impact on orthographic processing. That is, a child's progressive reading experience will positively affect spelling development. However, this progression is dependent on the orthographic depth of the written code they are learning (Seymour, et al., 2003).

When it comes to writing and reading, several authors (Baron, Bryant & Bradley, Frith, cit. by Sousa, 1999, and Seymour & Porpodos, cit. by Sousa, 1999; Valle Arroyo, 1989) stress the fact that we must consider a double route model. Orthographic processing encompasses a double strategy, or double route: a phonological route and a lexical route, which may be used independently or in interaction. With respect to writing, Ehri (1997) suggests a triple route in the retrieval of orthographic knowledge: memory is used to write familiar words whereas non-familiar words are invented or written through analogies (access to a familiar word in reference to an analogous pronunciation pattern stored in lexical memory, retrieval of the correct letters and invention of the missing ones).

Bousquet, et al. (1999), on the other hand, refer to "cognitive worlds", where writing is the result of the use of cognitive processes that depend on representations of writing and orthography. This means that orthography demands an orthographic

awareness and results in a metalinguistic path that reflects itself in the ability to represent those representations verbally.

In this sense, Karmiloff-Smith (1995) states that knowledge is progressively re-described into increasingly explicit representations – Representational Redescription –, explaining how conscious access to specific knowledge arises and how children build their theories (Karmiloff-Smith, 1992). In her model (Karmiloff-Smith, 1986, 1992, 1995) the author defines four levels of representational redescription and explicitation: Implicit knowledge (level I), Primary explicitation (level E1), Secondary explicitation (level E2) and Tertiary explicitation (level E3).

Thus, in level I, implicit knowledge is not defined representationally, e.g., different procedures with common components are not explicitly represented internally (Karmiloff-Smith, 1986) and are not cognitively available (Karmiloff-Smith, 1992).

Level E1, a level I redescription, has explicit representations that may be manipulated and related with other representational redescriptions, setting and representing internally potential relations between level I procedures. However, level E1 knowledge is not yet available for metalinguistic reflection or verbalisation (Karmiloff-Smith, 1995). In level E2, representations are now directly accessible to consciousness, but, since these representations are E1 representational redescriptions, in a similar representational code, they do not have yet verbal expression so, as Pine and Messer (1999) stress, level E2 is difficult to identify. Only in level E3, that represents a redescription from the previous level representations into a more abstract code, these representations become explicit (Karmiloff-Smith, 1986).

So, Karmiloff-Smith argues that “the prerequisite of fundamental macro-developmental change, in the form of progressive explicitation and restructuring of representational relationships, is “success” (...) » (1986, p.100).

Despite the level of explicitation, when it comes to orthographic knowledge, children’s representations and theories about a word’s spelling – the orthographic lexicon (Morais, 1997) – may be reflected in their writing. Therefore, children’s errors allow us access to their representations about the correct spellings (Read, 1975 cit. in Ferreiro & Teberosky, 1979,) and must be regarded, according to Jaffré (1990), not as a deficit of knowledge of standard rules, but as a manifestation of intellectual work. In fact, Köhler (1993) suggests that educators should help induce “orthographic doubt” in children so that they, when confronted with different spellings of the same word, can be led to reflect about the correct spellings. In this scenario, social interactions assume great importance in learning and mastering orthography (Almeida, Guerreiro & Mata, 1998), since they will help the child build correct representations about spelling, promoting a conscious access to knowledge and to its verbalisation.

In sum, children’s spelling development is influenced by the complexity of the writing system and by children’s experiences with print. This complexity influences children’s representations about orthography.

So, how do children spell? What kind of errors do they make and how do their errors evolve? This study aims to understand if children’s spelling errors vary according to their orthographic performances and their grade level and aims to describe the way in which their knowledge about orthography rules may relate to their orthographic performance. Accordingly, the hypotheses stated were the following:

Hypothesis 1: The number of errors given in a spelling task will differ according to the participants' grade level (3rd and 4th), the latter making fewer spelling errors.

