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Does Graphophonemic Competence Exist? Tests on Native Speakers and ESL Students.

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ABSTRACT

Graphophonemic competence is a reading subskill that allows speakers to associate sounds to written discourse via the sublexical route. This means that the speaker can establish the grapheme-phoneme relationship, especially when reading words for the first time. This study attempts to measure the graphophonemic competence in several populations of speakers, both native and non-native. The method used for this research is the phonemic interpretation of non-words, in order to analyze to what extent the participants were able to identify the most likely pronunciation of a set of words. This study has allowed us to prove that graphophonemic competence exists, indeed. Moreover, we have seen that this competence can be better developed through specific teaching.

Graphophonemic, competence, non-word, reading, teaching

La competencia grafofonémica es una sub-habilidad de la lectura que permite al hablante asociar, mediante la ruta subléxica, el sonido a la palabra escrita, es decir, establecer la relación grafía-fonema incluso en palabras que el hablante lee por primera vez. Este estudio trata de medir la competencia grafófonemica de distintos grupos de hablantes, nativos y no nativos. El método usado para esto consiste en la interpretación fonémica de non-words, para después comprobar en qué medida los participantes son capaces de identificar la pronunciación mas adecuada para un grupo de estas palabras. Este estudio nos ha permitido demostrar que efectivamente existe una competencia grafofonémica que, además puede ser mejor desarrollada mediante la enseñanza.

INTRODUCTION

In this paper we address the issue of grapho-phonemic competence. The notion of competence from a linguistic point of view was first introduced by Noam Chomsky as "the speaker-hearer's knowledge of his language," and he also distinguished *competence* from *performance*, which is "the actual use of language in concrete situations." Performance must not be trusted to be an accurate way to measure the speaker's linguistic competence, as it is usually affected by external circumstances surrounding the speaker (Chomsky, 4). We could probably say that grapho-phonemic competence is part of this linguistic competence: the part that deals with grapho-phonemic rules, that is, with the way sounds are represented in written discourse. Therefore, a first definition of grapho-phonemic competence could be: the speakers' knowledge of letter-to sound correspondences in a language, as part of their linguistic competence. However, we must bear in mind that, while a complete lack of linguistic competence as that described by Chomsky would make it impossible for the speaker to communicate at all, grapho-phonemic competence only affects reading; a lack of this competence would not affect speaking or understanding of oral discourse. Therefore, we must consider whether it is really a part of Chomsky's concept of linguistic competence, or rather it is an independent skill which is also dispensable.

Grapho-phonemic competence is especially important in English, since the English spelling-sound system is more complicated than, for instance, that of the Spanish language. The Spanish writing system is *shallow*, meaning that "the correspondences between letters and sounds (graphemes/phonemes) in the writing system are close to one-to-one" (Davis, 4), while the English writing system is *deep*.

> Written English (…) appears as the most inconsistent "deep" orthography in the world. In English the reader has first to be able to make orthographic segmentation of multi-letter and often inconsistent graphemes (thief - /th/ /ie/ /f/), where the knowledge of basic letter sounds does not suffice for being able to use the grapheme/phoneme (letter/sound) correspondences. In English, the reader also has to take contextual influences into consideration, and some irregular words completely elude phonemic assembly. (Davis, 4)

Regarding these complications coming from the orthographic depth of the English writing system, Venezky claims that English orthography is "fundamentally

alphabetic,"[1] but it has deviations: after all, there are only 26 letters in the English alphabet for the more than 40 sounds of the language (4). We could think that this is a flaw of the English writing system, but in fact "English orthography is not a failed phonetic transcription system. Instead, it is a more complex system that preserves bits of history, facilitates understanding, and also translates into sound" (Venezky, 4): the "complications" or deviations of the English spelling-sound system are the result of the different invasions Great Britain has suffered throughout history by different people who left the footprints of their own language as they passed by the country. However, one thing is for sure: it is necessary to have a good knowledge of the language to be able to understand ─and sometimes even predict─ the rules of this complex writing-sound system: "any time we engage with print, we are confronted with an orthography that demands some special knowledge to be rendered into sound" (Venezky, xi). This difference in orthographic depth between the English and Spanish writing systems may be an obstacle for Spanish native speakers with English as their second language if they want to develop a native-like grapho-phonemic competence. Enrique Cámara, based on Chomsky's and Halle's theory, says that a writing system may be optimal for native speakers learning to read and at the same time utterly diabolical for L2 students of that language learning to speak. And this seems to be the case in English. (Cámara, 14).

We could affirm that grapho-phonemic competence can be considered as a skill that is independent from Chomsky's concept of linguistic competence, due to the fact that grapho-phonemics only affects reading, and we do not need to be able to read in order to communicate in a language, i.e. to have linguistic competence. Therefore, one of the features that characterize grapho-phonemic competence is that it is a skill concerning reading. First, we can say that it is a reading sub-skill. The sub-skills approach to reading states that "under the reading skill there are a lot of individual skills, which are called sub-skills" (Pan, 113). Moreover, this approach defends the idea that sub-skills can be attained with practice, and that their full development can only be reached through the "conscious practice of each specific skill" (Pan, 113). This idea that reading sub-skills can be acquired through practice and specific raining will be a key element for our research; since one of our premises is that grapho-phonemic competence can be

[1] In alphabetic orthographies there is a letter for each sound of the language.

taught. However, as we have said before, it is essential to have a good knowledge of the language both to fully acquire this competence and to be able to teach it: “if we can begin to understand the English orthographic system better, then we should be better able to understand the relationship between that system and the manifold problems of teaching people to read and write our language” (Cummings, xxviii). Another way to address the issue of grapho-phonemic competence being an independent ─ and not necessarily indispensable ─ reading skill is the Dual Approach to Reading, which contends that the process of reading can take two different possible routes: the lexical route and the sublexical (also known as nonlexical) route.

