Constructing Programming Objects for Electronic Activities that Teach Portuguese Spellings to Spanish Speakers

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Abstract

At the beginning of the present century, growth in the amount of published work on contrastive aspects of the Spanish language and of the Portuguese language was reported (Aparicio Viñambres, 2017). Within this work, research has observed linguistic interference of Spanish speakers' first language in their Portuguese spelling (Rocha & Altamirano Robles, 2017). Conversely, it has been asserted that Portuguese and Spanish false friends may give Portuguese speakers some trouble from different perspectives when they learn Spanish. One of these perspectives is orthography (Sastre Ruano, 2013). Furthermore, interest in the teaching of Portuguese idiomatic expressions to Spanish speakers (Rocha, 2014) and, conversely, in the teaching of Spanish idiomatic expressions to Portuguese speakers has been published. Within this realm, it has been argued that learning idiomatic expressions can help improve written communication when these are used spontaneously and this use results in fluency in communication (Lima & Ortiz Álvarez, 2012). Owing to the importance of Spanish speakers having control over their own Portuguese spelling when they write Portuguese text in general and expressions in particular, and of reducing the interference of the Spanish language in this use, different programming objects that use JavaScript syntax and that reflect contrastive aspects of the Portuguese language and of the Spanish language will be put forward. It is hoped that the content of these objects comes in useful in the construction of electronic activities that are used to teach Portuguese spelling to Spanish speakers in educational institutions.

Keywords: programming objects, Spanish language, Portuguese language, spelling, expressions

Die Erstellung von Programmierobjekten für elektronische Aktivitäten zum Erlernen der portugiesischen Schrift für Spanischsprachige

Abstract

Zu Anfang dieses Jahrhunderts wurde ein Anstieg der Zahl der veröffentlichten Arbeiten beobachtet, die sich mit kontrastiven Aspekten der spanischen und portugiesischen Sprache befassen (Aparicio Viñambres, 2017). In diesen Beiträgen wurden sprachliche Interferenzen der spanischsprechenden Muttersprachler in ihrer portugiesischen Orthografie beobachtet (Rocha & Altamirano Robles, 2017). Andererseits wurde behauptet, dass spanisch-portugiesische falsche Freunde beim Erlernen des Spanischen aus verschiedenen Perspektiven Probleme für portugiesische Muttersprachler verursachen können. Die Rechtschreibung ist eine davon (Sastre Ruano, 2013). Darüber hinaus wurde ein Interesse daran festgestellt, spanischsprachigen Menschen portugiesische idiomatische Ausdrücke beizubringen (Rocha, 2014) und umgekehrt spanische idiomatische Ausdrücke an portugiesischsprachige Menschen zu vermitteln. In diesem Bereich wurde argumentiert, dass das Erlernen idiomatischer Ausdrücke zur Verbesserung der schriftlichen Kommunikation beitragen kann, wenn sie spontan verwendet werden und diese Verwendung zu einer flüssigen Kommunikation führt (Lima & Ortiz Álvarez, 2012). Aufgrund der Bedeutung der Kontrolle, die Spanischsprechende über ihre portugiesische Rechtschreibung haben können, wenn sie Texte im Allgemeinen und Ausdrücke im Besonderen schreiben, und aufgrund der Wichtigkeit, die Interferenz der spanischen Sprache bei dieser Verwendung zu reduzieren, werden mehrere Programmierobjekte vorgeschlagen, in denen JavaScript-Syntax verwendet wird und die kontrastive Aspekte der spanischen und portugiesischen Sprache widerspiegeln. Es wird erwartet, dass die Inhalte dieser Objekte bei der Erstellung von elektronischen Aktivitäten für den Unterricht der portugiesischen Rechtschreibung für Spanischsprachige in Bildungseinrichtungen nützlich sein werden.

Stichwörter: Programmierobjekte, spanische Sprache, portugiesische Sprache, Rechtschreibung, Ausdrücke

La construcción de objetos de programación para actividades electrónicas que enseñan grafías portuguesas a hispanohablantes

Resumen

A comienzos del presente siglo, se observó un aumento en la cantidad de trabajos publicados que estudian aspectos contrastivos de la lengua española y de la lengua portuguesa (Aparicio Viñambres, 2017). Dentro de estos trabajos, la investigación ha observado interferencias lingüísticas de la lengua materna de hispanohablantes en su ortografía en lengua portuguesa (Rocha & Altamirano Robles, 2017). Por otro lado, se ha afirmado que los falsos amigos español-portugués pueden causar problemas a lusohablantes desde distintas perspectivas cuando aprenden español. La ortografía es una de ellas (Sastre Ruano, 2013). Además, se ha observado interés en la enseñanza de expresiones idiomáticas portuguesas a hispanohablantes (Rocha, 2014) e, inversamente, en la enseñanza de expresiones idiomáticas españolas a lusohablantes. Dentro de este campo, se ha argumentado que el aprendizaje de expresiones idiomáticas puede ayudar a mejorar la comunicación escrita cuando estas son usadas espontáneamente y este uso da como resultado la fluidez en la comunicación (Lima & Ortiz Álvarez, 2012). Debido a la importancia del control que los hispanohablantes puedan tener sobre su ortografía en lengua portuguesa cuando escriben textos en general y expresiones en particular, y debido a la importancia de reducir la interferencia de la lengua española en este uso, diversos objetos de programación en los que se emplea la sintaxis de JavaScript y que reflejan aspectos contrastivos de la lengua española y de la lengua portuguesa serán propuestos. Se espera que el contenido de estos objetos sea útil en la construcción de actividades electrónicas que sean empleadas en la enseñanza de la ortografía portuguesa a hispanohablantes en instituciones educativas.