Hypothesis 2: The types of errors given in a spelling task will be different, according to the participants' grade level.

Hypothesis 3: The types of errors given in a spelling task, in fourth grade, will be different according to the children's orthographic performances.

Hypothesis 4: Participants with better orthographic performances at the fourth grade level will be more able to verbalise orthographic rules than participants with lower orthographic performances.

2. METHOD

A longitudinal study was conducted to analyze the spelling development of the same group of children regarding the type of orthographic errors given in a spelling task when they were in the third and in the fourth grades. It is also a differential study as it compares the differences in the types of orthographic error, according to grade level (3rd and 4th grades) and orthographic performance (better and lower performances).

2.1 *Participants*

The participants were forty three children (24 boys and 19 girls), that attended the third grade (mean age: 8,4) and the following year the fourth grade (mean age: 9,8) of Primary Education in a Lisbon's public school, which may be characterized as belonging to an average socio-economic level. In order to verify hypotheses 1 and 2, the number and type of orthographic errors given in a spelling task were compared for all the participants (43 students) at the third and fourth grade levels. To verify hypotheses 3 and 4 the spelling errors' distribution at the fourth grade was analysed. Only participants in the 1st quartile (0 to 4 errors given in the spelling task) and in the 3rd quartile (13 to 29 errors) were considered. Thus, Group 1 had 12 children with better orthographic performances (considered as good spellers) and Group 2 had 12 children with lower orthographic performances (considered as poor spellers).

2.2 *Instruments*

To evaluate the types of orthographic error, children of both grades were asked to participate in a spelling task. We used a Sophia de Mello Breyner Andresen's text, entitled "A Praia" ("The beach", see Appendix A).

In order to assess the level of explicitation of the orthographic rules, we chose a list of words that children knew how to write correctly in the spelling task. The spelling of those words is dictated by explicit orthographic rules. The nine words

chosen were presented to the participants in their correct orthographic forms and written with errors that violate the orthographic rules in question (it was said that they were written by some other child) (Appendix B). Subsequently, each child was asked by the researchers to identify the errors and to say why he/she thought those errors were made.

The individual interviews were tape recorded and then transcribed. Prior to the interviews, a pre-test was carried out with some children of the same grade that had not taken part of the study in order to verify if the task was understandable.

To compare the number of errors given by the children in the third and fourth grades, a t-test for repeated measures was used. We classified the errors according to the following typology, inspired in studies from Girolami-Boulinier (cit. in Pinto, 1998), Morais and Teberosky (1994), Sousa (1999) and Valle Arroyo (1989):

- "Orthographic" - errors where phoneme-grapheme correspondences would be possible in other contexts, but in the context of the specific word, change its oral form (e.g. "posas" - [pɔzɔf] instead of "poças" - [pɔsɔf]).
- "Phonetic – type 1" - errors that conserve the oral form of the word (e.g. "Dezerta" instead of "deserta" - [dɛzɛrtɔ] or "avia" instead of "havia" - [avíɔ]).
- "Phonetic – type 2" - errors where phoneme-grapheme correspondences is incorrect, changing the oral form of the word (e.g. "Maravinhosos" – [maraviɔzɔf] instead of "maravilhosos" - [maravilɔzɔf]).
- "Incorrect segmentations" - errors due to incorrect segmentations of words in speech (e.g. "Quevinham" instead of "que vinham" – [kɛ víɔw] or "a pareciam" instead of "apareciam" – [apɛrɛsiɔw]).
- "Inflection of Gender or Number" - errors given by substitution of gender or number of the word (e.g. "cobertos" - [kubértɔf] instead of "cobertas" - [kubértɛf] or "rocha" – [Rɔʃɔ] instead of "rochas" - [Rɔʃɔf]).
- "Unrecognisable words" - errors that do not permit the recognition of the word (e.g. "pertra" – [pɛtrɔ] or "sima" – [simɔ]).
- "Others" - other types of errors that did not fit in the previous categories.

