

COMPLEX ONSETS IN CHILD LANGUAGE ACQUISITION

Thaís Cristófaró Silva^{1,2,3}, Izabel Campolina Miranda¹

Universidade Federal de Minas Gerais, CNPq, FAPEMIG

thaiscristofarosilva@ufmg.br, izabelccm@yahoo.com.br

ABSTRACT

This paper examines the emergence of complex onsets in Brazilian Portuguese (BP).¹ As with other languages, complex onsets in BP appear at a later stage in language acquisition. A very common strategy used by children when acquiring complex onsets is to present a single consonant. Thus, a word such as [pr]ato is typically transcribed as [p]ato for ‘prato’ *plate*. In this paper we suggest that phonetic transcripts do not capture the rich and detailed content observed in languages and in child language acquisition in particular [7]. We will show that children make use of vowel duration to express the contrast between single and complex onsets as a case of covert contrast [3,5,8]. The main issue to be addressed in this paper regards the nature of fine phonetic detail involved in the emergence of complex onsets by children who cannot produce them. The major contributions of this paper are: to discuss a case of covert contrast that applies to several children; to consider covert contrast involving syllables rather than segments and to contribute to the proposals which claim that detailed phonetic information is crucial for building phonological representations [1,2,6].

Keywords: complex onset, language acquisition, covert contrast, Exemplar Model.

1. INTRODUCTION

This paper examines the emergence of complex onsets in BP which are formed by an obstruent followed by a tap, as in [pr]ato ‘prato’ *plate*. As with other languages, complex onsets in BP appear at a later stage in language acquisition []. A very common strategy used by children when acquiring complex onsets is to present a single consonant. Thus, a word such as [pr]ato is typically transcribed as [p]ato for ‘prato’ *plate*.

As single and complex onsets contrast in BP some words appear to be pronounced as the same by children who have not yet acquired complex onsets. Thus, words pronounced by adults such as [pr]ato ‘prato’ *plate* and [p]ato for ‘pato’ *duck* are both transcribed as [p]ato in transcripts of children who do not produce complex onsets.

However, it is common to observe children making a point of the fact that they actually pronounce words with a complex onset differently from words with a single onset. For example, at a dinner table the child asks for her plate as [p]ato (rather than [pr]ato) and the adult corrects her saying that she should have rather said [pr]ato. The child usually responds: but I said p[a]to not p[a]to and thus affirming that she has said different words whilst the adult assumes both words were pronounced as the same (as expressed by the identical transcripts given above).

Given these facts we posited that in fact children who do not produce complex onsets indeed pronounce words with complex onsets differently from words with single onsets, although adults hear them as the same. We posited that this would be a case of covert contrast where children do make a contrast but do not have yet the phonetic skills which are necessary to express it [8]. The child would actually have the contrast between single and complex onsets but it would be different from the contrast observed in the adult speech community.

We suggest that children who do not produce a complex onset would lengthen the vowel which follows the obstruent. This would be appropriate as the production of a complex onset takes more time than the production of a single onset. Thus, a word pronounced by an adult as [pr]ato would be pronounced as [pa:]to by children who had not yet acquired a complex onset.

Therefore, for the child the contrast would be between a long and a short vowel: [pa:]to ‘prato’ *plate* and [p]ato for ‘pato’ *duck* rather than between a single and complex onset as it occurs in the adult speech community. We also posited that children who had already acquired complex onsets would not present vowel lengthening to express the contrast between single and complex onsets. This is because the contrast would be then expressed by the type of onset involved: single or complex.

2. THEORETICAL PERSPECTIVE

This paper benefits from previous research on covert contrast in language acquisition [3,5,8]. Munson et al. suggest that covert contrast may be understood as ‘a sub-phonemic difference that is typically not large enough to warrant being transcribed by a different

phonetic symbol, but can be measured acoustically'. In fact, covert contrast may be expressed by phonetic properties which are not necessarily adopted by the adults' speech community. The literature on covert contrast provides 'evidence that children can acquire phonological systems before they are able to master the phonetic skills needed to convey the contrasts in that system.' [8].

Covert contrast is not observed in all children although those who present it tend to progress quicker in therapy than children who exhibited no contrast at all [9]. Although the literature explores several instances of covert contrast in several languages it seems to be attested amongst few children [5].