> Reading via the lexical route involves looking up a word in a mental lexicon containing knowledge about the spellings and pronunciations of letter strings that are real words (and so are present in the lexicon); reading via the nonlexical route makes no reference to this lexicon, but instead involves making use of rules relating segments of orthography to segments of phonology (Coltheart, 9).

Given that we have said that part of grapho-honemic competence implies the ability to establish letter-to-word correspondences in written discourse, it would be correct to think that it is applicable when words are new and/or unknown; in these cases, a nonlexical route is the only possible procedure available. To sum up, our premises regarding the main characteristics of grapho-phonemic competence are the following:

- It is independent from linguistic competence.
- It can be understood as a sub-skill of reading.
- It can be acquired and developed through specific training.
- It is especially related to one of the two general processes of reading: the sublexical route.

The overall purpose of this study is to verify whether this grapho-phonemic competence exists or not, and if it does, in which populations of speakers it is more developed. Our initial hypothesis is that English native speakers should have a fully developed grapho-phonemic competence. Given that, as we have said earlier, grapho-phonemic competence can be understood as a reading subskill ─ and one of the fundamentals of the Subskills Approach to reading is that subskills can be taught and fully acquired with practice ─ we consider that they should have acquired and developed it as part of their life-long exposure to written materials and reading practice in the English language. But given this fact that we consider training and practice as an

essential element to acquire this skill, it is very likely that non-native speakers who receive a specific education in grapho-phonemics also acquire a grapho-phonemic competence that is probably equivalent to that of the native speakers. We will try, as far as possible, to measure the distance between the competence existing in these ESL students who are instructed and trained in grapho-phonemics and the native grapho-phonemic competence. We will also make a comparison with other non-native speakers who also have a high level of the English language but who have not had such a specific training in this field. Our study will basically entail assessing the presence or absence of grapho-phonemic competence in different populations of speakers through an exercise that involves choosing between possible alternative readings of non-words. A similar kind of research was carried out by S. Joubert, who used the silent reading of non-words to study the reading process through the sublexical route. Our study differs from Joubert's in the fact that we did not base our tests in reading, but rather in discrimination. Our subjects choose between different possible realizations of the same word, while Joubert only analyzed the pronunciations produced by his participants when reading a word. Moreover, we have worked with different populations of speakers (both native and non-native) while he only worked with native speakers in order to study their mental processes when executing different reading tasks that involve using the sublexical route. In any case, this is ─ as far as we know ─ the first study in which the reading of non-words is used to measure grapho-phonemic competence.

METHOD

I. THEORETICAL ISSUES

As we have mentioned in the Introduction section, we have used E. Cámara's work on grapho-phonemics as a guide for this project. We have designed a set of non-words that match the grapho-phonemic rules he establishes in Chapter 1, which affect the phonemic interpretation of the letter <a>. Letters <a> and <o> are the most complex from the grapho-phonemic point of view; for instance, they are the only graphemes whose pronunciation is affected by the initial high-specification context <w, qu->[2]. From the 44 rules covering the pronunciation of <a> that we find in Cámara's Chapter 1 we selected 24 rules and created 24 non-words based on them.

The following table shows the grapho-phonemic rules affecting letter <a> that we have taken to create the non-words we have used for this research, and the predicted pronunciation for them based on these rules.

Table 1.

NON-WORD	**RULE**		**PREDICTED PRONUNCIATION**
sha	**<a> I 1**	<a> + || → /ɑː/	/ʃɑː/
fraw	**<aw> 1**	<aw> → /ɔː/	/frɔː/
craff	**<a> I 2a**	<a> + C (CC) + || →/æ/	/kræf/
dwast	**<a> I 2c**	<w, qu> + <a> + C (CC) + || → /ɑː/ (Am) /ɒ/ (Br)	/dwɑːst/ /dwɒst/
quax	**<a> I 2d**	<w, qu> + <a> + <k, ck, x, g, nk, ng> + || /æ/	/kwæks/
drall	**<a> I 2e**	<a> + <ll, lk, lt, ld> + || →/ɔː/	/drɔːl/
tark	**<a> I 2h**	<a> + <r > (+ C (CC)) + || →/ɑː/	/tɑːrk/
swarce	**<a> I 2i**	<w, qu> + <a> + <r > (+ C (CC)) + || /ɔː/	/swɔːrs/
stady	**<a> II 2g (exception)**	<a> + C + V + || →/ɑː/ But if V = <y> →/eɪ/	/ˈsteɪdi/

[2] The initial high-specification context occurs when the graphemes <w-, qu-> precede the stressed vowel, which affects its usual phonemic interpretation.