For the analysis of hypotheses 1 and 2 non-parametric statistical tests were used – the Wilcoxon signed-ranks test for examining differences in the types of error between grades and the Mann-Whitney test for examining the differences in the types of error given according to the orthographic performances in the fourth grade (hypothesis 3).

As for hypothesis 4, children's answers were categorised based on Karmiloff-Smith's levels of explicitation as referred to in her Representational Redescription model (1986; 1992; 1995). However, since our data did not allow a clear distinction between levels E1 and E2 our categories encompass only three types of answer:

- 1) Type 1 answers - the answer does not refer to the specific errors or when it does, does not justify them. Examples:

"Kids usually misspell because the teacher dictates fast. Then they write fast and don't think about what they are writing, if they did, they would write correctly";

"I don't know";

"Because they like the beach very much ..."

- 2) Type 2 answers - the errors are identified, but the justification does not specify the rule or the reason why the word can not be written in that form. Examples:

(Longe/longue – [lɔ̃ʒə]/[lɔ̃gə]) "Because *longue*..., There are words that are written with gue and others with ge".

- 3) Type 3 answers - the orthographic rule or the reason why the word can not be written in that form is clearly specified. Examples:

(marvilhosos/marvilhozos - [mɑ̃ʁaviʎɔzɔʃ]) "Here the *s* has the same sound that *z* because it is between two vowels and they perhaps think it's with a *z*.";

(transparente/transparente – [trɑ̃ʁɛtə]) "*M* also sounds alike, but you can only write it before *p* or *b*".

Since there was no homogeneity of variance between the two groups in the different categories, the Mann-Whitney test was used for the analysis of these data.

3. RESULTS

The number of errors given by the participants at the third and the fourth grade levels decreased from 580 errors in the third grade to 410 errors in the fourth grade. Table 1 presents the mean, standard-deviation, *t* values and *p* values concerning the errors in the third and the fourth grades. As we can see in Table 1 there are statistically significant differences between the number of errors in the third and in the fourth grades ($t=3.74$; $p=0.001$).

Table 1. Third and fourth grade errors: mean, standard-deviation, t and p values

Number of errors	<i>M</i>	<i>SD</i>	<i>t</i>	<i>p</i>
3rd grade	13.49	8.59	3.74	.001
4th grade	9.53	7.34		

When it comes to the types of error, Table 2 presents the mean and standard-deviation values for the different types of error given in different grades.

Clearly, all types of error, except the ones from the "Others" category, are more frequent in the third grade than in the fourth grade. The Wilcoxon test reveals that there are statistically significant differences between both grades in all categories, except for the "Incorrect Segmentations", "Inflection of Gender or Number" and "Others" categories: "Orthographic" ($Z=-2,921$; $p= 0,003$); "Phonetic – type 1" ($Z= -2,419$; $p= 0,016$); "Phonetic – type 2" ($Z= -2,885$; $p= 0,004$) and "Unrecognisable

words” ($Z = -1,983$; $p = 0,047$). Since the number of errors in both grades differs, the proportion of errors given by each of the participants was calculated. Their mean and standard-deviation values are presented in Table 3.

Table 2. Mean and standard-deviation values of the type of errors in the third and in the fourth grades

Error categories	O		F1		F2		IS		IGN		UW		OT	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
3rd grade	4.63	3.26	4.95	3.58	2.14	2.46	.21	.47	.33	.78	.30	.91	.47	1.42
4th grade	3.42	3.10	3.81	3.42	1.05	1.43	.19	.67	.30	.71	.02	.15	.54	1.10

O – Orthographic; F1 – Phonetic - type 1; F2 – Phonetic - type 2; IS-Incorrect Segmentations; IGN – Inflection of gender or number; UW – Unrecognizable words; OT – Others

Table 3 - Mean and standard-deviation values of the types of error proportions in the third and in the fourth grades

Error categories	O		F1		F2		IS		IGN		UW		OT	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
3rd grade	.33	.15	.44	.23	.13	.10	.01	.03	.02	.03	.01	.03	.03	.10
4th grade	.38	.25	.44	.29	.10	.14	.01	.03	.02	.07	.00	.01	.03	.06

O – Orthographic; F1 – Phonetic - type 1; F2 – Phonetic - type 2; IS-Incorrect Segmentations; IGN – Inflection of gender or number; UW – Unrecognizable words; OT - Others

As we can see in Table 3, the proportion of errors given by the participants in both grades is almost the same in several categories. The Wilcoxon test shows that there are no significant differences between both grades in any of the categories.