One contribution of our paper is to present a case study of covert contrast which involves several children. In fact, all children in the experimental group presented similar results concerning covert contrast. Thus, the covert contrast discussed in this paper may involve a more general trajectory that children use in order to produce complex onsets. This seems to be the case in BP. Other languages with similar complex onsets could be investigated to evaluate if similar results would apply.

Usually covert contrast considers fine phonetic properties involving specific segments. In this paper we will consider covert contrast involving different types of syllables: single and complex onsets. We will consider vowel duration as a segmental property which expresses the contrast between different types of onsets. Thus, this paper also contributes to the debate on covert contrast involving different kinds of syllables, besides segments.

Finally, the results presented in this paper capture the idea that detailed phonetic information is crucial for building phonological representations as proposed by Exemplar Models [1,2,6].

3. METHODOLOGY

Data came from Brazilian children aged between 3:3 and 5:11, from the state of Minas Gerais, in Southeast Brazil. The study was conducted with an experimental group of ten children who did not produce complex onsets and a control group of ten children who did.

Children were selected from a large nursery state school and teachers, carers and parents contributed towards selecting children for each group. A pre-test was performed in order to finally place children either in the experimental or control group.

The experiment involved a picture naming task of ten pairs of words with and without a complex onset.² In all words the vowel which followed the single or complex onset was primarily stressed.

Words were presented in a random order to the children and they were asked to name them one at a time.

For each token we measured the duration of each segment, the syllable and the whole word.³ Figure 1 illustrates an example from the control group where a complex onset occurred – [broa] 'broa' *corn cake*. The box highlights the vowel [o] which follows the complex onset. Figure 2 illustrates an example from the experimental group where a complex onset was manifested as a single one – [boa] 'broa' *corn cake*.

Figure 1: Spectrogram and oscilogram for the word 'broa' from the control group.

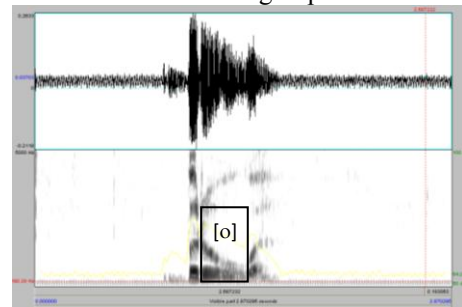
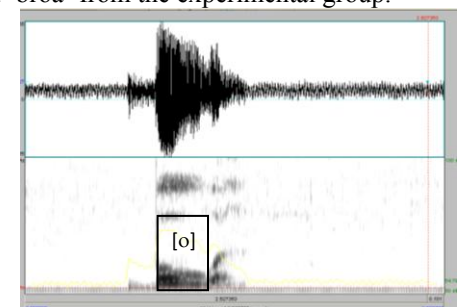


Figure 2: Spectrogram and oscilogram for the word 'broa' from the experimental group.



We hypothesized that children who did not produce a complex onset would lengthen the stressed vowel which follows the obstruent. This would be appropriate as complex onsets have greater duration as a whole than single ones. In fact lengthening the stressed vowel would create the temporal condition for a tap to intervene between the obstruent and the following vowel. This might be a more general strategy children use to produce complex onsets.

4. RESULTS

We will first consider results from the experimental group. Consider Figure 3 whose horizontal axis lists the ten pairs of words that were tested and the vertical axis which indicates the time in milliseconds (ms). Results for vowel duration in words which present a complex onset – but were pronounced by the children as a single consonant – are indicated by a black dot. The results for vowel

duration in words which present a single onset are indicated by a white dot.

Figure 3: Vowel duration for tested words from the experimental group.