chare	**<a> I 3e**	<a> + <r> + <e> + ||→ /e/ (Am) /eə/ (Br)	/ʧer/ /ʧeər/
scadge	**<a> I 4a**	<a> + CC + <e> || →/æ/	/skædʒ/
raftan	**<a> II 1a**	<a> + CC(C)… → /æ/	/ˈræftən/
cranger	**<a> I 4d**	<a> + <th, ng, st, ch> →/eɪ/ **(Rule applied to words stressed on the penultimate syllable)**	/ˈkreɪndʒər/
scable	**<a> II 2a**	<a> + C + V…→/eɪ/	/ˈskeɪbl/
stalter	**<a> II 1c**	<a> + <lt, ld, lk, ls, ln, lr, lw>… →/ɔː/	/ˈstɔːltər/
tarper	**<a> II 1d**	<a> + <r> + C(+C)… →/ɑː/	/ˈtɑːrpər/
warrel	**<a> II 1e**	<w, qu> + <a> + <r > + C… →/ɔː/	/ˈwɔːrəl/
spater	**<a> II 2a**	<a> + C + V…→/eɪ/	/ˈspeɪtər/
raxon	**<a> II 2c**	<a> + <x> + V… → /æ/	/ˈræksən/
scative	**<a> II 2e (exception)**	<a> + C + V + C (+C) →/æ/ But <-ative> → /eɪ/	/ˈskeɪtɪv/
drary	**<a> II 2h**	<a> + <r> + V… →/e/ (Am) /eə/ (Br)	/ˈdreri/ /ˈdreəri/
anfillous	**<a> III 1a**	stressed <a> on the antepenultimate syllable + C(CC) → /æ/	/ˈænfɪləs/
cartible	**<a> III 1b**	stressed <a> on the antepenultimate syllable + <r> + C(C) →/ɑː/	/ˈkɑːrtɪbl/
taudder	**<au> 1**	<au> →/ɔː/	/ˈtɔːdər/

To interpret the structure of the grapho-phonemic rules presented in the table ─ as explained in Cámara (33) ─ we must know that anything written between <> represents letters: either the stressed vowel whose pronunciation we are describing, the graphemes that follow the vowel in the stressed syllable, or the letters that correspond to the initial high-specification context. A letter C refers to a consonant, and V refers to a vowel. The symbol || indicates the ending of the word, while suspension points … mean that the word continues, but whatever comes afterwards is not relevant. For instance, rule <a> II 2h (area /ˈerɪə/, /ˈeərɪə/), which we have used to create the non-word *drary*, applies to words in which the stressed <a> is followed by the letter <r> followed by any vowel, and whatever comes after this vowel does not affect the phonemic interpretation of <a>

One thing we had to bear in mind when designing the type of exercise to do this research was the issue of grapho-phonemics vs phonology. What we are trying to analyze in this study is the ability of different populations of speakers to make letter-to-sound associations when reading words they see for the first time, that is their grapho-phonemic competence. We are not testing their ability to properly articulate the difference between phonemes, which would mean a more phonetic/phonological approach.

Finally, there is one more issue that affected the design of our exercise. As we will see later in this section, we designed a multiple choice test. One thing to always take into account with this kind of exercise is the random factor that is always present in the participant's answers. We consider that their level certainty when answering the different questions may be a key point when measuring their grapho-phonemic competence based on this test.

II. PARTICIPANTS

The participants that were chosen to take the test were divided into two main groups of around five to ten people: native and non-native speakers. Native speakers from different English speaking countries (US, UK, Ireland and Australia) were chosen ─ Group A. They were used as a control group, assuming that they are an authority in their own language and that they should present some kind of grapho-phonemic competence, as part of their linguistic competence acquired through exposure to the English language. Non-native participants ─ Group B ─ were ESL students with different levels of English and different grapho-phonemic knowledge. Therefore they are further divided into four subgroups:

- Group B1: participants with a high level of English C1 of the Common European Framework of Reference for Languages but who had not been specifically trained on grapho-phonemics. This group was mostly made up of ESL teachers and University professors of Estudios Ingleses.
- Group B2: participants who have received a specific training on grapho-phonemics. All of them were students of the Grado en Estudios Ingleses at the

University of Valladolid at the time when this test was run, and they all had passed ─ with a grade of 8 or above ─ the course “Lengua Inglesa Instrumental I”, which features grapho-phonemic training as part of its syllabus.

- Group B3: participants with a lower level of English. Most of them are high school students with a B1 level ─ CEFR standards.

III. PROCEDURE

As we have said before, the type of test we used for this research was a multiple choice exercise. We designed a listening exercise in which we gave the participants the written non-words, and they listened to three possible pronunciations for them: the predicted pronunciation and two alternative unpredicted pronunciations with different vowel values for the stressed <a>. The reason why we chose a listening exercise over a reading one was the fact that the group of non-native participants with the lowest level of English could tend to pronounce the sounds of <a> in a way that was close to the Spanish pronunciation of this letter, so it would have been quite difficult to decide if the result of their reading was the one we had expected. Therefore, we opted for a controlled multiple choice listening exercise. We made sure that the alternative vowel values we chose for the unpredicted pronunciations were somehow distant from the vowel of the predicted pronunciations (i.e. we avoided using similar phonemes in the three options) to ensure that we were testing grapho-phonemic competence as something independent from phonological competence. For instance, for the non-word *sha* we gave the expected pronunciation /ʃɑː/, and the two alternative pronunciations we proposed were /ʃɔː/ and /ʃoʊ/.

