The Production and the Syllabic Nature of Word Initial sC- Clusters in European Portuguese Speakers

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1. Introduction

Words written with the initial graphic sequences “es+C” (e.g.: escola/school) and “ex+C” (e.g.: exposição/exhibition) are definitely a controversial issue in the phonology of European Portuguese, as in other Romance languages (e.g. Italian1), especially when the syllabic status of the cluster has to be defined. The difficulty arises when the speakers have to identify the syllabic constituents, since the word initial -sC clusters cannot be accepted because they violate the Sonority Principle and the Dissimilarity Condition (Selkirk, 1982:116; Selkirk, 1984:110). This problem is more common in initial clusters of certain words in European Portuguese, due to a clear tendency to vowel deletion (in these graphic sequences) when vowels are not stressed.

We concluded that these sequences raise certain important issues:

- If these sequences are considered tautosyllabic, we are facing a violation of the Sonority Principle (Selkirk, 1984:110) and of the Dissimilarity Condition;
- speakers may face some difficulties in defining the syllable boundaries in these sequences;
- there is some variation and change from speaker to speaker, mainly due to the dialectal origin, in the case of European Portuguese.
- there seems to be some influence of the orthographic knowledge in the way the speakers produce and segment these words.

1.1 Different theoretical approaches to the graphic sequence “es+C”

According to the literature, there are three possible explanations to the initial graphic sequence “es+C” in European Portuguese.
1.1.1 Empty Nucleus

According to Miguel (1993), Mateus (1995) Andrade & Rodrigues (1999), Rodrigues (2000) Mateus & D’Andrade (2000), Andrade & Mateus (2000: 52), Rodrigues (2003), Freitas & Rodrigues (2003), there is not an initial vowel but an empty nucleus. Some authors claim that before the fricative there is no vowel but an empty nucleus, which avoids the violation of the Sonority Principle, since the fricative is the coda of the initial syllable. This perspective is definitely the most dominant in the study of the –sC clusters both in Italian (Marotta, 1995; Kaye, 1996; Bertinetto, 1999) and Portuguese.

1.1.2. Attributing syllabicity to the fricative

Another approach consists of attributing syllabicity to the fricative /ʃ/ (Delgado-Martins, 1994; Delgado-Martins, Mateus, Harmegnies & Poch, 1996; Leite, 1997; Freitas, 1997: 299; 2000: 507). Freitas (2000:507), based on language acquisition research, states that the fricatives are the consonants which are closer to the vowels in the sonority scale for the European Portuguese. Furthermore, attributing syllabicity to the fricatives also happens in the Slavic languages, which seems to justify this possibility also for the European Portuguese. There is, according to the author, a movement towards the left by the fricative, the consonant moves from the coda position to the nucleus, as we can see in Fig.1.

Attributing syllabicity to [ʃ]

1.1.3. The influence of the orthographic knowledge

The third explanation, which has been commonly overlooked, is the influence of the orthographic knowledge (Veloso, 2002:54) in these sequences. As the speakers see an orthographic vowel, they tend to produce it and insert it when segmenting the word. This approach is based on the notion that “both orthographic and spoken language experience modify phonological awareness and provide an informational space in which
phonological data derived from speech and written symbols could integrate” (Cheung et al., 2001:239).

### 1.2. Different theoretical approaches to the graphic sequence “ex+C”

As for the graphic sequence “ex+C”, there are two common perspectives, according to previous studies: i) filled nucleus; ii) influence of the orthographic knowledge.

#### 1.2.1. Filled nucleus

According to Andrade & Rodrigues (1999), Rodrigues (2000), Rodrigues (2003), Freitas & Rodrigues (2003), in these graphic sequences there is a filled nucleus /e/. Thus, the solution presented by this theory can be represented as /eS.p/. One of the clues for this thesis is the fact that when we add the prefix IN- in words like *inexperiente* (*inexperient*) we have the vowel [ɨ], which proves that there is an underlying vowel.