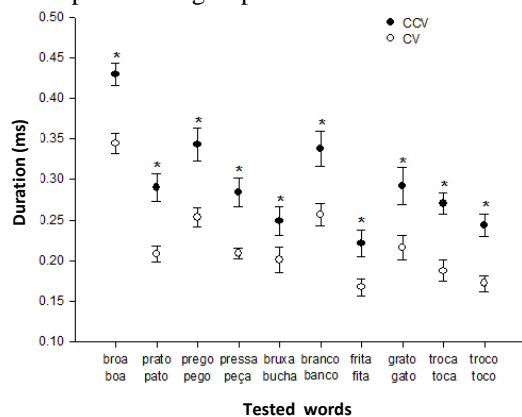


Figure 3 shows that the stressed vowel is longer in cases where a complex onset should have been produced than in cases where a single onset occurs. This pattern was observed for all words tested with the experimental group. Therefore, for children who do not produce complex onsets the contrast would be between a long and a short vowel: [pa:]to ‘prato’ *plate* and [p]ato for ‘pato’ *duck* rather than between a single and complex onset (being the later present in the adults’ speech community).

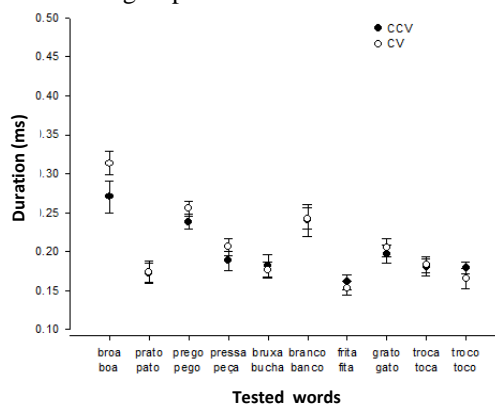
What the results presented in Figure 3 show is that children make phonological use of lengthening a vowel (a property that is not present in BP phonology) to express contrast between single and complex onsets. We suggest this is a case of covert contrast where children present phonological contrast before being able to master the phonetic skills needed to convey the contrast. Covert contrast is then expressed by a property which is not adopted by the adults’ speech community: vowel lengthening. One expects that once complex onsets are acquired the difference in vowel length would not be present. This is because contrast would then be manifested by single and complex onsets as it is the case in the local community. Consider results presented in Figure 4 which reflect data from the control group.

Results presented in Figure 4 show that for the control group – which comprised of children who already produced complex onsets – vowel duration is similar when following a single onset or a complex one. Therefore, children who produce complex onsets do not present different vowel duration to express the contrast between single and complex onsets.

In sum, results presented in Figures 3 and 4 indicate that children who do not produce complex onsets use vowel duration to contrast single and

complex onsets. Children who have already acquired a complex onset do not make use of vowel duration as a phonological property.

Figure 4: Vowel duration for tested words from the control group.



5. DISCUSSION

The results presented in the previous section show that vowel duration is a relevant property for documenting child language acquisition in BP. However, this property is not typically marked in phonetic transcripts. As we have previously mentioned the literature reports that children who have not yet acquired complex onsets produce in like manner words with a single or a complex onset. Since adults do not explore vowel lengthening as a phonological property of BP they typically do not hear that children pronounce differently words like [pa:]to ‘prato’ *plate* and [p]ato for ‘pato’ *duck*, therefore vowel duration is not marked in transcripts.

Although phonetic transcripts have the merit of helping to document linguistic facts, they limit the description and explanatory proposals when it comes to expressing fine phonetic detail which may be crucial to the understanding of phonological phenomena, which in the case reported in this paper refers to language acquisition.

We suggest that there is articulatory motivation to vowel lengthening in the case reported in this paper. In order to produce a tap after the obstruent in a complex onset the child lengthens the vowel so as to create the temporal environment for the tap to be introduced. Thus, vowel lengthening would create the condition for the tap to be produced after the obstruent. This may explain why the covert contrast reported in this paper displayed similar properties amongst several children.

If the covert contrast presented in this paper reflects a more general strategy adopted by children in producing obstruent-tap sequences we expect that other languages would display similar

characteristics. Thus, it would be interesting to consider languages with similar complex onsets in order to investigate whether similar durational patterns are found.

We suggest that the results presented in this paper also support a view, such as the proposals presented in Exemplar Models, which claim that detailed phonetic information is crucial for building phonological representations [1,2,6].