We recorded the predicted pronunciations for the 24 non-words, as well as the two alternative unpredicted pronunciations for each of them, and inserted the recordings in a PowerPoint file in which the participants could play the audios for each question of the test; we used one PowerPoint slide per non-word. Each participant received an email containing this PowerPoint file and a link to a Google Form in which we designed our multiple choice test. This way the participants were able to play the audios for each question on the PowerPoint as many times as they needed, and mark their answers on

this form online, which allowed us to receive their answers as soon as they completed all the questions in the test.

We also wanted to measure the certainty factor that we have mentioned before. We made the participants answer all 24 questions of the test compulsorily; therefore there was a possibility that in non-words for which the participants were not able to find the predicted pronunciation at all, their answers were given in a completely random way. Since we were aware that this factor may affect the results and our conclusions, we introduced an element that would allow us to know how sure the participants were when answering each of the questions. The way to do this was to include a Likert scale as the one we can see in the image below after each question, and asked the participants to be honest about their certainty.

Figure 1. Likert scale to measure certainty.

Measuring this certainty factor allowed us to reach interesting conclusions when comparing the participants' level of certainty and their confluence in expected answers, as we will see in the Results and Discussion sections.

RESULTS

The results of the test have been analyzed at two different levels. On the one hand, the numbers of predicted answers of each participant, as well as their average percentage of certainty, were introduced in an Excel spreadsheet, in order to calculate the average percentage of predicted answers and certainty of each group. On the other hand we gathered specific data that show which were the most "conflictive" non-words for each group of participants. We did this by looking at the answers of each group to observe the confluence/dispersion factor in them. We were able to account for this with help of the general statistics that Google Forms show based on the participants' answers, since there was a different form for each group. This also allowed us to see whether there was a relationship between these words and the participants' level of certainty when answering these questions in particular; analyzing these data allowed us to reach quite interesting conclusions.

The following table shows the general results of the four groups together.

Table 2. General results.

ID	Exp. A	%	C. 0%	C. 25%	C. 50%	C. 75%	C. 100%	Av. C.
A001	18	75	0	1	2	7	14	85,42
A002	14	58,33	0	0	0	15	9	84,38
A003	19	79,17	0	0	0	3	21	96,88
A004	19	79,17	0	0	0	4	20	95,83
A005	17	70,83	0	0	1	16	7	81,25
Average	**17,4**	**72,5**					**Average**	**88,75**
B1001	15	62,50	0	1	5	14	4	71,88
B1002	14	58,33	0	3	0	15	6	75,00
B1003	17	70,83	0	0	3	10	11	83,33
B1004	9	37,50	6	8	5	0	0	18,75
B1005	11	45,83	0	0	4	15	5	76,04
B1006	17	70,83	0	0	3	11	10	82,29
B1007	20	83,33	0	5	9	9	1	56,25
B1008	17	70,83	0	0	1	1	22	96,88
B1009	23	95,83	0	1	5	6	12	80,21
Average	**15,88**	**66,2**					**Average**	**71,18**
B2001	21	87,50	0	0	0	6	18	93,75
B2002	23	95,83	0	0	3	4	17	89,58
B2003	20	83,33	0	0	5	8	11	81,25
B2004	19	79,17	0	0	0	21	4	82,29
B2005	24	100,00	0	0	0	4	20	95,83
B2006	19	79,17	0	0	1	7	16	90,63
B2007	19	79,17	2	8	9	5	0	42,71

Average	**20,71**	**86,31**						**Average**	**82,29**
B3001	15	62,50	0	7	10	7	0		50,00
B3002	13	54,17	3	4	11	6	0		45,83
B3003	14	58,33	1	5	5	6	7		63,54
B3004	9	37,50	0	5	8	7	4		60,42
B3005	13	54,17	0	4	11	6	3		58,33
B3006	16	66,67	0	5	10	8	1		55,21
Average	**13,33**	**55,56**						**Average**	**55,56**

Each line of the table contains the results obtained by one single participant. Each participant was assigned an ID to maintain their anonymity and respect their privacy. The ID starts with the letter that determines the group the participant belongs to (A, B1, B2, B3), followed by a number to distinguish the participants within the same group. For example, the five native participants (group A) are identified with ID's that go from A001 to A005. To give an example on how to interpret this table, we will take the line containing the results of participant A001, who pronounced a total of 18 words from the 24 words that make up the test in the predicted way (Pred. A.: predicted answers), which represent 75% of them. Then, we move on to the results regarding A001's level of certainty, based on what this person answered on the Likert scale after each question. For 14 of the chosen pronunciations, this participant showed 100% certainty that the non-word should be pronounced in the word he/ indicated; he showed 75% certainty in 7 cases, 50% in two cases, and 25% in one non-word. We calculated his average certainty (Av. C) which was 85,42%. The average number of predicted answers of all the participants of group A was 17,4 (72%), and their average level of certainty was 88,75%. The results of the rest of the groups can be interpreted in the same way.