Hypothesis 3 intended to verify if the types of error given in the spelling task, in the fourth grade, differ according to the children’s orthographic performance. Mean and standard-deviation were calculated for the different types of error given by participants with better and with lower orthographic performances. As Table 4 indicates, participants with better orthographic performance only make errors of the "Phonetic - type 1" and the "Orthographic" categories, the latter having a slightly inferior mean value. In contrast, participants with lower orthographic performances make errors in

all the categories, despite the very low mean value of the "Unrecognisable Words" category. In addition, the "Phonetic - type 1" category mean value is higher than the "Orthographic" category's in both groups. The Mann-Whitney test reveals that there are statistically significant differences in the following categories: "Orthographic" ($Z = -4,308$; $p = 0,000$), "Phonetic - type 1" ($Z = -4,552$; $p = 0,000$); "Phonetic - type 2" ($Z = -3,423$; $p = 0,001$), "Incorrect Segmentations" ($Z = -2,422$; $p = 0,015$), "Inflection of Gender or Number" ($Z = -2,736$; $p = 0,006$) and "Others" ($Z = -3,060$; $p = 0,002$). Hence, the proportion for each type of error was calculated by dividing the number of errors given by each participant on each one of the categories by the total number of errors given by him/her. Subsequently, mean and standard-deviation were calculated and are presented in Table 5.

Table 4. Mean and standard-deviation values of the types of error according to orthographic performance in the fourth grade

Error categories	O		F1		F2		IS		IGN		UW		OT	
	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
G1	1.00	1.13	1.33	1.15	0	0	0	0	0	0	0	0	0	0
G2	6.50	3.42	7.92	3.18	2.25	1.66	.67	1.15	.50	.52	.08	.29	1.58	1.56

O – Orthographic; F1 – Phonetic - type 1; F2 – Phonetic - type 2; IS-Incorrect Segmentations; IGN – Inflection of gender or number; UW – Unrecognizable words; OT – Others; G1 – Better orthographic performance; G2 – Lower orthographic performance

Table 5. Mean and standard-deviation values of the types of error proportion according to orthographic performance in the fourth grade

Error categories	O		F1		F2		IS		IGN		UW		OT	
	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
G1	.39	.39	.53	.41	0	0	0	0	0	0	0	0	0	0
G2	.34	.14	.38	.15	.12	.10	.03	.05	.04	.03	.00	.01	.06	.08

O – Orthographic; F1 – Phonetic - type 1; F2 – Phonetic - type 2; IS-Incorrect Segmentations; IGN – Inflection of gender or number; UW – Unrecognizable words; OT – Others; G1 – Better orthographic performance; G2 – Lower orthographic performance

The proportions, presented in Table 5, show that the participants with better orthographic performances make mainly "Phonetic - type 1" errors, followed by "Orthographic" errors, both in higher proportions than participants with lower orthographic performances. The Mann-Whitney test used to compare the proportions of the errors given by the two groups has revealed the existence of statistically significant

differences in the "Phonetic - type 2" ($Z = -2,511$; $p = 0,012$), "Incorrect Segmentations" ($Z = -2,360$; $p = 0,018$), "Inflections of Gender or Number" ($Z = -2,526$; $p = 0,012$) and "Others" ($Z = -2,771$; $p = 0,006$) categories.

Finally, as formulated in Hypothesis 4, it was expected that the participants with better orthographic performances would be more able to verbalise the orthographic rules than the participants with lower orthographic performances. Table 6 presents values obtained for each type of answer given in the interview by the participants in the fourth grade, according to their orthographic performances.