Palabras clave: objetos para la programación, lengua española, lengua portuguesa, ortografía, expresiones

La construction d'objets de programmation pour des activités électroniques qui enseignent des graphies portugaises aux hispanophones

Résumé

Au début du siècle, on a observé une augmentation du nombre de travaux publiés qui étudient des aspects contrastés de la langue espagnole et de la langue portugaise (Aparicio Viñambres, 2017). Dans le cadre de ces travaux, la recherche a observé des interférences linguistiques de la langue maternelle des hispanophones dans leur orthographe en langue portugaise (Rocha & Altamirano Robles, 2017). D'autre part, il a été affirmé que les faux amis espagnol-portugais peuvent causer des problèmes aux lusophones de différents points de vue lorsqu'ils apprennent l'espagnol. L'orthographe en est un (Sastre Ruano, 2013). En outre, on a observé un intérêt dans l'enseignement des expressions idiomatiques portugaises à des hispanophones (Rocha, 2014) et, inversement, dans l'enseignement des expressions idiomatiques espagnoles aux lusophones. Dans ce domaine, on a argumenté que l'apprentissage des expressions idiomatiques peut aider à améliorer la communication écrite lorsqu'elles sont utilisées spontanément et que cette utilisation permet une communication naturelle (Lima & Ortiz Álvarez, 2012). En raison de l'importance du contrôle que les hispanophones peuvent exercer sur leur orthographe portugaise lorsqu'ils écrivent des textes en général et des expressions en particulier, et de l'importance de réduire l'interférence de la langue espagnole dans cet usage, divers objets de programmation dans lesquels la syntaxe JavaScript est utilisée et qui reflètent des aspects contrastés de la langue espagnole et de la langue portugaise seront proposés. On espère que le contenu de ces objets sera utile à la construction d'activités électroniques qui seront utilisées dans l'enseignement de l'orthographe portugaise aux hispanophones dans les établissements d'enseignement.

Mots-clés : objets pour la programmation, langue espagnole, langue portugaise, orthographe, expressions

La costruzione degli oggetti di programmazione per le attività elettroniche che insegnano grafie portoghesi a ispanoparlanti

Riassunto

Agli inizi del secolo corrente, si è osservato un aumento nella quantità di lavori pubblicati che studiano gli aspetti contrastivi della lingua spagnola rispetto alla lingua portoghese (Aparicio Viñambres, 2017). In questi lavori la ricerca ha osservato interferenze linguistiche della lingua materna degli ispanoparlanti nella loro ortografía nella lingua portoghese (Rocha & Altamirano Robles, 2017). Inoltre si è affermato che i falsi amici spagnolo-portoghesi possono causare problemi ai lusoparlanti sotto vari punti di vista quando imparano lo spagnolo. L'ortografia è uno di questi (Sastre Ruano, 2013). Oltre a ciò si è osservato l'interesse per l'insegnamento di espressioni idiomatiche portoghesi agli ispanoparlanti (Rocha, 2014) e, all'inversa, nell'insegnamento di espressioni idiomatiche in spagnolo ai lusoparlanti. In questo campo si è argomentato che l'apprendimento di espressioni idiomatiche può aiutare a migliorare la comunicazione scritta, quando queste ultime sono usate spontaneamente e quest'uso dà come risultato la fluidità nella comunicazione (Lima & Ortiz Álvarez, 2012). Data l'importanza del controllo che gli ispanoparlanti possano avere sulla loro ortografía nella lingua portoghese quando scrivono testi in generale ed espressioni in particolare e dovuto all'importanza di ridurre l'interferenza della lingua spagnola in quest'uso, diversi oggetti di programmazione, nei quali si impiega la sintassi di JavaScript e che riflettono gli aspetti contrastivi della lingua spagnola rispetto alla lingua portoghese, saranno proposti. Ci si aspetta che il contenuto di questi oggetti sia utile nella costruzione di attività elettroniche che siano impiegate nell'insegnamento dell'ortografia portoghese agli ispanoparlanti nelle istituzioni educative.

Parole chiave: oggetti per la programmazione, lingua spagnola, lingua portoghese, ortografia, espressioni

A construção de objetos de programação para atividades eletrônicas que ensinam grafias do português a falantes de espanhol

Resumo

No início deste século, observou-se um aumento no número de trabalhos publicados que estudam aspectos contrastivos da língua espanhola e da língua portuguesa (Aparicio Viñambres, 2017). Nesses trabalhos, pesquisas observaram interferências linguísticas da língua materna dos falantes de espanhol na sua ortografia em português (Rocha & Altamirano Robles, 2017). Por outro lado, foi afirmado que os falsos amigos espanhol-português podem causar problemas aos falantes de português desde diferentes perspectivas na aprendizagem do espanhol. A ortografia é uma delas (Sastre Ruano, 2013). Além disso, tem sido observado interesse no ensino de expressões idiomáticas do português para falantes de espanhol (Rocha, 2014) e, inversamente, no ensino de expressões idiomáticas do espanhol para falantes de português. Neste campo, tem-se argumentado que a aprendizagem de expressões idiomáticas pode ajudar a melhorar a comunicação escrita quando são utilizadas de forma espontânea e esse uso dá como resultado a fluência na comunicação (Lima & Ortiz Álvarez, 2012). Pela importância do controle que os falantes de espanhol podem ter sobre a sua ortografia da língua portuguesa na redação de textos em geral e de expressões em particular, e pela importância de reduzir a interferência da língua espanhola nesse uso, vários objetos de programação que utilizam a sintaxe do JavaScript e que refletam aspectos contrastivos da língua espanhola e da língua portuguesa serão propostos. Espera-se que o conteúdo desses objetos seja útil na construção de atividades eletrônicas que sejam utilizadas no ensino da ortografia do português para falantes de espanhol em instituições educativas.

