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Cognition, représentation, langage

HS-11 | 2012

RJC Cotexte, contexte, situation

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Electronic version

URL: <http://journals.openedition.org/corela/2093>

DOI: 10.4000/corela.2093

ISSN: 1638-573X

Publisher

Cercle linguistique du Centre et de l'Ouest - CerLICO

Electronic reference

Claudia Sylvia, « “Raining c_ _ _ and _o_ _” - The role of the syllable onset in word recognition in reading in Portuguese », *Corela* [Online], HS-11 | 2012, Online since 02 April 2012, connection on 22 April 2019. URL : <http://journals.openedition.org/corela/2093> ; DOI : 10.4000/corela.2093

This text was automatically generated on 22 April 2019.

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"Raining c_ _ _ and _o_ _" - The role of the syllable onset in word recognition in reading in Portuguese

Claudia Sylvia

1. Introduction

- 1 In this study, we presuppose that the syllable onset provides better clues for word recognition in reading in Portuguese than the rime or its constituents (nucleus and coda).
- 2 The postulation of this hypothesis was motivated by the results from a previous study (Silva, 2006) related to chat discourse. We found out that, in the type of writing that occurs in this type of synchronous computer-mediated communication, the syllable onset was generally preserved, whereas the rime was more prone to deletion.
- 3 Moreover, we could notice that, in TV contests, it seems that the contestants get better results in guessing a word when the initial onset is given.
- 4 Thus, we considered it relevant to verify the importance of the (initial) syllable onset to word recognition in reading.
- 5 The importance of the onset is suggested in previous research. In fact, as far as reading is concerned, it was shown that units of a higher level (like the onset and the rime) facilitate reading more than lower-level linguistic units (like the phoneme) in English, according to Treiman & Zukowski (1996: 210-211) and Goswamy (2002: 47-48). Furthermore, the preservation of the whole onset or rime facilitates reading. Consequently, when external symbols are employed to segment words, it is observed that a word is more easily read when the unit of the onset or the rime is kept (as in "cl//asp") rather than when it is interrupted, as in "c//lasp", as suggested in studies by Treiman (1994: 106), Bowey (1996: 590) and Assink *et al.* (1998: 640).

- 6 The relevance of consonants in the reading process in English is pointed out by Lee, Rayner & Pollatsek (2001), who show that there is a stronger activation of the consonantal skeleton of the written words when compared to the activation of vowels. Also, in consonant scripts, only consonants are represented; the fact that vowels only indicate grammatical or derivational changes, whereas the consonant roots express lexical content, favours their suppression (Coulmas, 1996: 91).
- 7 Word processing also suggests the importance of the onset, especially the word onset. The beginning of words provides clues for word perception - as is shown in the fact that initial phonemes go through less assimilation processes (Gow *et al.*, 1996). An important factor for word organization in our mental lexicons is based on phonological information - the initial phoneme is a very important factor when it comes to lexical storage and access, as similar-sounding words are clustered together (as described by Reeves, Hirsh-Pasek & Golinkoff, 1998: 170). Moreover, an interactive model of word recognition in speech developed by Marslen-Wilson & Welsh (1978), the Cohort Model, refers to the importance of the initial phonetic information of a word to form the set of possible candidates in a given context. The phonetic information at the beginning of a target word activates all words in memory that resemble it, and it is only afterwards that syntactic and semantic information contribute to achieve word recognition.
- 8 Even in cases where cognitive factors like memory or attention affect the speakers' performance, it is visible a clear preference towards the onset. In "tip-of-the-tongue" cases, for example, even though one may fail to recall the word intended, one knows its initial phoneme (cf., for example, Reeves, Hirsh-Pasek & Golinkoff, 1998: 170). As far as slips of the tongue are concerned, the branching onset and the initial position are more prone to their occurrence (Meyer, 1992: 186-190), suggesting the relevance of this unit in this particular position.
- 9 Evidence may also be given in language acquisition. In fact, studies related to the syllabic types which appear in the babies' first words (vd. Fikkert, 1994 and Freitas, 1997) demonstrate that the simple onset is one of the first constituents to be acquired.
- 10 Therefore, our main question to be studied is whether the syllabic onset provides relevant information for word recognition in the reading process in Portuguese.