Table 6 - Mean and standard-deviation values of the types of answer given in the interviews according to orthographic performance in the fourth grade

Types of answer	Type 1		Type 2		Type 3	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
G1	1.33	2.57	4.57	2.53	2.92	2.31
G2	3.42	3.29	3.25	2.22	2.33	1.87

G1 – Better orthographic performance; G2 – Lower orthographic performance

Participants with lower orthographic performance gave more Type 1 answers than the participants with better orthographic performance. In contrast, Type 2 and Type 3 answers were mainly given by participants with better orthographic performance. However, there were statistically significant differences only between the two groups in the Type 1 answers ($Z = -2,674$; $p = 0,007$).

4. DISCUSSION

The results indicate that, despite the fact that orthographic performances are different according to grade level, the majority of errors made by the participants were phonographic in nature. This finding is consistent with the results from other studies, such as the ones from Frith, (cit. in Jorm, 1985), Jorm (1985), Morais & Teberosky (1994), Pinto (1998), Rebelo (1993), Sousa (1999) or Valle Arroyo (1989). For example, Surrador and Brito Mendes (2005), in a study of the Portuguese orthographic errors, concluded that errors are a deviation, not of the Portuguese graphic system, but of the orthographic norm, reflecting speech (Barbeiro, 2007; Surrador & Brito Mendes, 2005).

In our first hypothesis we predicted the existence of differences in the number of errors according to the participants grade level (3rd and 4th), since it is the orthographic training, according to Perfetti (1997), that improves orthographic performance. This hypothesis was confirmed. In the second hypothesis, we predicted that there would be differences in the type of error given according to grade level. This hypothesis was partially confirmed as the total number of some types of error such

as "Orthographic", "Phonetic – type 1", "Phonetic – type 2" and "Unrecognizable Words", effectively decreased from the third to the fourth grade. These results are sustained by Pinto (1998), who maintains that the phonetic errors tend to disappear with formal school instruction. However, when the proportion of errors from the third to the fourth grades is compared, there are no statistically significant differences for any of the categories. Children in the fourth grade make effectively fewer errors than they do in the third grade; however, these errors are not qualitatively different.

Hypothesis 3 anticipated the existence of differences in the types of error given according to the orthographic performances at the fourth grade level. In fact, participants with better orthographic performances made exclusively "Phonetic – type 1" and "Orthographic" errors, whilst the participants with lower orthographic performances made errors in all the categories. When the proportion of the errors given by both groups are compared, statistically significant differences are found in the "Phonetic - type 2", "Incorrect Segmentations", "Inflections of Gender or Number" and "Others" categories. These categories correspond to errors that can be considered as less specialized and are more frequent in students with lower orthographic performances. These students, as Pinto (1998) states, may present a deficient acquisition of reading mechanisms. Similarly, "Incorrect Segmentations" errors may be associated with a lexical criterion – knowledge of the words' graphic forms ("quevinham" [kəvíŋaw] – or "a pareciam" – [α pɑrəsiaw]) (Barbeiro, 2007).

According to Jaffré (1990), «true progress does not occur when a child no longer makes errors, but rather when she no longer makes the same ones, it's when she realizes that they change» (p. 7).

According to hypothesis 4 it was expected that the participants with better orthographic performances in the fourth grade would be more able to verbalise orthographic rules than the participants with lower orthographic performances.

The results obtained show that the participants with lower orthographic performances, when compared with the participants with better orthographic performances, gave more type 1 answers. That is, there are statistically significant differences between both groups concerning answers where participants do not justify the spelling errors or do not even refer to them. These findings are maintained by Morais and Teberosky's study (1994). However, despite the fact that students with better orthographic performances tend to give more answers of Type 2 and Type 3 – considered to mirror more advanced orthographic knowledge – the differences between both groups are not statistically significant.