#### 1.2.2. The influence of the orthographic knowledge

According to our point of view, there is another possible explanation, which is related to the influence of the orthographic knowledge. This thesis can probably explain the differences between the two sequences, which have its origins in the evolution of Latin.

Therefore, one should take into consideration that these two graphic sequences have different origins in Latin, based on Rodrigues (2003: 347) and also Bourcier (1967: 47) who claims that: “Notons enfin que le x de l’alphabet était une consonne double, equivalente à k+s.” Even the evolution of words with the initial graphic sequence “es+C” proved to be different, according to Bourciez (1967: 48): “A partir du II siècle, les inscriptions prouvent que s initial suivi d’une autre consonne (groupes sp, st, sc) amenait en tête du mot la production d’une voyelle accessoire destine à faciliter la prononciation. Cette voyelle a été notee d’abord i, plus tard e: iscola, CIL. VI, 32965; ispose, ib. VIII, 3485; espiritum, ib. IX, 6408.” It is curious to notice that the disappearance of the initial vowel did not happen in written Portuguese; however, it tends to disappear in oral speech, nowadays. Nevertheless, the most important aspect is to discover if there is a phonological vowel.

To sum up, these evidences seem to prove, in our point of view, the influence of orthography in the phonological knowledge of the speaker.

### 2. Experimental study

#### 2.1. Aims

After analyzing the different theoretical perspectives, we decided to conduct a study with the following aims:

- To analyse the mental representation of these sequences in the phonological knowledge of the subjects, suggesting that the intuitive knowledge of the speakers should not be disregarded by linguists;
- to prove that phonetic data can be useful to understand the speakers’ phonological knowledge;
- to determine if there is an initial vowel in these sequences;
• in case there is an initial vowel, to study its nature: phonetic or phonological;
• to find out if these sequences have the same underlying structure;
• to determine if we can talk about change and variation, in case these structures may be considered tautosyllabic by the speakers.

We considered that an experimental study would allow us to find the solutions to this problem and to perceive how the speakers produce and segment these words. We believe that the phonological theory cannot overlook the speakers' phonological knowledge. As Hinskens, Van Hout & Wetzels (1997: 2-3) claim: “It seems to us that the most efficient way of bridging the gap between different theories and methodologies is to discuss the issue of variation on the basis of case studies that explicitly address the question of the tension between variation and theoretical abstraction.”

### 2.2 Method

14 Students looked at pictures and were asked to produce the words (words with initial graphic sequence “es+C”). In the case of the words with the initial graphic sequence “ex+C”, they were given a clue to guess the word, instead of an image, since some of these words are difficult to represent through images (e.g.: expulso/ expelled; experiência/ experiment).

15 The second phase consisted of the segmentation of the same words, since the manipulation of syllables can give us a clearer picture of how the speakers perceive these segments, more precisely, how they define the syllable boundaries.

16 The interviews were recorded, heard several times and the results were statistically analysed with the program SPSS 16. The test used was the Mann-Whitney test since we were testing a reduced number of speakers and two independent variables: the orthographic knowledge and the dialectal origin. The influence of orthographic knowledge and the dialect were the basis of the assumptions that orientated this study.

- Speakers produced the words differently according to the dialect;
- there is a strong possibility that orthography and the process of learning to read and write may influence the way the speakers perceive these sequences, mainly in the task of segmenting the syllables.

<table>
<thead>
<tr>
<th></th>
<th>Northern dialect (oporto-septentrional dialect)</th>
<th>Southern dialect (Lisbon-central-meridional dialect)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nursery school</td>
<td>10 (5 M + 5 F)</td>
<td>0</td>
</tr>
<tr>
<td>5th grade</td>
<td>10 (5 M + 5 F)</td>
<td>10 (5 M + 5 F)</td>
</tr>
<tr>
<td>9th grade</td>
<td>10 (5 M + 5 F)</td>
<td>10 (5 M + 5 F)</td>
</tr>
</tbody>
</table>

17 Having these aims in mind, we selected some speakers from different age groups (Nursery school, 5th and 9th grade) and from different dialectal origin (Septentrional and Central meridional dialect).
The first group of speakers (attending the nursery school) was chosen because they have not been submitted to the process of learning to read and write; the students from the 5th year had already learnt the basics of orthography and were learning how to read and write proficiently. The ones from the 9th year were chosen because they had already learnt all the basic rules of the language.