We can observe group B2 ─ university students who have received a specific training on the field of grapho-phonemics ─ generated the highest amount of predicted answers. They even surpass the native participants used as control group in this aspect; however, they do not exceed the natives in terms of certainty, although they are significantly closer in that than other groups of L2 speakers. Group B3 ─ participants with the lowest level of English ─ generated the lowest amount of predicted answers, and also showed the lowest level of certainty. This distance between the number of expected answers and the level of certainty is also something we have to bear in mind. As we can see in the table, the level of certainty in groups A (native) and B1 (high level

of English but no grapho-phonemic training) goes beyond their average confirmation of predicted pronunciations, while the certainty of group B2 (specific grapho-phonemic training) is a little lower, but quite close to their expected answers. In group B3 (lowest level of English) the average percentage of expected answers and the average level of certainty is exactly the same.

In order to find out which the graphophonemic rules the participants seem to have fully acquired ─ and also which are the most "conflictive" ones ─ we have determined a confluence/dispersion factor in each of the answers of each group. One of our premises is that there is random factor in multiple choice tests like the one we have done. This random factor may affect the results in some way; therefore we consider that confluence and certainty are related. We have calculated the average certainty for each answer, and created the following table with the data obtained.

The table gathers our data in the following order: for each non-word, we have presented values that show the confluence of responses (in percentages) in each answer (1, 2, 3) of each group, being the column on the left of each group (answer 1) the answer that we expected to obtain from the participants. For example, group A has a 100% confluence in answer 1 on the non-word *sha*, which means that the five participants coincided completely in selecting the same pronunciation, which was also the one (answer 1) predicted by the rules. The responses of group B1 are more dispersed: there is 89,9% confluence in answer 1, 11,1% confluence in answer 2, and 0% confluence in answer 3. Group A's results for *sha* would be an example of maximum confluence, while an example of maximum dispersion of answers would be, for instance, B3's *spater*: 33,3% confluence in answer 1, 33,3% confluence in answer 2, and 33,3% confluence in answer 3.

To obtain a result that informs us of the general dispersion of answers of each group we have calculated the average confluence in each answer within each group, which is presented in the line "Av. Conf". For instance, group A has a 79,17% average confluence in all predicted answers (answer 1), 20,83% average confluence in answers 2, and 0% in answers 3. From each average confluence we have calculated the standard deviation (S): a formula that gives us the amount of dispersion of a set of data with respect to its average value. The higher the standard deviation value, the more dispersed

the data are. We have calculated the standard deviation of the average confluence of each answer, but now we will only focus on the expected answers (column 1 of each group). From these calculations we have obtained the following results: group B2 has the highest average confluence of expected answers (86,30%), and the lowest standard deviation (14,29%), which means the lowest amount of dispersion of responses. Group A follows group B2, with a 79,17 average confluence of expected answers and a 17,17% standard deviation. B1's average confluence of expected answers is higher than B3's, but B1's standard deviation is also higher than that of B3, meaning that B1's answers are generally more dispersed than B3's.

The table also includes the average certainty (Av. C) of each group in each answer. These data have shown us that, generally, the higher the confluence in expected answers, the higher level of certainty. This is the case of *cartible* and *taudder* in group A: maximum confluence in expected answers and maximum certainty. However, in non-words with higher dispersion (e.g. B3's *spater*), the level of certainty is significantly lower.

Table 3. Confluence/Dispersion factor and Certainty.

Confluence/Dispersion Factor in groups												
	GROUP A			**GROUP B1**			**GROUP B2**			**GROUP B3**		
ITEM	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**
sha	100	0,00	0	88,9	11,1	0	71,4	28,6	0,00	100	0	0
	Av. C. 85%			**Av. C. 80%**			**Av. C. 75%**			**Av. C. 75%**		
fraw	80	20	0	77,8	11,1	11,1	85,7	14,3	0	50	33,3	16,7
	Av. C. 84%			**Av. C. 63%**			**Av. C. 89%**			**Av. C. 62%**		
craff	100	0	0	100	0	0	100	0	0	50	50	0
	Av. C. 85%			**Av. C. 80%**			**Av. C. 89%**			**Av. C. 50%**		
dwast	80	20		44,4	44,4	11,1	100	0	0	50	33,3	16,7
	Av. C. 65%			**Av. C. 58%**			**Av. C. 70%**			**Av. C. 45%**		
quax	80	20	0	66,7	33,3	0	100	0	0	83,3	16,7	0
	Av. C. 70%			**Av. C. 69%**			**Av. C. 82%**			**Av. C. 54%**		
drall	80	20		88,9	11,1	0	100	0	0	66,7	33,3	0
	Av. C. 85%			**Av. C. 80%**			**Av. C. 85%**			**Av. C. 62%**		
tark	100	0	0	88,9	11,1	0	71,4	14,3	14,3	83,3	16,7	0
	Av. C. 90%			**Av. C. 70%**			**Av. C. 71%**			**Av. C. 60%**		
swarce	60	40	0	55,6	33,3	11,1	85,7	14,3	0	66,7	33,3	0
	Av. C. 75%			**Av. C. 50%**			**Av. C. 64%**			**Av. C. 50%**		