These results may be due to the fact that some of the participants with better orthographic performance may not as yet have developed a degree of metacognitive awareness that allows explicitation (Karmiloff-Smith, 1986), despite their good spelling performance. They can also be due to the meaning that children from both groups may have assigned to the task; participants were asked to justify the word's correct spelling, presented with errors, but it was not explicitly requested to justify it with the orthographic rules that they knew. Indeed, Alves Martins and Neto (1990) and Grossen (1988) maintain that the answers given to a certain task are determined not only by one's knowledge but also by the representations and meanings that one

gives to that task and to the situation in which it is presented. In future research we will try to be aware of this problem and analyse more carefully the contexts in which the interviews take place and the nature of the requests made to the children.

REFERENCES

- Almeida, M.; Guerreiro, M. & Mata, L. (1998). O desenvolvimento de competências ortográficas e as interações sociais. [Orthographic abilities development and social interactions]. *Análise Psicológica*, 2(XVI): 321-329.
- Alves Martins; M. & Neto, F. C. (1990). A influência de factores sociocontextuais na resolução de problemas [The influence of sociocontextual factors in problem solving]. *Análise Psicológica*, 8(III): 265-274.
- Alves Martins, M., & Niza, I. (1998). *Psicologia da aprendizagem da linguagem escrita [Written language learning psychology]*. Lisboa: Universidade Aberta.
- Barbeiro, L. (2007). *Aprendizagem da Ortografia. Princípios, dificuldades e problemas [Learning Orthography. Principles, difficulties and problems]*. Porto: ASA.
- Bousquet, S., Cogis, D., Ducard, D., Massonnet, J., & Jaffré, J.P. (1999). Acquisition de l'orthographe et mondes cognitifs [Orthography acquisition and cognitive worlds]. *Revue Française de Pédagogie*, 126, 23-37.
- Downing, J. (1973). *Comparative Reading*. New York: Macmillan.
- Ehri, L. (1997). Apprendre à lire et apprendre à l'orthographe, c'est la même chose ou pratiquement la même chose [Learning to read and learning to orthograph, it's the same thing or practically the same thing]. In L. Rieben, M. Fayol, & C. Perfetti (Eds), *Des orthographes et leur acquisition*, (pp. 231-265). Lausanne: Delachaux et Niestlé.
- Fayol, M., & Jaffré, J.P. (1999). L'acquisition/apprentissage de l'orthographe [The acquisition/learning of the orthograph]. *Revue Française de Pédagogie*, 126, 143-170.
- 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.
- Ferreiro, E. & Teberosky, A. (1979). *Los sistemas de escritura en el desarrollo del niño [Writing systems in de child's development]*. Siglo Veintiuno Argentina Editores, S.A.
- Gombert, J.-E. (1990). *Le développement métalinguistique [Metalinguistic development]*. Paris: PUF.
- Grossen, M. (1988). *L'intersubjectivité en situation de test [Intersubjectivity in test situation]*. Fribourg: Editions Delval.
- Jaffré, J. P. (1990). L'orthographe: Avec ou sans erreurs [Orthography: With or without errors]. *Recherche en Education - théorie & pratique*, 1, 3-8.
- Jaffré, J. P., & Fayol, M. (1997). *Orthographes - Des systèmes aux usages [Orthography: from systems to use]*. France: Flammarion.
- Jorm, A. F. (1985). *Dificuldades da Leitura e da Ortografia [Reading and orthography difficulties]*. Porto Alegre: Artes Médicas.
- Karmiloff-Smith, A. (1986). From meta-processes to conscious access: Evidence from children's metalinguistic and repair data. *Cognition*, 23, 95-147.
- Karmiloff-Smith, A. (1992). *Más allá de la Modularidad [Beyond Modularity]*. Madrid: Alianza Editorial.
- Karmiloff-Smith, A. (1995). Restricciones de la consciencia metalingüística [Metalinguistic awareness restrictions]. *Infancia y Aprendizaje*, 72, 33-50.
- Köhler, D. (1993). Du bon usage de l'erreur dans une didactique de l'orthographe [A good use of error in orthographic didactics]. In L. Allal, D. Bovin, & P. Perrenoud (Eds), *Évaluation Formative et Didactique du Français*, (pp. 162-169). Lausanne: Delachaux et Niestlé.
- Morais, A. & Teberosky, A. (1994). Erros e transgressões infantis na ortografia do Português [Child's errors and transgressions in Portuguese orthography]. *Discursos*, 8, 15-51.
- Morais, J. (1997). *A Arte de Ler. Psicologia cognitiva da leitura [The reading art. Reading cognitive psychology]*. Lisboa: Edições Cosmos e José Morais.
- Mousty, P., & Alegria, J. (1999). L'acquisition de l'orthographe: données comparative entre enfants normo-lecteurs et dyslexiques [The orthographe acquisition: comparative data between normal readers and dyslexic children]. *Revue Française de Pédagogie*, 26, 7-22.