Palavras-chave: objetos para programação, língua espanhola, língua portuguesa, ortografia, expressões

Introduction

In a study on the presence of contrastive features between the Spanish language and the Portuguese language in Portuguese as a Foreign Language (PFL) textbooks aimed at Spanish speakers, Aparicio Viñambres (2017) made some very interesting observations. Aparicio Viñambres (2017) observed that interest in the learning of Portuguese in the Hispanic world had grown considerably in recent years and that, owing to this, there had been an increase in the amount of published work that had focused on contrastive aspects of the Spanish language and of the Portuguese language (p. 4). Aparicio Viñambres (2017) also argued that growth in the amount of published work on this field had also been due to similarities between both languages and their effect on learning either of them by speakers of the opposite language (p. 5).

In relation to this effect, research has suggested, for example, that the similarity or apparent similarity (Araújo, 2008) between the Portuguese language and the Spanish language may give rise to difficulties within the realm of phonology, morphology, syntax, lexis, discourse, (Araújo, 2008) and orthography (Rocha & Altamirano Robles, 2017) when Spanish speakers learn Portuguese. As regards the last item, i.e. orthography, the following may be expected. The presence of contrastive aspects of the Portuguese language and of the learners' first language in textbook materials that teach PFL could be useful for those learners who want to be made aware of differences between the former language and the latter language. This is, for example, when similarities between both languages may lead to confusion in these learners' Portuguese spelling. If that were the case, one would also be able to argue that the presence of these contrastive aspects in electronic materials that teach Portuguese spelling to speakers of other languages should also come in useful to the same end.

With a view to focusing on the Portuguese language as a target language amongst Spanish speakers, the objectives of this paper are as follows. The first objective is to present the design of a set of programming objects whose values are verb and non-verb Portuguese and Spanish spellings. The second objective is to present the design of a set of programming objects whose values are spellings of elements of Portuguese and Spanish expressions. The third objective is to put forward a classification of the objects containing elements of these expressions. The reason why it has been decided to tackle verb and non-verb spellings and the spelling of expressions will emerge in the literature review.

It is hoped that the content of the objects in question and their classification will make an interesting contribution to the construction of electronic activities that are meant to be used to teach Portuguese verb and non-verb spellings and the spelling of Portuguese expressions to speakers whose first language is Spanish (defined as Spanish speakers in the present paper), particularly in contexts in which these speakers are to be familiar with differences between the Spanish language and the Portuguese language. Therefore, it is also hoped that the present article will be useful for software developers and educators who design electronic PFL activities for Spanish speakers and will also be useful for developers and educators who aim to embark on this task. Nonetheless, it has to be clarified that this paper is not a reference source and that, as a result, the contents of the above-mentioned objects, which will be presented later in this paper, should be checked with any reliable reference works in the event of using these contents to teach the Portuguese language.

Literature Review

Comparisons of the Spanish language and of the Portuguese language where a very specific lexical feature of both languages is concerned are present in a study by Rocha (2014). This feature consists in idiomatic expressions that refer to parts of human and animal bodies (Rocha, 2014, p. 18). In this study, Rocha (2014) built a semi-bilingual collection of this type of expression. This collection consists in entries that deal with a Portuguese idiomatic expression of the given type and that include a definition, at least one sentence that illustrates the use of this expression, further information that aims to help to understand the expression beyond its definition, and at least one equivalent Spanish idiomatic expression. It can be argued that it is certainly the case that the combination of the use of Portuguese corpora, of collections of idiomatic expressions such as the one presented in Rocha's (2014) work, of monolingual dictionaries and of bilingual dictionaries can provide substantial information as far as the use of idiomatic expressions is concerned.

However, the following concepts should also be borne in mind. Even though the following work by Lima and Ortiz Álvarez (2012) focused on teaching Spanish idiomatic expressions to Portuguese speakers, it is believed that the following two features of these expressions may apply to Portuguese idiomatic expressions taught to Spanish speakers as well. Lima and Ortiz Álvarez (2012) explained that there is a fixed structure in idiomatic expressions and argued that this structure can help to memorise them or, at least, to recognise them in different contexts (pp. 72-73). Furthermore, the authors

argued that learning idiomatic expressions can help improve written and spoken communication in that they can be used as chunks spontaneously and in that this use can result in fluency in communication (Lima & Ortiz Álvarez, 2012, p. 73). These arguments should highlight the importance of practice in the construction of these structures. Indeed, it was thought that in addition to the use of corpora, collections and dictionaries dealing with idiomatic expressions, practice in the construction of Portuguese expressions through electronic activities that focus on the spelling of the components of these expressions and on their order within these expressions could be useful in the following situation. This is to help Spanish learners consolidate knowledge of the components that these expressions comprise and of the position that these components should have within these expressions. This idea was taken into consideration in the construction of the programming objects whose values are elements of Portuguese and Spanish expressions and that will be presented below.

