Sound Change in Tautosyllabic Consonantal Clusters in Brazilian Portuguese

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ABSTRACT

This article explores the proposal that some sound changes may be attributed to the fact that a low type frequency moves towards a high type frequency pattern [2, 4, 7]. Three ongoing changes in tautosyllabic obstruent-liquid clusters in Brazilian Portuguese will be examined: the loss of the liquid (li[vr]o > li[v]o *livro* 'book'), the change in the obstruent (a[tl]eta > a[kl]eta *atleta* 'athlete') and the change in the liquid ([pl]ano > [pr]ano *plano* 'plan'). It will be suggested that although type frequency plays a central role in phonological generalisations it must be analysed together with token frequency effects. It will also be suggested that phonological generalisations proceed according to lexical diffusion patterns. The results presented in this paper indicate that sound changes, which refer to phonotactic domains, may be evaluated differently from sound changes that are phonetically motivated.

1. INTRODUCTION

Sound change in the vast majority of cases may be viewed as phonetically motivated, being that phonetic properties are altered as articulation proceeds. Thus, a great number of sound changes and casual speech processes are closely related to weakening or reduction and assimilation. This proposal finds support in the works of Mowrey & Pagliuca [21] and Browman and Goldstein [1]. Following from the phonetic motivation underlying sound change Bybee [4] suggests a hypothesis according to which regular sound change is reductive or assimilatory, with the result that articulatory changes all move towards compression and reduction of articulatory gestures. However, there are exceptions to the general tendencies of articulatory gestures and sound changes may also be said to have an auditory-perceptual motivation [22,23]. This article will explore an additional proposal posited by Bybee [4] according to which sound change may follow from the extension of a high type-frequency pattern at the expense of a low type-frequency one. It will be argued that this later case offers an insightful analysis for sound changes that refer to phonotactic domains, being that phonotactic generalisations are based on frequency distribution in the existing lexicon. Three works, which explore this later line of research, are reviewed below.

Brown [2] evaluates cases of posteriorization of labials in a number of varieties of Spanish. These cases involve forms with word-internal [ps,pt] sequences which are changing to [ks,kt] sequences: Pe[ps]i > Pe[ks]i 'Pepsi' and conce[pt]o > conce[kt]o 'concept'. Brown argues that this change follows from the fact that [k] occurs more frequently in syllable-final position in Spanish than [p]. Thus, [ks,kt] have a higher type count than [ps,pt] sequences. In approximately forty thousand word corpora there were only 13 different words with word-internal [ps,pt] sequences whereas there were 89 different words with the word-internal [ks,kt] sequences. Notice that the case of posteriorization of labials in Spanish refers to a segmental change in a phonotactic domain, i.e. syllable final position.

Bybee [4] considers cases analysed by Morin et al [2] in which a word-final ɔ is tensed to o in Standard French. Examples are: metr[ɔ]politan > metr[o] 'metropolitan' and vel[ɔ]ciped > vel[o] 'bycycle'. Bybee argues that word-final o-tensing in French reflects a case of phonological generalisation of a less recurrent pattern moving towards a more recurrent one. An important point to be made is that word-final o-tensing in French makes crucial reference to the end of the word (or the word-final syllable), which is a phonotactic domain.

Cristófaro-Silva and Oliveira [7,26] analyse the change in r-sounds following a vocalised-l in Brazilian Portuguese (henceforth BP). There are two kinds of r's in Portuguese: weak-r and strong-R. The weak-r is always a tap and the strong-R varies considerably (typically it is either a trill or a fricative). After a postvocalic consonantal position a strong-R always occurs in Portuguese: de[sR]espeito 'disrespect'. In dialects with no l-vocalisation the strong-R always follows the [l] in coda: gue[lR]a *guelra* 'gill'. However, in dialects which vocalise l's in postvocalic position a rapid change from the strong-R to the weak-r after a vocalised-l: gue[wR]a > gue[wr]a'gill' has been observed. As Cristófaro-Silva and Oliveira observe, this reflects the fact that w-diphthongs are typically followed by the weak-r in Portuguese: e[wr]opa *europa* 'Europe' or a[wr]ora *aurora* 'dawn'. The sequence w-diphthong followed by a tap (as in e[wr]opa) has a greater number of types than the sequence vocalised-l followed by an r-sound (as in gue[lR]a and gue[wr]a). Notice that the segmental change in the r-sound after a vocalised-l makes reference to a phonotactic domain, i.e. initial syllable after a coda.