stady	60	40	0	55,6	44,4	0	85,7	14,3	0	50	33,3	16,7
	Av. C. 65%			**Av. C. 58%**			**Av. C. 82%**			**Av. C. 54%**		
chare	60	40	0	44,4	33,3	22,2	85,7	14,3	0	66,7	33,3	0
	Av. C. 85%			**Av. C. 70%**			**Av. C. 70%**			**Av. C. 58%**		
scadge	80	20	0	55,6	33,3	11,1	100	0	0	50	33,3	16,7
	Av. C. 90%			**Av. C. 60%**			**Av. C. 70%**			**Av. C. 58%**		
raftan	100	0	0	88,9	11,1	0	100	0	0	83,3	16,7	0
	Av. C. 95%			**Av. C. 58%**			**Av. C. 82%**			**Av. C. 45%**		
cranger	60	40		66,7	33,3	0	100	0	0	66,7	33,3	0
	Av. C. 85%			**Av. C. 58%**			**Av. C. 71%**			**Av. C. 50%**		
scable	60	40	0	77,8	22,2	0	100	0	0	66,7	33,3	0
	Av. C. 90%			**Av. C. 96%**			**Av. C. 78%**			**Av. C. 54%**		
stalter	80	20	0	88,9	11,1	0	71,4	28,6	0	50	33,3	16,7
	Av. C. 80%			**Av. C. 71%**			**Av. C. 75%**			**Av. C. 41%**		
tarper	100	0	0	77,8	22,2	0	85,7	14,3	0	50	33,3	16,7
	Av. C. 95%			**Av. C. 78%**			**Av. C. 78%**			**Av. C. 37%**		
warrel	60	40	0	55,6	44,4	0	85,7	14,3	0	66,7	33,3	0
	Av. C. 80%			**Av. C. 78%**			**Av. C. 89%**			**Av. C. 58%**		
spater	60	40	0	44,4	44,4	11,1	57,1	28,6	14,3	33,3	33,3	33,3
	Av. C. 95%			**Av. C. 59%**			**Av. C. 70%**			**Av. C. 58%**		
raxon	80	20	0	77,8	11,1	11,1	71,4	28,6	0	66,7	16,6	16,6
	Av. C. 85%			**Av. C. 87%**			**Av. C. 71%**			**Av. C. 60%**		
scative	60	40	0	55,6	33,3	11,1	57,1	42,9	0	50	33,3	16,7
	Av. C. 70%			**Av. C. 81%**			**Av. C. 82%**			**Av. C. 41%**		
drary	60	40	0	44,4	33,3	22,2	71,4	28,6	0	50	33,3	16,7
	Av. C. 85%			**Av. C. 71%**			**Av. C. 70%**			**Av. C. 62%**		
anfillous	100	0	0	33,3	33,3	33,3	100	0	0	66,7	33,3	0
	Av. C. 95%			**Av. C. 78%**			**Av. C. 85%**			**Av. C. 54%**		
cartible	100	0	0	55,6	22,2	22,2	100	0	0	66,7	16,6	16,6
	Av. C. 100%			**Av. C. 65%**			**Av. C. 90%**			**Av. C. 62%**		
taudder	100	0	0	55,6	44,4	0	85,7	14,3	0	50	50	0
	Av. C. 100%			**Av. C. 59%**			**Av. C. 85%**			**Av. C. 58%**		
Av. Conf	79,17	20,83	0	66,22	26,3	7,4	86,3	12,5	1,19	61,81	29,8	8,34
Standard deviation (S)	17,17	17,17	0	18,68	13,8	9,64	14,29	12,8	4,04	15,13	10,9	9,84

We have highlited in a different color those non-words for which rules each group has shown a total confluence in expected answers. Group B2 (non-native participants trained on grapho-phonemics) have a total confluence in 10 items: *cartible*, *anfillous*, *scable*, *cranger*, *raftan*, *scadge*, *drall*, *quax*, *dwast*, *craff*. They are followed by the natives in group A, who have a total confluence in 8 items: *taudder*, *cartible*, *anfillous*, *tarper*, *raftan*, *tark*, *craff*, *sha*. 5 of these items coincide with those of group B2. It is interesting to observe that group B1 (non-natives with a high level of English but no grapho-phonemic training) have a total confluence in only one item (*craff*), which is closer to group B3, whose participants only have a total confluence in *sha*.

The results of our test can be summarized as follows:

- For all the questions, there was at least 50% expected answers in the four groups. Moreover, in four non.words (*craff*, *raftan*, *anfillous* and *cartible*) two of the groups (A and B2) have shown a total confluence in the predicted answer.
- Group B2 is at the top of the chart, even above the native participants in group A.
- Group B2 presents the lowest amount of dispersion in their answers, followed by groups A, B3 and B1, which has the highest level of dispersion.
- The level of certainty is also quite different among the four groups: groups A and B1's certainty exceeds their average number of expected answers. Participants in group B3 seem to be the most doubtful about their answers. Table 3 shows that certainty and confluence are closely related, and also that there are certain non-words ─ and consequently certain graphophonemic rules ─ that have been conflictive for some groups. This will be further discussed in the Discussion section.