In areas other than idiomatic expressions, namely syntax, semantics and orthography, Rocha and Altamirano Robles (2017) dealt with linguistic interference amongst Spanish speakers undertaking graduate and postgraduate studies and taking a PFL course in Brazil. Bearing in mind one of the interests of the present paper, i.e. presenting programming objects for electronic activities to teach specific Portuguese spellings to Spanish speakers, it is worth citing the following four findings. Rocha and Altamirano Robles (2017) found out that the largest number of instances of linguistic interference in the texts the participants wrote were about orthography, and that all the participants not only encountered difficulties with spelling in the Portuguese language (p. 674) but also reported the following: The Spanish language interfered with their learning of the Portuguese language (p. 675) and they resorted to the Spanish language in the event of not knowing an item in the Portuguese language (p. 676). Paiva Mota (2020) also studied linguistic interference in texts written by Spanish speakers studying PFL at a university in Brazil. This research also dealt with three types of interference: grammatical, lexical and orthographic. Like in the previous research, Paiva Mota (2020) indicated that the instances of orthographic interference were the most frequent ones. Altamirano Robles (2016) conducted another study in which texts also written by Spanish speakers were examined for the presence of instances of linguistic interference. This time the participants were studying PFL in Peru. Cases of syntactic, semantic and orthographic interference were tackled. Nonetheless, in this study orthographic interference encompassed only the use of accent (Altamirano Robles, 2016, p. 43). In this respect, this study highlighted the cases of omission of accent in three types of

words owing to the use of the norms of the Spanish language (Altamirano Robles, 2016, *Resumo* section).

The findings of the three studies presented in the previous paragraph are certainly an indicator of the importance dealing with spelling could have in PFL courses aimed at Spanish speakers. The objectives of this paper were influenced by the possibility that there may be gaps in the control of Portuguese spellings amongst Spanish speakers studying Portuguese and by the idea that electronic activities that centre on contrastive Portuguese and Spanish spellings can tackle these gaps.

Awareness of the importance of being well acquainted with the spelling of the target language has also been discussed in the literature on lexicography. In an article that deals with the construction of a dictionary of Portuguese and Spanish false friends, Sastre Ruano (2013) asserted that these may give Portuguese speakers some trouble from different perspectives when they learn Spanish. One of these perspectives is orthography (Sastre Ruano, 2013). Indeed, this dictionary was meant to contain not only grammatical gender tags, grammatical number tags, and tags related to phonology, lexis and semantics, but also contrastive tags related to accent (*contraste acentual* in the original paper) and graphemes (*contraste gráfico* in the original paper, Durão, 2015, p. 205). The aim of these tags was to depict any possible contrast between Portuguese lemmas and their Spanish equivalents (Durão, 2015, p. 205). In addition, three of the criteria that were taken into account in the selection of the false friends that were included in the aforementioned dictionary were related to spelling. These were differences in stressed syllables (*sílaba tónica* in the original paper), spelling similarities but spelling differences at the same time, and spelling similarities and gender (Sastre Ruano, 2013, p. 54).

It is to be said that the inverse may also be true: differences in spelling between the Portuguese language and the Spanish language may also give Spanish speakers trouble when they learn Portuguese. For example, upon reading the Portuguese noun *sapato* one should notice the use of the consonant letter *z* in the Spanish noun *zapato* and, conversely, upon reading the Spanish noun *zapato* one should notice the use of the consonant letter *s* in the Portuguese noun *sapato*. Furthermore, connections between orthographically related words can get more complex when different categories of words are added to these comparisons. For example, Spanish speakers may be made aware of the fact that whereas the Spanish noun *silencio* carries no written accent, the Portuguese noun *silêncio* does carry a circumflex one. However, it may also be pointed out that *silencio* is the spelling of the form of the first person singular of the present tense

of the indicative mood of the Portuguese verb *silenciar*. This leads to a triangular relation between a Spanish non-verb spelling, namely *silencio*, a Portuguese non-verb spelling, namely *silêncio*, and a Portuguese verb spelling, namely *silencio*. It is thought that teaching Portuguese spellings to Spanish speakers may benefit from flexibility in the construction of programming variables. It is also thought that it can benefit from the art of combining the values of variables when treating these triangular orthographic relations and even more complex ones in the creation of electronic activities.

In this paper, the following four points have been highlighted. The first one is the claim that being familiar with the fixed structures of idiomatic expressions can help to memorise them or at least to recognise them (Lima & Ortiz Álvarez, 2012). The second point is that learning these expressions can improve written and spoken communication (Lima & Ortiz Álvarez, 2012). It was also put forward that practice in constructing Portuguese expressions and in writing them through electronic activities could be an interesting tool for Spanish speakers to learn the structures of these expressions and to learn what their components are. The third point is the research finding that orthography can be a major indicator of linguistic interference in texts written in Portuguese by Spanish speakers (Rocha & Altamirano Robles, 2017). The last point was the decision to include contrastive tags related to accent and graphemes to show any possible contrast between Portuguese lemmas and their Spanish equivalents in a dictionary of Portuguese and Spanish false friends (Durão, 2015). In this respect, it was considered useful to include triangular orthographic relations of verb and non-verb spellings in electronic activities that teach Portuguese spellings to Spanish speakers. Three papers dealing with teaching Portuguese orthography using electronic devices will be cited.

Ouverney-King et al. (2016) addressed mobile learning in the specific area of Portuguese orthography. Indeed, the authors conducted a study on the use of an application called *SoletrandoMob* in a Portuguese language class focusing on spelling and addressed to Computer Science students. Ouverney-King et al. (2016) explained that this application represented a spelling game that could perform several didactic functions. To take two examples, it was able to show a target word in a sentence and make corrections if there was a mistake. Ouverney-King et al. (2016) concluded that the software content aroused the students' interest and curiosity as regards learning in a mobile mode. They also argued that one of the benefits of educational software lies in the fact that it can enable speakers of other languages and who are abroad to study the Portuguese language and have access to its spelling. Other software aimed to work on Portuguese spelling is that developed by Pires et al. (2018). This was an educational purpose game called *O Livro do Conhecimento*, which aimed to aid in the learning of the

Portuguese language (Pires et al., 2018). Indeed, the authors explained that the purpose of the software was to supply a tool that could assist in the correct writing of the Portuguese language, the structure of words and applications in everyday phrases (Pires et al., 2018, p. 703). Assis et al. (2018) also designed a digital application that focused on the teaching of Portuguese spelling. This application consisted in a game whose name was *Grapphia*. In the rationale behind this game there is use of memory to teach orthographic irregularities (Assis et al., 2018, p. 198). More specifically, this application was created with the purpose of assisting in the teaching of the spelling of words where the use of letters and digraphs is not explicitly set by a rule (Assis et al., 2018, pp. 198-199).