Cristófaro-Silva and Oliveira suggest that the change in r-sounds after a vocalised-l in BP is implemented through lexical diffusion. This proposal would fit into Usage-Based

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Phonology [3,4] and a model of mental representations such as an Exemplar Model [14,30]. These frameworks account for the fact that sound changes are implemented word by word and that phonetic detail is relevant for the organisation of mental representations. An interesting consequence of such frameworks is that statistics in the lexicon is crucial for the organisation of linguistic systems [13,29].

Following these theoretical proposals this article will evaluate three cases of ongoing sound changes in tautosyllabic consonantal clusters in BP. The data are from speakers from Belo Horizonte, state of Minas Gerais. This paper suggests that sound changes which refer to phonotactic domains may reflect a change from a lower type frequency pattern towards a higher type frequency one.

2. CLUSTER REDUCTION

Cluster reduction represents the case of the loss of the liquid yielding a CV syllable: ou[tr]o > ou[t]o 'another one', exem[pl]o > exem[p]o 'example' [5,6]. Cluster reduction in BP has been relatively well documented in the process of language acquisition [8,31,35] and it has also been addressed by researchers working with the acquisition of literacy [10,19].

Cristófaro-Silva [5] shows that cluster reduction is not phonologically conditioned. It may occur in stressed or unstressed syllables ([pr]eto or [p]eto 'black' or exem[pl]o or exem[p]o 'example'), though clusters in unstressed syllables are more likely to be reduced than those in stressed ones. The unstressed vowel may be pretonic ([pr]ateleira 'shelves'; [pl]aneta 'planet') or postonic (qua[tr]o 'four'; exem[pl]o 'example'). The reduced cluster may be followed by an oral or nasal vowel or a diphthong ([pr]ato 'plate', [pl]anta 'plant' or [fr]aude 'fraud'). The cluster may be in the initial or final syllable of the word ([pr]imeiro 'first'; om[br]o 'shoulder'). In sum, no structural restriction is imposed on cluster reduction. Considering the lack of structural conditioning an evaluation of sociolinguistic parameters proceeded [15].

Cluster reduction is not socially marked. Parameters such as age, education and sex did not prove to be significant in the implementation of cluster reduction. However, the word itself and the speaker and its network group play a crucial role in cluster reduction [18,25]. The exploration of these parameters goes beyond the purpose of this paper. However, the fact that the significant factors in cluster reduction are the word, the speaker and specific networks may raise the question as to whether changes proceeding from phonological generalisations are not sociophonetically indexed. This is a point for further research.

Another interesting point, which deserves further investigation, is the role of fine phonetic detail in the implementation of sound change. Preliminary results show that the vowel that follows the reduced cluster may be longer than vowels that follow a cluster. Further exploration of this issue is appropriate since it appears that fine phonetic detail may be relevant in speech processing and phonological categorization [16,4].

A traditional evaluation of cluster reduction would suggest a process of lenition that would yield to the loss of the liquid. Intervocalic loss of liquids would reinforce this proposal [9]: e[l]as > eas 'they (fem)', ago[r]a > agoa 'now'. Auditory-perceptual factors may also be claimed in the process of deleting the liquid. However, neither of these criteria indicates why the liquid is lost and the obstruent remains in cluster reduction.

A final point to be made concerning cluster reduction is that there are a greater number of CV syllables in contrast to CCV syllables. That is, the CV-type syllables are greater than the CCV-type syllables. Thus, the move from a CCV pattern into a CV one could follow from a generalisation of a higher type frequency (in this case CV) at the expense of a lower type frequency (in this case CCV).

3. CHANGE IN THE OBSTRUENT

The change in the obstruent involves a sequence of coronals [tl] where the alveolar stop is replaced by a velar stop (A[tl]ético > A[kl]ético 'Atlético club' [10]. It is not a socially marked phenomenon and in fact speakers are not aware of it. Words which display the change tl > kl may also have the cluster reduced (A[tl]ético> A[t]ético) or may present the change in the liquid (A[tl]ético>A[tr]ético).

The traditional evaluation of cases displaying change in the obstruent would involve dissimilation. This would be due to the fact that the stop and the lateral are both alveolar consonants. Thus, the obstruent would become velar in the process of dissimilation. However, in clusters in which a tap is the liquid and an alveolar is the obstruent – as in [tr]abalho 'work' – the alveolar stop is never replaced by a velar stop (*[kr]abalho), i.e dissimilation does not apply to this set of contiguous alveolar consonants. Since only (alveolar stops-lateral) clusters are affected, the dissimilation analysis does not seem to be appropriate.