2. Experimental study

- 11 Bearing these descriptions in mind, we considered it relevant to carry out an experimental study in order to shed light to our understanding of the onset's role in word recognition as far as reading is concerned.

2.1 Objectives

- 12 The main objectives of this experimental study are defined below:
 1. To check if the syllable onset provides better clues for word recognition rather than the rime and the nucleus or coda¹.
 2. To verify if the position of the onset and of the rime in the first or second syllables influences the number of clues they provide for word recognition.
 3. To check if the preservation of the branching onset enables easier recognition.
 4. To reflect on the possibility of a digraph in medial position enabling easier word access.

5. To reflect on the importance of keeping the whole constituent (the constituent's unit).

2.2 Population

- 13 As far as the population is concerned, it was composed of twenty Portuguese native speakers, fourteen women and six men (gender was not a variable to be taken into consideration). Seeing that it was our purpose to find subjects that shared a common background, this population was composed of graduate subjects from the Faculty of Arts of Oporto. Thus, all of them possessed a high level of education, which we considered to be a pre-requisite for proficient reading, necessary to our experiment. The age of the subjects covers a relevant scope, between twenty-six and fifty-two years old, but mostly there were subjects in their thirties. The average age is 37,65 years.
- 14 According to our oral questionnaire, these people had never been diagnosed dyslexia or any problem related to reading.

2.3 Linguistic material

- 15 The linguistic material is based on nouns referring to objects or visible entities. We assumed that these nouns were of frequent usage and were known by any native speaker. They were also short nouns, monosyllables or disyllables, and they possessed a distinct syllable structure. It must be stressed that, although the graphemes generally correspond to phonemes in the chosen words, this is not the case when digraphs are used. The words were divided into the following groups:

- **Group I**

Monosyllables composed of Consonant, Vowel, Consonant (CVC):

Words: sol (sun); mar (sea); lar (home)

- **Group II**

Disyllables composed of Consonant, Vowel and Consonant, Vowel (CV.CV)

Words: sapo (frog); saca (plastic bag); pele (skin); pata (paw)

- **Group III**

Disyllables composed of Consonant, Vowel, Consonant and Consonant, Vowel (CVC.CV)

Words: relva (lawn); porta (door); mosca (fly); carta (letter)

- **Group IV**

Disyllables composed of Consonant, Consonant, Vowel and Consonant, Vowel (CCV.CV)

Words: prato (plate); braço (arm)

- **Group V**

Disyllables composed of Consonant, Vowel and Consonant, Consonant, Vowel (CV.CCV)

Words: livro (book); pedra (stone)

- **Group VI**

Disyllables with a digraph at the beginning of the second syllable

Words: massa (pasta); carro (car); leque (fan)

2.4 Methodology

- 16 The subjects were given a set of sentences in which one of the words was not completely specified as it had gaps replacing letters. Each sentence was given on a separate piece of paper and the context provided clues for word recognition, even though it did not allow

immediate access to the word. The subjects' task consisted in trying to guess the word as quickly as possible for which they were given a maximum of 5 attempts or 30 seconds. The subjects were told that, even though more than one alternative was possible, it was expected that they guessed the correct word.. We considered that accepting other words could evaluate the subjects' reading competence but not the actual understanding of the message conveyed, which was what we were testing, and thus we decided not to accept other words. As soon as the correct word was discovered, or the time limit was exceeded, the time it took for the person to answer was counted in seconds. At first, subjects were given two sentences to practice the task.