Ouverney-King et al.'s (2016) statement that educational software can enable speakers of other languages and who are abroad to study the Portuguese language and have access to its spelling is a very interesting observation. Assis et al.'s (2018) focus on the teaching of the use of letters and digraphs in the absence of explicit rules can certainly be useful for Spanish speakers learning PFL. The same argument holds good in the practice of similar words such as *mas* and *mais* in Pires et al.'s (2018) application. The present paper, however, provides content in the form of programming objects that intend to be useful in the creation of activities teaching Portuguese spelling to Spanish speakers. Indeed, after suggesting the idea that electronic activities can help Spanish speakers not only to learn the spelling and structure of expressions but also to practise contrastive aspects of Portuguese and Spanish spelling, in the following section the author will proceed to describe the content of programming objects that is meant to be useful in the construction of the activities in question.

Methodology

Before plunging into the content of the programming objects themselves, a description of these will be provided. These objects will be constructed using JavaScript syntax. JavaScript syntax has been chosen for several reasons. According to a site that deals with different aspects of web development, JavaScript is "the world's most popular programming language", it "is the programming language of the Web", and it "is easy to learn" (https://www.w3schools.com/js/). It is thought that the last of these three features may be reflected in the syntax of JavaScript objects. An example of an object taken from the next section of this paper is the following:

```
const vivo = {vozEsp: "en", vozPort: "ao"}
```

In this case, *vivo* is the name of the object. This object has two properties. Each property has a name and a value (https://www.w3schools.com/js/js_objects.asp). The first name shows that the value that follows it is a Spanish word (*vozEsp* stands for *Spanish word* as explained below), and the second name indicates that the value that follows it is a Portuguese word (*vozPort* stands for *Portuguese word* as explained below). The value of the first property is *en*, and the value of the second property is *ao*. This object may enable programmers to store content that may be used in the construction of the Spanish expression *en vivo* and of the Portuguese expression *ao vivo* through electronic activities. Nonetheless, whereas values in objects such as the one in the previous example may only be strings, objects may also have more complex structures as shown in the next example, which has also been taken from the next section of this paper.

const parte = {espNucleoOne: “formar”, espNucleoTwo: [“parte”, “de”], portNucleoOne: “fazer”, portNucleoTwo: [“parte”, “de”]}

In this example, the object has both strings and arrays. This object may allow programmers to store content that may be used in the construction of the Spanish expression *formar parte de* and of the Portuguese expression *fazer parte de* through electronic activities. It will also be highlighted that the decision to use JavaScript syntax also resides in the similarity between the syntax of the objects in question and JSON syntax, which can then be accessed in different programming languages. After providing a brief description of the structure of the JavaScript objects that will be introduced in this paper, the approach to each research objective will be discussed.

As stated in the first objective, the design of a set of programming objects whose values are verb and non-verb Portuguese and Spanish spellings will be presented. Indeed, in the next section, the author will refer to verb forms and to non-verb forms. The concept of verb form will be understood as the spelling of one of the forms of the conjugation of a Spanish verb or of a Portuguese verb. The notion of non-verb form will refer to any other word. In the *Literature Review* section, the author highlighted the idea that flexibility in the construction of programming variables and in handling their values may come in useful in the creation of electronic activities that deal with triangular orthographic relations. Two kinds of these types of relations will be covered in this objective. With a view to illustrating the first one, objects whose name is a Spanish non-verb form and whose properties are a Portuguese verb form and a Portuguese non-verb form will be designed. All these forms share their sequences of letters. Concerning the second type of triangular orthographic relation, objects whose name is a Spanish non-verb form and whose properties are a Portuguese verb form and a Portuguese non-verb form will also

be designed. Nonetheless, in this case, sequences of letters within each object will differ. Examples of these objects will be provided in the next section.

With regard to the second objective, it was explained that this was to present the design of a set of programming objects whose values are spellings of elements of Portuguese and Spanish expressions. At this point, owing to the fact that the literature review made reference to previous research on idiomatic expressions, the following needs to be clarified. In this article, only the term *expression* is being used for the following reasons. The first reason lies in one of the main features of idiomatic expressions. After looking at each component of an expression separately, it may still be difficult to understand its meaning as a whole (Rocha, 2014, p.62). Nevertheless, it may be claimed that it may not always be easy to draw a line between an idiomatic expression and an expression that is literal. This claim results from the assumption that there may be different conceptions regarding the sufficient amount of idiomaticity required for an idiomatic expression to be defined as such. Consequently, the general term *expression* has been preferred. The second reason lies in the fact that, indeed, an online Portuguese dictionary may put expressions together after definitions following no headings or following a heading called *Expressões*. In either case, in addition to the heading called *Expressões* (if this heading exists), different strategies may be applied to indicate that the content that follows definitions within a web page includes expressions. One of these is headwords that consist in an expression and that are printed in bold type and in the same colour as that of the definitions printed above or in bold type and in a different colour from that of the definitions printed above. Two more strategies are the use of single line breaks and padding. After taking the first reason into consideration, it has been decided to follow the approach of some online dictionaries, i.e. not to group expressions under the heading *idiomatic expression* itself.