DISCUSSION

The first thing we must take into account from the results that we obtained is the fact that for every non-word that we incorporated to the test, the average of conformity to the predicted pronunciation surpasses the 50% in all four groups A, B1, B2 and B3. We must also consider the fact that the higher confluence in predicted answers, the higher level of certainty we found in the participants; therefore a high confluence is not given randomly. These circumstances give us every indication that there is, indeed, a certain level of grapho-phonemic competence in them. The fact that group A gave a quite high number of rule-predicted answers (72,5%) proves our hypothesis that native speakers have a developed grapho-phonemic competence as one of their reading sub-skills. But the interesting fact is that it was group B2 ─ the university students of Grado en Estudios Ingleses, who have received a specific training the field of grapho-phonemics based on the rules gathered in E. Cámara's work ─ the one that generated the highest amount of predicted answers. This leads us to two important conclusions. First, there are works like those carried out by Cámara, Venezky or Cummings that have achieved to capture and describe a grapho-phonemic competence that is present and fully operational in native readers. Second, these rules can be used to help ESL students acquire a native-like grapho-phonemic competence. We have been able to appreciate this in the participants of group B2, who acquired this competence in their first year of University through Cámara's work, and seem to have retained it throughout four years of study in which they have not touched the topic of grapho-ponemics again in any specific way. But probably one the most interesting things about the results obtained is the fact that English L2 speakers who have obtained fairly good results without any specific training on grapho-phonemics: both groups B1 and B3 have also generated more than 50% expected answers. In the case of group B1 it was more to be expected that they showed a certain level of grapho-phonemic competence , since most of them are graduates in Filología Inglesa and are in the teaching profession. However, the results we had expected from group B3 were not as good. We now must address the question of how it is possible that L2 speakers who are not trained on the field of grapho-phonemics ─ even high school students ─ seem to have developed a certain level of this competence.

As we have said before, The Spanish writing system is shallow, while the English wirting system is deep. This also means a difference in the reading processes followed by the speakers of each language. English native speakers' reading process is phonic-oriented: " it is not primarily context-driven, but is, instead, a highly automatized, modular process. "Comprehension depends on rapid and automatic word identification" (Educational Research Newsletter and Webinars). English native speakers have a phonic lexicon where they store pronunciations that they later associate to written words. For example, a native speaker who has the phonemic sequence /'teɪbl/ stored on his lexicon will be able to associate the spelling <table> to that pronunciation by a top-down process that goes from a general, abstract knowledge that is kept in the lexicon to a specific application of this knowledge in the reading process. On the other hand, the reading process followed by Spanish speakers when learning English is spelling-oriented, also known as Concept-Oriented Reading Instruction (CORI): an approach to reading that defends that "the building blocks of reading (the alphabetics — phonics and phonemic awareness; the fluency and automaticity; the vocabulary; the comprehension) must be taught explicitly" (Reading Rockets). The shallow character of the Spanish writing system means that, when learning the English language, Spanish ESL students have to start from what is written and learn the pronunciation for every word they see for the first time. It is a bottom-up process in which we "build up" our knowledge. This difference in the natives' and L2 speakers' reading processes may explain why all of the groups made up of ESL students present grapho-phonemic competence: our shallow writing system consists in establishing grapheme-phoneme relations when reading, which helps us become familiar with the sublexical route we have used for our exercise with non-words. However, we still have to answer the question of why group B2 surpassed the native participants' average of expected answers. Given that what makes the different between the participants of this group and the rest of L2 speakers who took the test is the fact that they have been specifically trained on grapho-phonemics through Cámara's approach, we could reach the conclusion that grapho-phonemics needs to be taught in order for L2 speakers to reach a competence that is close to the native one. The fact that they did not only get close to group A but they are above them in the chart could tell us that specific training on this field makes ESL students more aware of the competence they have developed ─ as opposed to native speakers, whose grapho-

phonemic competence is acquired only through exposure to the English language ─ but also that the fact that we have used Cámara's approach for this research (an approach they're very familiar with) gave them an advantage over the native participants.

The results regarding the confluence-dispersion factor served to reinforce the conclusions we have reached until now. The fact that group B2 has a slightly higher average confluence in expected answers than group A and a lower standard deviation (which means a lower amount of dispersion of responses) is a ratification of B2's superiority regarding the identification of expected pronunciations for the non-words proposed in the test. It is somehow shocking that group B1's answers were more dispersed than those of B3 when the average confluence in expected answers of B1 was higher. But this could be related to the type of participants that made up each of these groups: while group B3 is formed of mostly high school students who are currently following the same education program, group B1 contains a more varied set of participants. All of them have at least a C1 level of English (CEFR standards), but some of them are graduates in Filología Inglesa, which means they have further knowledge of the English language than other participants of this group. The fact that B1 was a more heterogeneous group than B3 is, most likely, the explanation to the higher amount of dispersion in B1's answers. Another hypothesis that we had was that this confluence factor was related to the certainty factor. This has been proved as we can see in the case of group B3: the lower level of certainty the participants show, the more dispersed their answers are. Assuming that they were completely sincere when expressing how sure they were about their answers, it is probably right to say that in questions in which they were not sure about the answer or did not know it at all they chose to answer randomly. The fact that both group B1 have a higher average percentage of certainty than of expected answers tells us different things: on the one hand, that native speakers' innate linguistic competence gives them confidence when looking for the right pronunciation of the non-words. This could also apply to B1 participants, whose confidence comes from their high level of English and their years of experience with the language. The fact that group B2 has 86% expected answers and 82% certainty ─ there is very little distance between both elements ─ could be an indicator that a grapho-phonemic competence that has been fully acquired through study allows us to be almost always sure of our answers.