17 The sentences which were presented are the following:

- Gosto do m___ azul. (mar) – I like the blue sea.
- Estou num ___ r acolhedor. (lar) – I'm in a cosy home.
- Sinto o ___ o ___ quente. (sol) – I feel the hot sun.
- A ___e___ é um órgão importante do nosso corpo. (pele) - The skin is an important organ in our body.
- O ___ ___ o não é o meu animal preferido. (sapo) - The frog is not my favourite animal.
- Esta marca foi deixada por uma ___ t___ grande. (pata) – This track was made by a big paw.
- Trouxe tudo nesta s___ ___ grande. (saca) – I brought everything in this big bag.
- Não podes passar por cima da ___ el___. (relva) – You can't walk in the lawn.
- Ainda falta colocar a p___ ___ naquela casa. (porta) – That house's door is still missing.
- A ___ ___ c___ não parava de pousar na sua cabeça. (mosca) – The fly kept hanging over his head.
- meu br___ ___ está mais moreno que o teu. (braço) – My arm is darker than yours.
- Está no pr___ ___ azul. (prato) – It's in the blue plate.
- Comprei f___ ___ no mercado. (fruta) – I bought fruit in the market.
- Apanhei uma ___ dr___ no monte. (pedra)- I caught a stone in the hill.
- Recebi um ___ vr___ no Natal. (livro) – I got a book for Christmas.
- Ontem recebi uma ___ rt___. (carta) – I got a letter yesterday.
- Esqueci-me de comprar ___ ss___. (massa) – I forgot to buy pasta.
- A dama abriu o seu ___ qu___ gentilmente. (leque) – The lady gently opened her fan.
- A criança recebeu um ___ rr___ de prenda. (carro) – The child got a toy car as a gift.

2.5 Results

- 18 After the application of the test to the subjects, we calculated the number of correct and incorrect answers and the respective percentage. In relation to the correct answers, we determined the average time (in seconds) which the subjects took to answer.
- 19 The results are going to be presented according to the type of word, that is, monosyllables or disyllables, as well as the syllabic constituent presented. With respect to the constituents (onset and rime) and subconstituents (nucleus and coda) in disyllables, our analysis will include their position: whether they belong to the first or second syllables. In the cases where there are two words or more, we indicate the average result.
- 20 The results concerning the monosyllables are presented in chart number 1.

Chart n.º 1 – Results concerning monosyllables.

Constituent (E.g.:)	Correct answers	Time (seconds)	N.º Attempts
Onset (mar)	100%	6,25"	6
Nucleus (sol)	70%	6,36"	2
Coda (lar)	100%	4,3"	1

- 21 As far as disyllables are concerned, these were the results obtained:

Chart n.º2 – Results concerning disyllables.

Constituent (E.g.:)	Correct answers	Time seconds	N.º Attempts
Simple onset in initial position (saca, porta)	95%	6,80"	8,5
Simple onset in medial position (pata, mosca)	50%	9,38"	13
Branching onset in initial position (braço, prato)	100%	5,8"	2
Branching onset in medial position (pedra, livro)	77,5%	5,6"	4,5
Branching onset with only first consonant represented (fruta)	55%	4,82"	24
Onset with digraph (massa, carro, leque)	85%	6,19"	1,3
Consonants in 2 constituents (carta)	90%	4,39"	7
Complex rime (relva)	65%	11,08"	13
Simple rime in medial position (pele)	50%	10,3"	7
Simple rime in final position (sapo)	15%	16,3"	58

- 22 Through the observation of the results, it is evident the existence of a higher percentage of correct answers in monosyllables than in disyllables. As to monosyllables, the percentage of correct answers is more reduced when the nucleus is given (70%) than when the onset or the coda are specified (100%). Concerning disyllables, the higher percentage is verified in initial position, in the case of the branching onset (100%) or the simple onset (95%). The lower percentage, on the other hand, happens when the only constituent represented is the simple rime, especially in final position/ second syllable (15%). This case generates a great deal of ambiguity, which is suggested by the large

amount of attempts to guess the word. In fact, to deduce the word "sapo" (*frog*), many other alternatives are suggested, like "gato, pato, rato, lobo, galo, leão" (*cat, duck, mouse, wolf, cock, and lion*).