As regards the construction of the programming objects which are related to the second objective, a few methodological decisions need to be addressed. These decisions will be described by going back to the second example that has been provided in this section:

const parte = {espNucleoOne: “formar”, espNucleoTwo: [“parte”, “de”], portNucleoOne: “fazer”, portNucleoTwo: [“parte”, “de”]}

It will be observed that the objects corresponding to the second objective can be more complex than those corresponding to the first objective since they may include both strings and arrays. Indeed, expressions that were more complex were split into chunks with a view not only to focusing on the spelling of its components, but also to comparing these components. In the object above, for example, same spelling can be seen in either

of the components of the second chunk of the Spanish expression and of the Portuguese expression, namely *parte* and *de*, whereas different components may be observed in their first chunk, namely *formar* and *fazer*. Therefore, for the sake of dealing with the spelling and the components of expressions, whereas expressions such as *a propósito* (Spanish) and *de propósito* (Portuguese) were said to have one nucleus, namely *propósito*, expressions such as *formar parte de* (Spanish) and *fazer parte de* (Portuguese) were said to have two: *formar* and *parte* in the Spanish expression and *fazer* and *parte* in the Portuguese expression. Nonetheless, since different criteria could be adopted to split expressions, the programming objects that are presented in this paper can be reshaped.

The second objective leads to the third objective: to put forward a classification of the objects containing elements of these expressions. While different classes of idiomatic expressions have been suggested to teach these expressions (Lima and Ortiz Álvarez, 2012), the classification that will be put forward in this paper aims to make programmers aware of the contrastive aspects of Spanish and Portuguese expressions where spelling is concerned. Nonetheless, the present classification may be combined with other classifications. For example, it may be applied just to expressions that make reference to animals. Six classes will be suggested in this paper. They range from objects containing expressions that share none of their spellings to objects containing expressions that share the spelling of all the elements that compose them.

The content of the objects in question will be presented in the section that follows.

Programming Objects

This section has been divided into two parts. In the first part, differences between verb and non-verb spellings will be identified. In the second part, reference to the spelling of Spanish and Portuguese expressions will be made.

Part 1

This part has been divided into two groups.

Group 1.1

In this group, there are pairs of words that are related in the following way. In the first pair, a Spanish non-verb word and a Portuguese non-verb word have the same

sequence of letters and share at least a meaning. Nonetheless, the Portuguese word carries an accent. For example,

vicio (Spanish) and *vício* (Portuguese).

In the second pair, the Spanish non-verb word of the first pair and a Portuguese verb form belong to the same semantic field and share their spelling. In this case,

vicio (Spanish) and *vicio* (Portuguese).

In this way, an object whose name is a Spanish non-verb word and whose properties are the Portuguese word classes (verb or non-verb) could be constructed. The Portuguese verb form will be *plusVerb* and the Portuguese non-verb form will be *minusVerb*. For example,

const vicio = {plusVerb: “vicio”, minusVerb: “vício”}

More examples are presented below.

```
const cambio = { plusVerb: “cambio”, minusVerb: “câmbio”}
const estereotipo = { plusVerb: “estereotipo”, minusVerb: “estereótipo”}
const obvia = { plusVerb: “obvia”, minusVerb: “óbvia”}
const obvio = { plusVerb: “obvio”, minusVerb: “óbvio”}
const perpetua = { plusVerb: “perpetua”, minusVerb: “perpétua”}
const perpetuo = { plusVerb: “perpetuo”, minusVerb: “perpétuo”}
const premio = { plusVerb: “premio”, minusVerb: “prémio”}
const premio = { plusVerb: “premio”, minusVerb: “prêmio”}
const prestigio = { plusVerb: “prestigio”, minusVerb: “prestígio”}
const providencia = { plusVerb: “providencia”, minusVerb: “providência”}
const repudio = { plusVerb: “repudio”, minusVerb: “repúdio”}
const silencio = { plusVerb: “silencio”, minusVerb: “silêncio”}
const sitio = { plusVerb: “sitio”, minusVerb: “sítio”}
const suplicio = { plusVerb: “suplicio”, minusVerb: “suplício”}
```

The second group of this part is tackled below.

Group 1.2

This section also includes pairs of words from both languages. In the first pair, a Spanish non-verb word and a Portuguese verb form have the same sequence of letters. For example,

amplia (Spanish) and *amplia* (Portuguese).

In addition, there is a non-verb Portuguese word whose spelling is similar to that of the components of the first pair and which belongs to the semantic field of the Spanish non-verb word. For example,

ampla (Portuguese) in relation to *amplia* (Spanish).

Following this reasoning, an object whose name is a Spanish non-verb word and whose properties are the Portuguese word classes (verb or non-verb) can be created. As in the previous group, the Portuguese verb form will be *plusVerb* and the Portuguese non-verb form will be *minusVerb*. For example,

const amplia = {plusVerb: “amplia”, minusVerb: “ampla”}

A few more examples are presented.

const amplio = {plusVerb: “amplio”, minusVerb: “amplo”}
const presencia = {plusVerb: “presencia”, minusVerb: “presença”}
const renta = {plusVerb: “renta”, minusVerb: “renda”}

Part 2

This part has been divided into six groups.