An evaluation of type frequency indicates that [tl] sequences are rare and occur in few words whereas [kl] sequences occur in a greater number of words, consisting thus of a stronger type. Since in the case under consideration the change is from tl > kl it reinforces the proposal of phonological generalisations of a higher type frequency (in this case kl) at the expense of a lower type frequency (in this case tl).

4. CHANGE IN THE LIQUID

The change in the liquid involves cases in which the lateral is replaced by a tap: [pl]ano > [pr]ano 'plan'. Historically, obstruent-lateral clusters entered into Portuguese as loans from Spanish [34]. The alternation between a lateral and a tap is observed amongst a number of lexical items and it appears to have strong lexical conditioning [12]. There are

only two words which actually have a distinct trajectory. They originally had an obstruent-tap sequence which became an obstruent-lateral Cr > Cl (si[kl]ano 'part of a saying: *'fulano and ----'* and [kl]eusa 'Cleusa' which is a proper name). Otherwise, all cases of change in the liquid involve a lateral being replaced by a tap: Cl > Cr.

In the case of changes in the liquid no articulatory or perceptual motivation may be claimed. However, if type frequency is taken into consideration, one observes that (obstruent-tap) sequences have a higher count of types than (obstruent-lateral) sequences. Thus, it appears that the directionality of the change may be accounted for by the fact that a lower type frequency pattern is moving towards a higher type frequency one. The following section will evaluate the three cases involving tautosyllabic clusters in BP in the light of the current debate on the role of type and token frequency.

4. CONCLUSIONS

Bybee [3] suggests that sound changes which affect high frequency words before low frequency words are phonetically conditioned and the change is phonetically and lexically gradual. Thus, token frequency will play a major role in the implementation of such changes. On the other hand, she claims that sound changes which affect low frequency words before high frequency words are due to imperfect learning, because they may not be available in experience to be acquired [27,28]. Type-frequency appears also to be important in the cases addressed in this paper – which involve phonological generalisations. It will be argued that type frequency plays a major role in implementing changes which refer to phonotactic domains. Consider Table 1 which illustrates the number of types for CCV types and CV types in BP [17].

Cr	types	Cl	types	CC	types	C	types
pr	4.484	pl	2.734	p	7.218	p	33.108
br	3.850	bl	800	b	4.650	b	20.876
tr	13.532	**tl**	**95**	t	13.627	t	77.826
dr	2.641	dl	9	d	2.650	d	54.967
kr	4.449	**kl**	**1.994**	k	6.443	k	38.640
gr	4.429	gl	1.034	g	5.463	g	17.135
fr	2.022	fl	1.303	f	3.325	f	20.470
vr	206	vl	2	v	208	v	16.071
Cr	**35.613**	**Cl**	**7.971**	**CC**	**43.584**	**C**	**279.083**

Table 1: CCV and CV types in BP

The first two columns indicate the kind of (obstruent-tap) cluster and the respective number of types for each category. Columns 3 and 4 indicate the kind of (obstruent-lateral) cluster and the respective number of types for each category. Columns 5 and 6 indicate the sum of (obstruent-tap) and (obstruent–lateral) clusters, i.e. CCV syllables. Finally, columns 7 and 8 indicate the number of types for each (obstruent-vowel) syllable in BP, i.e. CV syllables.

Cluster reduction may be accounted for by the fact that CV types (279,083) number more than CCV types (43,584). Change in the obstruent may be accounted for by the fact that [tl] has just 95 types whereas [kl] counts 1,994 types. The cases of change in the liquid may be accounted for by the fact that consonant-lateral count 7,971 types whereas consonant-tap count 35,613 types. In these three cases one may observe that the directionality of the change follows from a lower type frequency pattern moving towards a higher type frequency one. All these cases, and also those addressed in section 1 involve sound changes which refer to phonotactic domains. It appears that all these cases – which refer to phonotactic domains - may be evaluated by a type frequency analysis which will indicate the directionality of the change. These changes affect patterns and the change is implemented through lexical diffusion, which predicts that the word is the locus of change [11,25,32,33]. A general conclusion that follows from the cases analysed in this paper is that changes which refer to phonotactic domains may be evaluated in the light of type frequency whereas token frequency will apply to sound changes that are phonetically motivated. Besides type and token frequency one observes that phonetically motivated sound changes apply across morphological and syntactic boundaries whereas sound changes referring to phonotactic domains are restricted to word-internal boundaries. However, a full evaluation of the relationship between type and token frequency is still necessary since some very low type frequency patterns with a high token count are preserved (cf. [sR] and [vr] in BP [5,7]).

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