2.6 Discussion of the results

- 23 The number of correct answers depends on word dimension: monosyllables have a higher percentage of success than disyllables, probably due to their easiness and accessibility, which implies less cognitive effort in the retrieval of the missing letters. We can generally conclude that the syllable nucleus is the one which provides fewer cues for lexical recognition as it presents a lower percentage of correct answers and requires more time to recognition. Indeed, the vowels that compose the nucleus do not limit the group of possible words in a large extent since their reduced number makes them less distinctive or informative. Therefore, vowels are easily predictable when consonants are graphically represented as happens in consonantal writing systems.
- 24 Concerning monosyllables, both the onset and the coda enable easier word recognition in this corpus. This contradicts our prediction that the onset provided more clues than any of the other syllabic constituents. It can be due to the fact that a coda consonant, in a monosyllable, easily enables a better identification of the syllabic type of the word, as it excludes the possibility of the existence of a complex nucleus. But we believe that we should have used more examples since the sentence given in the case of the coda was easier than that with the onset represented, which allowed some confusion with the possessive determiner "meu" (*my*).
- 25 As far as disyllables are concerned, we reached the conclusion that the constituent that facilitated word recognition was the branching onset in initial position (100% of correct answers), which confirmed the hypothesis formulated. The branching onset provides clues for word recognition seeing that it is a marked structure and, as such, infrequent; consequently, it is very informative.
- 26 But it is the initial position that mostly favours word recognition since the presence of the branching onset in medial position or second syllable obtains fewer correct answers than the same constituent in initial position; also, the simple onset in initial position has a very significant amount of correct answers. This corroborates the results obtained by Gow *et al.* (1996), which suggest the prominence of the word initial position (word onset) to lexical recognition (although this study focussed in oral speech whereas ours is associated to reading). Moreover, as reading in the Portuguese alphabetic system is processed from left to right, it is expectable that word initial position is more relevant than other positions. The relevance of the initial position may also be related to the primacy effect in memory, as reviewed by Nunes (2001), which may imply that the initial letters are essential in accessing the word and retrieving it from our memory.
- 27 There was also a case in which only part of a branching onset was represented (<f> in "fruta" – *fruit*). According to the theories described in the first part of this article, it is important to preserve the constituents' unit in order to facilitate lexical recognition (vd. Treiman, 1994: 106; Bowey, 1996: 590 and Assink *et al.*, 1998: 640). This need to preserve the whole onset is supported by the results we obtained given that when part of the onset was suppressed, it was more difficult to find out the missing word. There were 24 alternative words suggested by the subjects, and most of them (83,3%) started with a simple onset, such as "facas, fiambre, folha, fatos, feijão" (*knives, ham, leave, suits, and*

beans). Goswami (2002) advises some training at the level of syllabic constituents during the process of learning how to read and we corroborate that this practice should not be forgotten in parallel with explicit phonemic training.

- 28 We wondered what the readers' response would be in the case of the word "carta", in which the unit of the constituents given is not respected since they belong to different syllables. It was expectable that the number of correct answers decreased owing to the disrespect of the constituents' unit. However, this was not confirmed by our results because the subjects seem to intuitively realise that "rt" is not a possible onset in Portuguese, thus correctly making the syllabic division.
- 29 Our results show that the representation of digraphs enables word recognition in a large extent (85%). We consider that, even though writing digraphs involves increased effort, they are preserved in spelling since their infrequency facilitates their identification in reading. This is also suggested by the fact that there is only a residual amount of alternative words provided by the subjects questioned.
- 30 As far as the rime is concerned, its representation activates 65% of correct answers when it is complex. Thus, the more information we give, the more probable it is to guess the word. It is important to stress that the graphemes represented (<el>) were not always considered as belonging to the same syllable, as <l> is considered as a possible onset in the subjects' minds. Not recognising the graphemes as composing a unitary constituent influenced the identification of the correct word in a negative way. When the rime was just composed of a vowel in nucleus, the number of correct answers was significantly reduced, suggesting that vowels can be omitted as they are easily predictable due to context and linguistic knowledge. This is especially true when the nucleus occurs in the second syllable, corresponding to word final position. In this case, the information provided is so little that it causes a high degree of ambiguity.