Group 2.1

This group contains expressions that share at least one of their meanings (or whose meanings are related) and the spelling of their only nucleus. In this case, objects that share the following features will be constructed. The name of an object will be the nucleus of the Portuguese expression and of the Spanish expression that this object contains. This name will not have any accents. The properties of this object are either of the languages to which the words that accompany the nucleus belong and the words themselves: *vozEsp* refers to the Spanish language and *vozPort* refers to the Portuguese language. For example, taking into account the following pair:

a propósito (Spanish) and *de propósito* (Portuguese),

the following object will be constructed:

const proposito = {vozEsp: “a”, vozPort: “de”}

Further examples that belong to this group have been observed.

const contado = {vozEsp: “al”, vozPort: “de”}
const flagrante = {vozEsp: “en”, vozPort: “em”}

const vivo = {vozEsp: “en”, vozPort: “ao”}

Group 2.2

Expressions that share at least one of their meanings (or whose meanings are related) and the spelling of at least one of their components but not that of their nuclei may be found in this group. For example,

a mediados de (Spanish) and *em meados de* (Portuguese).

These pairs of expressions will also be represented through objects. The name of an object will be a nucleus of the Spanish expression and this name will have no accents. Its properties will reveal the elements that compose each expression. Within these properties, the following will be found: *esp* to refer to the elements that make up the Spanish expression, *port* to show the components of the Portuguese expression, *espNucleoOne* to address the elements that belong to the phrase that contains the first nucleus of the Spanish expression, *espNucleoTwo* to indicate the elements that belong to the phrase that contains the second nucleus of the Spanish expression, *portNucleoOne* to address the elements that belong to the phrase that contains the first nucleus of the Portuguese expression, and *portNucleoTwo* to indicate the elements that belong to the phrase that contains the second nucleus of the Portuguese expression. In this group, the structures of the objects may be said to be more complex than those of the objects that belong in the previous groups, and the reason for this is that these new objects may contain arrays. A case in point is the following: *esp* is an array that contains three elements, and the same applies to *port*.

const mediados = {esp: [“a”, “mediados”, “de”], port: [“em”, “meados”, “de”]}

Other examples that reveal the features that characterise this group are listed.

const asi = {esp: [“así”, “que”], port: [“assim”, “que”]}
const cuanto = {esp: [“en”, “cuanto”, “a”], port: [“quanto”, “a”]}
const cuentas = {espNucleoOne: [“a”, “fin”], espNucleoTwo: [“de”, “cuentas”], portNucleoOne: “afinal”, portNucleoTwo: [“de”, “contas”]}
const disgusto = {esp: [“a”, “disgusto”], port: [“a”, “contragosto”]}
const fin = {esp: [“por”, “fin”], port: [“por”, “fim”]}
const guardia = {esp: [“de”, “guardia”], port: [“de”, “plantão”]}
const lejos = {esp: [“de”, “lejos”], port: [“de”, “longe”]}
const mayor = {esp: [“al”, “por”, “mayor”], port: [“por”, “atacado”]}
const menos = {espNucleoOne: “echar”, espNucleoTwo: [“de”, “menos”, “a”], portNucleoOne: “sentir”, portNucleoTwo: [“falta”, “de”]}
const pesar = {esp: [“a”, “pesar”, “de”], port: [“apesar”, “de”]}
const pie = {esp: [“a”, “pie”], port: [“a”, “pé”]}
const solas = {esp: [“a”, “solas”], port: [“a”, “sós”]}

const traves = {esp: [“a”, “través”, “de”], port: [“através”, “de”]}

Group 2.3

This group includes expressions that share at least one of their meanings (or whose meanings are related) and the spelling of one of their nuclei and also the spelling of at least one of the remaining components. For example,

a causa de (Spanish) and *por causa de* (Portuguese).

The expressions will be depicted through objects the names of which will be a nucleus whose Spanish and Portuguese spellings match. The criteria used in this group are the same as the ones used in the previous group. The name of the objects will have no accents and the properties of the objects that are included in this group show the elements that compose each expression. Amongst these properties, the following will be found: *esp* to refer to the elements that compose the Spanish expression, *port* to show the components of the Portuguese expression, *espNucleoOne* to address the elements that belong to the phrase that contains the first nucleus of the Spanish expression, *espNucleoTwo* to indicate the elements that belong to the phrase that contains the second nucleus of the Spanish expression, *portNucleoOne* to address the elements that belong to the phrase that contains the first nucleus of the Portuguese expression, and *portNucleoTwo* to indicate the elements that belong to the phrase that contains the second nucleus of the Portuguese expression. With regard to the complexity of the objects that belong in this section, it is similar to that of the objects of the previous section: they may contain strings and arrays. The following two objects, for example, contain only arrays.

const causa = {esp: [“a”, “causa”, “de”], port: [“por”, “causa”, “de”]}
const vez = {espNucleoOne: [“de”, “vez”], espNucleoTwo: [“en”, “cuando”], portNucleoOne: [“de”, “vez”], portNucleoTwo: [“em”, “quando”]}

The following two objects, by contrast, contain arrays and strings.

const favor = {espNucleoOne: “estar”, espNucleoTwo: [“a”, “favor”, “de”], portNucleoOne: “ser”, portNucleoTwo: [“a”, “favor”, “de”]}
const parte = {espNucleoOne: “formar”, espNucleoTwo: [“parte”, “de”], portNucleoOne: “fazer”, portNucleoTwo: [“parte”, “de”]}

Group 2.4

This group will show objects whose expressions share none of their spellings. Nonetheless, they do share at least one of their meanings (or their meanings are related). For example,

a lo lejos (Spanish) and *ao longe* (Portuguese).