The confluence and certainty data are also the way to address another question after having reached the conclusion that all the participants that took the test present a certain level of grapho-phonemic competence: the issue of whether all the grapho-phonemic rules that we chose for this research are part of the participants' grapho-phonemic competence, or rather some of them seem to not be fully acquired by all the groups. If we take a look back at Table 3, we can see that both group A and B2 had more that 50% average confluence in expected answers, and also more than 50% average certainty in all the questions of the test. Therefore, we can conclude that all of Cámara's grapho-phonemic rules used to design the set of non-words for the test are part of A and B2's grapho-phonemic competence. However, we cannot conclude the same for groups B1 and B3. Here are some non-words in which either the confluence in expected answers or the certainty of these groups are below 50%:

Table 4. Grapho-phonemic rules that may not be part of B1 and B3's competence.

GROUP B1		**GROUP B3**	
R: **<a> I 2c**	*dwast*	R: **<a> I 2c**	*dwast*
R: **<a> I 3e**	*chare*	R: **<a> II 1a**	*raftan*
R: **<a> II 2a**	*spater*	R: **<a> II 2a**	*spater*
R: **<a> II 2h**	*drary*	R: **<a> II 1c**	*stalter*
R: **<a> III 1a**	*anfillous*	R: **<a> II 1d**	*tarper*
		R: **<a> II 2e (exception)**	*scative*

This is probably an indicator of those specific grapho-phonemic rules not being part of these groups' competence. Table 4 shows the non-words for which both the average confluence in expected answers and the average certainty were below 50% in each group. As we can see, there are two non-words that both groups have in common: *dwast* and *spater*. The fact that the participants had trouble with these specific non-words is quite interesting, since they have been created from grapho-phonemic rules that are considered to be particularly conflictive by experts in this field. *Dwast* ─R: <a> I 2c (watch /wɑːtʃ/, /wɒtʃ/) ─ is an example of the pronunciation of the letter <a> being affected by the high initial specification context. The fact that these participants had such dispersed answers and low certainty in this question of the test may mean that they

may not fully dominate grapho-phonemic rules affected by this phenomenon. But this could also mean that in these specific cases the rules proposed by Cámara, which technically describe the interpretation of these words (*dwast* and *spater*), do not reflect a real native-like grapho-phonemic competence, but rather an excessively optimistic estimation of the regularity of the English writing system. On the other hand, both groups also seem to have had trouble with the non-word *spater* ─ R: <a> II 2a (agent /ˈeɪdʒənt/). Here we tackle one of the most conflictive aspects of grapho-phonemics: rules which have VCV structure. Normally, the stressed <a> in words with VC# is pronounced /æ/, but when the consonant is followed by another vowel, /eɪ/ is the expected pronunciation of <a> (Cámara, 20). Rules with this kind of structure are usually the most difficult to acquire, so that may explain why non-native participants without specific training on grapho-phonemics do not show confluence in their answers when trying to identify the expected pronunciation for these words. There is one more case affected by this type of VCV rule in group B3: *scative*. Furthermore, it seems that group B1's competence does not include those rules that affect words in which <a> is followed by <r> and a vowel: see *chare* ─ R: <a> I 3e (care /ker/, /keəʳ/) ─ and *drary* ─ <a> II 2h (area /ˈerɪə/, /ˈeərɪə/). The rest of the rules presented in Table 4 that may not be part of B1 and B3's grapho-phonemic competence do not seem to be related in any way. The reason why these non-words in particular are conflictive for these groups may require further research. What we can be certain of is that a majority of the rules used to design our non-words are part of the competence of both the native participants and the specifically trained ESL students.

CONCLUSIONS

The conclusions we have reached from our research are the following:

1. Grapho-phonemic competence does exist. It is a reading sub-skill that allows speakers' to abstract the phonetic rules from written discourse. It is related to the sub-lexical dimension of the English writing system,
2. This competence exists in native speakers, who acquire it through a long-life exposure to the oral and written English language. Moreover, the grapho-phonemic rules that constitute the native competence can be brought together and described; we can find them in approaches such as Cámara's, Venezky's or Cummings'.
3. Spanish ESL students intuitively develop grapho-phonemic competence due to the spelling-oriented learning process they have to follow when learning the English language, which is different from the natives' phonic-oriented reading process. The way in which we learn to read English words allows us to acquire this competence to a certain degree, even without a specific training on grapho-phonemics. However, L2 speakers without this training do not acquire the most complicated grapho-phonemic rules, such as those with VCV structure or affected by the initial high specification context.
4. ESL students who receive a specific grapho-phonemic training acquire a competence that is comparable to that of the native speakers, and can even surpass it when identifying predicted pronunciations of non-words.
5. Therefore, grapho-phonemic competence is a skill that has to be specifically taught in order to be fully acquired. A high level of English in L2 speakers does not guarantee that Enligsh L2 speakers are able to read like natives. A native-like grapho-phonemic competence can only be apprehended through specific training, and the teaching method has to be adapted to the native language of the learners.

The results of the research have been generally satisfactory, since we have proved our initial hypotheses and discovered some interesting facts about this competence

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