3. Conclusion

- 31 In this study, we formulated the hypothesis that the onset, especially in word initial position, facilitates word identification, based on evidence like the following:
- the syllable onset is preserved in chat discourse whereas the rime is more prone to elision (Silva, 2006);
 - the consonant graphemes are more easily activated by readers than the vowel graphemes (Lee, Rayner & Pollatsek, 2001);
 - the consonant roots are represented in consonantal writing systems (Coulmas, 1996);
 - the word onset provides clues for word identification and suffers less assimilation phenomena (Gow *et al.*, 1996);
 - the preservation of the whole constituent favours word recognition (Treiman, 1994; Bowey, 1996 and Assink *et al.*, 1998).
- The results from the experimental study which we have conducted led to some conclusions, from which we emphasise the following:
- the constituent which facilitates word identification is the complex onset, especially in word initial position;
 - the complex onset provides clues for recognition as it is a marked structure and hence less frequent;
 - the initial position favours lexical recognition and we presuppose it is relevant to word processing and lexical access;

- the rime, especially when only composed of a vowel in nucleus, does not facilitate word recognition, owing to its contextual predictability.

4- Limitations and future perspectives

- 32 This study possesses important limitations. One of them is based on the small number of readers and words analysed. Context is also a limitative factor since it activates the speakers' previous knowledge (*cf.*, for example, Smith, 1988). Therefore, the subjects make different predictions according to their knowledge of the world, which interferes with their ability to identify the words intended. A possible future study may include words not integrated in a context alongside words in a sentence. A longitudinal study is also a possibility - the same subjects would have to perform the same task a year later with the same sentences but with another syllable constituent specified. Its aim would be to verify if it is the context or rather the constituent graphically represented which is facilitating word recognition.

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NOTES

1. We considered the syllable structure proposed by Blevins (1995), in which it is divided in onset and rime, the latter of which branches into nucleus and coda.

ABSTRACTS

The aim of this study was to confirm on new data whether the syllable onset, especially in word initial position, enables more efficient word recognition in reading. Many researchers have suggested the importance of the syllable onset. The consonantal skeleton of words is the first to be activated in the reading process in English, according to Lee, Rayner & Pollatsek (2001). Moreover, it was shown that the onset is preserved whereas other graphemes are suppressed in chat discourse in Portuguese (Silva, 2006). An experimental study was conducted based on a word recognition task in the context of a sentence. One or two graphemes belonging either to the onset or the rime, or its constituents, the nucleus or the coda, were represented. We reached the conclusion that the branching onset in word initial position favours lexical recognition.

La question centrale de cette étude est de vérifier dans une expérience portant sur le portugais que l'attaque syllabique, surtout en début de mot, permet une reconnaissance lexicale plus efficace en lecture. Des études préalables ont suggéré l'importance de l'attaque syllabique: le squelette consonantique des mots est activé le premier dans le processus de la lecture, selon Lee, Rayner & Pollatsek (2001) et aussi, malgré la suppression de graphèmes dans l'écriture dans les *webchats* en portugais (Silva, 2006), ce constituant prosodique est généralement préservé. Une étude expérimentale a été développée ayant pour base une tâche de reconnaissance de mots en contexte phrasique, moyennant la non présentation de tous les graphèmes sauf un ou deux

graphèmes appartenant à des constituants syllabiques différents: soit à l'attaque ou à la rime, soit à un des constituants de celles ci (noyau ou coda). On conclut que l'attaque branchée en début de mot est favorable à la reconnaissance lexicale.

INDEX

Keywords: chats, syllable onset, lexical recognition, reading, syllable structure

Mots-clés: attaque syllabique, reconnaissance lexical, structure syllabique, lecture

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