The speakers were randomly chosen in each class but they did not have any physical or cognitive problems. The criteria for the selection of the speakers were: i) same area of birth and residence; ii) similar backgrounds and experiences based on an inquiry that was previously filled in.

We chose speakers from the Septentrional and Centro-meridional dialects because there is a clear tendency to the deletion of the initial vowel in the speakers from the South (central-meridional dialect), while the speakers from the North (septentrional dialect) tend to introduce a vowel in the first sequence and a diphthong in the second one (Barros Ferreira et al., 1996:495).

2.2.2 Corpus

All the words had the sequence fricative plus plosive (10 words for each graphic sequence):

- esponja (sponge), escada (stairs), espuma (foam), escuro (dark), esconde (hidding),
- escova (brush), espada (sword), estante (shelf), espelho (mirror), esquilo (squirrel),
- experiência (experience), expulso (expelled), extintor (fire extinguisher), exterior (external),
- exposição (exhibition), expiração (expiration), externo (external).

The variable stress was not tested.

3. Results

3.1. Production

![Graph showing the results of the production of the initial graphic sequence "es+C".](image)

Fig. 2. Results of the production of the initial graphic sequence "es+C"
As we can see from the graphics (Fig. 1 and Fig. 2), the words with the initial graphic sequence “es+C” are mainly produced without vowel (example: [ʃkɔl] - escola/school). The production with a vowel (in the words with the sequence “es+C”) is more frequent among the speakers from the Northern dialect.

There is a statistically significant difference between the speakers from the nursery school (production without vowel) and those attending the 9th form (z=−2.799; p<0.005). The only other statistically significant difference was the results of the production without vowel of the speakers from the 9th form of the Septentrional and Central-meridional dialect (z=−2.834; p<0.005).

On the other hand, in the words with the initial sequence “ex-C”, the speakers insert vowel or diphthong. (example: [ɐʃpɔɾ]/[ejʃpɔɾ]/[ʃpɔɾ] = expor/exhibit).

Productions with vowel deletion are in average more frequent among the speakers from the South (Lisbon). Therefore, these results seem to preserve the dialectal differences.

### 3.2. Segmentation

![Fig. 4. Results of the segmentation of the initial graphic sequence “es+C”](image-url)
As we can conclude from the fig. 4 and fig. 5, in the case of the “ex+C”, the results showed that:

- Speakers who did not learn how to read or write segmented the graphic sequence “es+C” without the initial vowel.
- The speakers tend to introduce a vowel or diphthong when they segment these sequences.
- There is only a statistical significant difference between the speakers attending the 9th form from the North (Oporto) and those from the South (Lisbon).
- Both sequences are segmented as heterosyllabic.

Conclusions

Although some of the results were not statistically significant and this was a study with few speakers, we can draw some important conclusions:

- The speakers do not produce these graphic sequences the same way.
- In the first sequence (“es+C”), there is probably an empty nucleus (cf. Andrade & Rodrigues, 1999) while in the second one (“ex-C”), there’s probably an underlying vowel (/eSC/) (cf. Freitas & Rodrigues, 2003).
- Both sequences are segmented as heterosyllabic.
- The results were similar among the different groups regardless of the school year or dialect.
- There was a certain influence of the orthographic knowledge, especially in the words with the graphic sequence “ex+C”.