These expressions will be represented in objects whose names are a nucleus of the Spanish expression. As in the previous groups, these names will have no accents. In addition, the properties of the objects that are included in this group show the elements that compose each expression. Amongst these properties, the following will be found: *esp* to refer to the elements that compose the Spanish expression, *port* to show the components of the Portuguese expression, *espNucleoOne* to address the elements that belong to the phrase that contains the first nucleus of the Spanish expression, *espNucleoTwo* to indicate the elements that belong to the phrase that contains the second nucleus of the Spanish expression, *portNucleoOne* to address the elements that belong to the phrase that contains the first nucleus of the Portuguese expression, and *portNucleoTwo* to indicate the elements that belong to the phrase that contains the second nucleus of the Portuguese expression. Regarding the complexity of these objects, arrays and strings may be found in them. The following is an example of this type of expression.

const lejos = {esp: [“a”, “lo”, “lejos”], port: [“ao”, “longe”]}

Other examples include the following items.

const contado = {esp: [“al”, “contado”], port: [“à”, “vista”]}
const desear = {espNucleoOne: [“dejar”, “mucho”], espNucleoTwo: [“que”, “desear”], portNucleoOne: [“deixar”, “muito”], portNucleoTwo: [“a”, “desejar”]}
const desnudo = {esp: [“al”, “desnudo”], port: [“a”, “nu”]}
const fin = {esp: [“al”, “fin”], port: [“por”, “fim”]}
const fin = {esp: [“al”, “fin”], port: [“até”, “que”, “enfim”]}
const general = {esp: [“en”, “general”], port: [“em”, “geral”]}
const menor = {esp: [“al”, “por”, “menor”], port: [“a”, “varejo”]}
const oscuras = {esp: [“a”, “oscuras”], port: [“às”, “escuras”]}
const pie = {esp: [“hacer”, “pie”], port: [“dar”, “pé”]}
const relieve = {espNucleoOne: “poner”, espNucleoTwo: [“de”, “relieve”], portNucleoOne: “pôr”, portNucleoTwo: [“em”, “relevo”]}
const serio = {esp: [“en”, “serio”], port: [“a”, “sério”]}
const veces = {esp: [“a”, “veces”], port: [“às”, “vezes”]}

Group 2.5

In this group, objects contain expressions that share at least one of their meanings (or their meanings are related) and the spelling of all the elements that compose them. For example:

dentro de (Spanish) and *dentro de* (Portuguese).

Each expression will be represented through an object whose name is the nucleus of this expression and, as before, this name will have no accents. The properties of this object are the elements that make up this expression. The first element will be *elemUno*, *elemDos* will be the second element and *elemTres* will be the third element. For example,

const dentro = {elemUno: “dentro”, elemDos: “de”}

Other examples are listed below.
const proposito = {elemUno: “de”, elemDos: “propósito”}
const mano = {elemUno: “mano”, elemDos: “a”, elemTres: “mano”}
const causa = {elemUno: “por”, elemDos: “causa”, elemTres: “de”}

Group 2.6

In this group, expressions that do not fit in any of the five groups introduced in this second part and that can be sorted out into two cases will be presented. These expressions share at least one of their meanings (or their meanings are related). The names of the objects will be a nucleus of Spanish and Portuguese expressions. As in previous groups, *espNucleoOne* addresses the elements that belong to the phrase that contains the first nucleus of the Spanish expression, *espNucleoTwo* indicates the elements that belong to the phrase that contains the second nucleus of the Spanish expression, *portNucleoOne* addresses the elements that belong to the phrase that contains the first nucleus of the Portuguese expression, and *portNucleoTwo* indicates the elements that belong to the phrase that contains the second nucleus of the Portuguese expression. Regarding the complexity of these objects, arrays and strings may be found in them.

In the first case, the pair differs from those of the previous groups because each of its expressions has two nuclei and the spelling of both the nuclei of one of the expressions matches the spelling of both the nuclei of the corresponding expression. Nonetheless,

the spelling of the other elements of the object in question differs. The following example has been found:

const luz = {espNucleoOne: “dar”, espNucleoTwo: [“a”, “luz”], portNucleoOne: “dar”, portNucleoTwo: [“à”, “luz”]}

In the second case, the pair differs from those of the previous groups because each pair has two nuclei but the spelling of only one of the nuclei of one expression matches the spelling of one of the two nuclei of the corresponding expression.

const tomar = {espNucleoOne: “tomar”, espNucleoTwo: [“la”, “delantera”], portNucleoOne: “tomar”, portNucleoTwo: [“a”, “dianteira”]}

Conclusion

In this paper, the content of programming objects aimed to teach and to practise contrastive Spanish and Portuguese spellings has been presented. The plasticity of these objects lies in the fact that they can associate related Portuguese and Spanish spellings in different ways. For example, different parts of speech may be integrated into the construction of the programming objects that were proposed. In the first part of the *Programming Objects* section, for instance, verb and non-verb forms have been combined to reflect Portuguese and Spanish spelling similarities and differences which are thought to lead to confusion in Spanish speakers’ written production in Portuguese.

In the second part of the *Programming Objects* section, plasticity in the construction of programming objects to teach contrastive aspects of the Spanish language and of the Portuguese language has been reflected in objects focusing on Spanish and on Portuguese expressions. These objects can serve multiple purposes. For example, their content can be used to build electronic activities that tackle the spelling of the components of Portuguese and Spanish expressions separately. It can also be employed to create electronic activities that deal with comparative aspects of the spelling of expressions from both languages. Moreover, it may serve in the construction of electronic activities that centre on awareness of the elements that compose expressions or on the order of these elements within them in the Spanish language or in the Portuguese language separately or in both languages comparatively.

Since in this article the focus of the content of objects to teach expressions was on spelling, a classification of these objects based on this criterion was suggested. Nevertheless, it would also be interesting to examine the possibility of using

programming objects whose content is selected according to other classifications of expressions (a case in point are those that take semantic aspects of language into account). Furthermore, the possibility of transposing the content of expressions from the syntax used in this paper to the syntax of nested objects or to the syntax of other programming languages in order to store content that is relevant for the construction of software applications that teach PFL could also be explored.

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