6. CONCLUSION

This paper examined the emergence of complex onsets in Brazilian Portuguese (BP). The main focus was on the acquisition of obstruent-tap sequences, as in [pr]ato ‘prato’ *plate*. Data from ten children who did not produce complex onsets and a control group of ten children who did were considered. The main question addressed in this paper regarded the nature of fine phonetic detail involved in the production of complex onsets by children who cannot produce them. We posited that children who do not produce a complex onset would lengthen the vowel which follows the obstruent. This would be appropriate as the production of a complex onset takes more time than the production of a single onset.

We showed that children make use of vowel duration to express the contrast between single and complex onsets as a case of covert contrast. Although BP does not contrast vowel duration children who have not yet acquired complex onsets use this property to express the contrast between single and complex onsets: [pa:]to ‘prato’ *plate* and [p]ato for ‘pato’ *duck*. On the other hand an adult uses a complex or single onset: [pra]to ‘prato’ *plate* and [p]ato for ‘pato’ *duck*. Our results contribute thus, to the debate on covert contrast involving different types of syllables.

Although covert contrast is usually registered for few children the case study presented in this paper involves several children. All children in the experimental group presented similar results concerning covert contrast. We suggest that there might be articulatory motivation to vowel lengthening. In order to produce the tap after an obstruent in a complex onset the child lengthens the vowel so as to create the temporal environment for the tap to be produced.

Finally, the results presented in this paper capture the idea that detailed phonetic information is crucial for building phonological representations as proposed by Exemplar Models [1,2,6].

7. REFERENCES

- [1] Foulkes, P.; Docherty, G. The social life of phonetics and phonology. 2006. *Journal of Phonetics*, v. 34, n. 4, p. 409-438.
- [2] Johnson, K. Speech perception without speaker normalisation. 1997. In: Johnson, K.; Mullenix, J. W. (ed.) *Talker variability without in speech perception*. San Diego: Academic Press, p.145-165.
- [3] Li, F., Edwards, J., & Beckman, M. E. 2009. Contrast and covert contrast: the phonetic development of voiceless sibilant fricatives in English and Japanese toddlers. *Journal of Phonetics*, 37, 111–124.
- [4] Miranda, C. 2007. *Aquisição e variação estruturada de encontros consonantais tautossilábicos*. Unpublished PhD Dissertation. Universidade Federal de Minas Gerais.
- [5] Munson, B., Edwards, J., Schellinger, S., Beckman, M., Meyer, M. 2010. Deconstructing phonetic transcription: Covert contrast, perceptual bias, and an extraterrestrial view of *Vox Humana*. *Clinical Linguistics & Phonetics*, April–May. 24(4–5): 245–260.
- [6] Pierrehumbert, J. Exemplar dynamics: Word frequency, lenition and contrast. 2001. In: Bybee, J.; Hopper, P. (Ed.) *Frequency effects and the emergence of linguistic structure*. Amsterdam: John Benjamins, p. 1-19.
- [7] Port, R. How are words stored in memory? Beyond phones and phonemes. 2007. In: *New Ideas in Psychology*, v. 25, p. 143-170.
- [8] Scobbie, J., Gibbon, F., Hardcastle, W., Fletcher, P. 2000. Covert contrast as a stage in the acquisition of phonetics and phonology. *Papers in Laboratory Phonology 5*: 194-207.
- [9] Tyler, A. A., Figurski G. R., & Langdale, T. 1993. Relationships between acoustically determined knowledge of stop place and voicing contrasts and phonological treatment progress. *Journal of Speech and Hearing Research*, 36,746–759.

¹ We gratefully acknowledge the support of Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq) grant numbers 30.65.95/2011-7 and 48.45.90/2013-8. We also acknowledge the support of Fundação (FAPEMIG) grant number 00399-14 and FAPEMIG-CAPES PACCSS II 15/2013. The authors are also grateful for support from the Universidade Federal de Minas Gerais (UFMG).

² The words examined were: *broa corn cake*, *boa good*, *prato plate*, *pato duck*, *prego nail*, *pego take*, *pressa hurry*, *peça gadget*, *bruxa witch*, *bucha sponge*, *branco white*, *banco bench*, *frita fries*, *fita lace*, *grato thankful*, *gato cat*, *troca exchange*, *toca den*, *troco change*, *toco stump*.

³ In this paper we report the results for the duration of primarily stressed vowels since these were statistically significant. The duration for the other segments in the examined words did not show statistically significant results and thus are not reported here [4].