On the other hand, some of the early predictions proved to be wrong or at least inconclusive, such as:

- The possibility of tautosyllabic segmentation, based on Delgado-Martins (1996). This hypothesis did not occur in this study.
- The possibility of change and variation. The only change is the fact that the results of both dialectal groups are similar, which was unexpected since there are some clear differences in the production of these sequences.
- This is possibly the result of orthographic knowledge.

To sum up, some of the data showed the influence of the orthographic knowledge, the importance of learning to read and write in the phonological awareness of the speakers. This was especially evident in the graphic sequence “ex+C” with the insertion of the...
diphthong which may also be the result of the evolution of language (Rodrigues, 2003: 347; Bourciez, 1967: 48). Furthermore, the similar results among the different groups from different dialects may be the result of the influence of the orthographic knowledge acquired at school.

Nonetheless, there are still questions related to the ‘grey area’ of the fricatives in the beginning of the syllable. These can be some of the topics to be considered in a future study with more data from language acquisition, more speakers and also different tasks such as reading spontaneous speech.

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**BIBLIOGRAPHIE**


NOTES


2. Based on the study of Content, Kearns and Frauenfelder (2001) who are in favour of the influence of the orthographical knowledge in the phonological knowledge.

3. Veloso (2002:54) conducted a study with young Portuguese speakers.

4. The phonological status of this vowel may be questioned, since some authors (Mateus & D’Andrade, 2000) do not consider it a vowel of the Portuguese.

5. Rodrigues (2003:347) argues that the words with the graphic sequence “es+C” come from words with [sk], [st], and [sp], while words with the graphic sequence “ex+C” derive from words beginning with EX-.

6. Bourciez (1967: 158) states that the evolution of Latin lead to the disappearance of the initial vowel: “La voyelle qui s’était développée à l’initiale devant s-cons. […] n’a persisté qu’en Occident où elle s’est fixée sous forme de e faisaient partie integrante du mot.”


8. There is a clear tendency to the deletion of the initial vowel in the speakers from the South, while the speakers from the septentrional dialect tend to introduce a vowel in the first sequence and a diphthong in the second one (Barros Ferreira et al., 1996:495).
Le but de cette étude est la compréhension du statut syllabique des mots ayant les séquences graphiques initiales “es+C” et “ex+C” en portugais, puisqu’elles violent le Principe de la Sonorité (Selkirk, 1982:116). Ainsi, on a procédé à une étude avec des locuteurs appartenant à de différents groupes d’âge et origines dialectales. On a choisi dix locuteurs de la maternelle, de l’école élémentaire (dernière année) et des collégiens en troisième de la région de Lisbonne et du Porto. Après avoir visionné des images, les locuteurs devaient produire et segmenter les mots y représentés. Les résultats ont démontré que ces séquences graphiques ont une structure sous-jacente différente et que les différences dialectales ont tendance à disparaître à cause de l’influence (de l’apprentissage) de la lecture et de l’écriture, car les élèves inséraient une voyelle dans la première séquence et une diphtongue dans la seconde (“ex+C”) lorsqu’ils segmentaient les syllabes.

This study aims at understanding the syllabic status of words written with the initial graphic sequences “es+C” and “ex+C” in European Portuguese, since they violate the Sonority Principle (Selkirk, 1982:116). Having this purpose in mind, we selected some speakers from different age groups and from different dialectal origin. We chose 10 speakers who attended nursery school, the 5th grade and the 9th grade in the area of Oporto and Lisbon. After some images were shown, the speakers were asked to produce and segment the words with the two graphic sequences. Some of the data showed that these sequences may have a different underlying structure and the dialectal traits may be disappearing due to the influence of learning to read and write, since some of the speakers introduced a vowel in the first sequence (“es+C”) and a diphthong in the second sequence (“ex+C”) when segmenting the syllables.

**INDEX**

**Mots-clés :** Conscience phonologique, segmentation phonologique, connaissance orthographique, production orale, variation dialectale

**Keywords :** Phonological awareness, dialectal variation, phonological segmentation, orthographic knowledge, oral production

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