- Nunes, T., Bryant, P., & Bindman, M. (1997). Orthographe et grammaire: *the necsed move* [Orthography and grammar: *the necsed move*]. In L. Rieben, M. Fayol, & C. Perfetti (Eds), *Des orthographes et leur acquisition*, (pp. 101-123). Lausanne: Delachaux et Niestlé.
- Perfetti, C. (1997). Psycholinguistique de l'orthographe et de la lecture [Orthography and reading psycholinguistic]. In L. Rieben, M. Fayol, & C. Perfetti (Eds), *Des orthographes et leur acquisition*, (pp. 37-56). Lausanne: Delachaux et Niestlé.
- Pine, K., & Messer, D. (1999). What children do and what children know: looking beyond success using Karmiloff-Smith's RR framework. *New Ideas in Psychology*, 17, 17-30.
- Pinto, M.G.L.C. (1998). *Saber Viver a Linguagem – Um Desafio aos Problemas de Literacia* [Knowing how to Live Language – a challenge to literacy problems]. Porto: Porto Editora.
- Rebelo, D. (1993). Análise do erro ao nível oral e escrito [Oral and written error's analysis]. In F. Sequeira (org.), *Linguagem e desenvolvimento*. Braga: Instituto de Educação, Universidade do Minho.
- Seymour, P. H. K., Aro, M., & Erskine, J.M. (2003). Foundation literacy acquisition in European orthographies. *British Journal of Psychology*, 94, 143–174.
- Sousa, O. (1999). *Competências Ortográficas e Competências Linguísticas* [Orthographic abilities and linguistic abilities]. Lisboa: ISPA.
- Surrador, A., Brito Mendes, C. (2005). Facetas Psicolinguísticas da Ortografia do Português [Psycholinguistic Aspects of the Portuguese Orthography]. In J. Morais & P. Ventura (Eds), *Estudos sobre a Mente*, (pp. 65-111). EDUCA.
- Valle Arroyo, F. (1989). Errores en lectura y escritura – Un modelo dual [Reading and writing errors – a dual model]. *Cognitiva*, 2, 35-63

APPENDIX A: TEXT PRESENTED IN THE SPELLING TASK

A Praia

Era uma praia muito grande e quase deserta onde havia rochedos maravilhosos. Mas durante a maré alta os rochedos estavam cobertos de água. Só se viam as ondas que vinham crescendo de longe até quebrarem na areia com um barulho de palmas. Mas na maré vazia as rochas apareciam cobertas de limo, de búzios, de anémonas, de lapas, de algas e de ouriços. Havia poças de água, rios, caminhos, grutas, arcos, cascatas. Havia pedras de todas as cores e feitios, pequeninas e macias, polidas pelas ondas. E a água do mar era transparente e fina. Às vezes passava um peixe, mas tão rápido que mal se via.

Sophia de Mello Breyner Andreson

APPENDIX B: WORDS PRESENTED IN THE INTERVIEW

. praia	práia
. maravilhosos	maravilhozos
. viam	vião
. longe	longue
. quebrarem	cebrarem
. apareciam	aparesiam
. limo	limu
. transparente	transparente
. peixe	paixe