A Complexity Approach to Sound Change: Palatalization in Brazilian Portuguese

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This paper intends to provide evidence for a complexity and dynamic approach to sound change (Wang, 2013; Bybee, 2013). We will argue that sound change expresses the reorganization of linguistic patterns under the pressure of several interacting factors. The analysis will focus on palatalization in Brazilian Portuguese (BP). The main reason to assume that languages operate as a complex system follows from the fact that any known language changes continuously, all the time, which means that languages do not settle down to a fixed equilibrium state (Bybee, 2013). As time evolves languages exhibit regularities, which are typically described as stable grammatical properties. Nevertheless, as other complex and dynamic systems all languages combine stable grammatical properties concomitantly with variation that in fact reflects emergent grammatical patterns. A question that may be posited is how stable grammatical properties interact with variable patterns. We suggest that stable grammatical properties in sound changes are abstractions that interact with emergent retiming of coordinated articulatory routines, combined with lexical diffusion patterns, yielding a stable and variable system. Linguistic patterns may consist of syllables, words or constructions that are involved in a complex web-like series of connections with each other. Any linguistic pattern is subject to adaptation and change. Recurrent linguistic patterns are represented by robust exemplars that consolidate abstractions. Abstractions operate at various levels of categorization and are also subject to instability and changes through adaptations. Emergent patterns and abstract ones interact in a complex and dynamic network where language use adjusts the web connections to new forms that are experienced. This perspective is compatible with Exemplar Models. That is the representational model we assume in phonology.

Let us then consider Palatalization in BP. It is related to the emergence of affricates followed by a high front vowel: tia [tia]>[tʃia] 'aunt' and dia [dia]>[dʒia] 'day'. Varieties that present affricates followed by a high front vowel are said to be palatalizing ones – e.g. tia [tʃia] 'aunt' and dia [dʒia] 'day' – and non-palatalizing varieties present alveolar stops followed by a high front vowel: tia [tia] 'aunt' and dia [dia] 'day'. Palatalizing varieties are expanding throughout Brazil and are considered prestigious. Thus, non-palatalizing varieties face pressure from palatalizing ones which are seen more prestigious and are predominant in Brazil (Carvalho, 2004).

We will analyze three contexts which are related to palatalization in BP (Barboza 2013).The first one consists of either alveolar stops or affricates followed by a high front vowel in primarily stressed position: [ti, di] or [tʃi, dʒi]. Examples are: [tia] or [tʃia] 'aunt' and [dia] or [dʒia] 'day' depending on whether it is a palatalizing variety or not. In palatalizing varieties, affricates are recurrent before a high front vowel in stressed and unstressed position in the beginning, middle or end of a word. This fact corroborates the generalization assumed as a phonological process: alveolar stops turn into affricates when followed by a high front vowel. As a phonological process that has been concluded one should not expect to find alveolar stops followed by a high front vowel in palatalizing varieties. Nevertheless, we will show that such cases occur and are related to cluster reduction: pa[di] ~[padɾi] 'priest'. In non-palatalizing varieties, on the other hand, affricates are not expected but they do occur when an alveolar stop occurs in primarily stressed position where the voiceless stop is favored: [tia]>[tʃia] 'aunt'. In fact, we observe variation between voiceless affricates and aspirated voiceless stops at various degrees. We interpret the emergence of affricates in non-palatalizing varieties as a result of retiming of coordinated articulatory routines. Thus, in palatalizing varieties affricates are consolidated abstract patterns whereas in non-palatalizing ones affricates are emergent patterns related to the retiming of coordinated articulatory routines displaying fine phonetic properties.

The second context examined presented alternation between alveolar stops or affricates in singular and plural forms. Singular forms presented an affricate in palatalizing varieties - [sidadʒis] 'cities' - and an alveolar stop in non-palatalizing varieties, whereas plural ones presented an alveolar

stop- [sidadis]. In plural forms, both varieties may present an alveolar stop: [sidads]. What was of interest is that in palatalizing varieties singular forms presented affricates - [sidadʒis] - and plural ones presented an alveolar stop: [sidads]. One can obviously notice that cases where an alveolar stop occurs - [sidads] - do not present a high front vowel between the stop and final vowel. In fact, the pattern of stops followed by a final sibilant reflect a general feature of BP which deletes final unstressed high vowels which are followed by a sibilant in word final position. Any BP consonant occurring in the final syllable of a word may become adjacent to a sibilant as shown in the following singular and plural forms: [ʃɛki] and [ʃɛks] 'cheque(s)' or [koni] and [kons] 'cone(s)'. As singular and plural forms are related to the phonological grammar of BP, one has to assume that affricates and alveolar stops are related at an abstract level. Furthermore, palatalizing and non-palatalizing varieties have emergent patterns related to the retiming of coordinated articulatory routines that yields (consonant-sibilant) sequences at the end of words in BP. A consequence of this phonological property is that affricates and alveolar stops are morphophonologically related: [sidadʒi] and [sidads] cidade(s) 'cities'. Deletion of unstressed high vowels yields paroxitone words to be realized as oxytone ones, which is a general tendency in BP (Cantoni 2013).

Although the deletion of an unstressed high vowel yielded morphophonological alternation of affricates and stops - [sidadʒi] and [sidads] cidade(s) 'cities' - in other cases segmental alternation is not observed as a consequence of the deletion of an unstressed high vowel. This can be illustrated by the third context that was examined which consisted of raising diphthong reduction in postonic position. In palatalizing and in non-palatalizing varieties we observed that the postonic raising diphthong as in [patju] or [patʃu] 'patio', are reduced to a monothong - [patʃu] - so that an affricate occurs in final position. In this case, one observes the retiming of coordinated articulatory routines involved in the palatal glide deletion. Unstressed vowels in the final syllable of a word in BP may only be one of the following vowels: [i,a,u]. It follows that the emergence of affricates in word-final position as a consequence of diphthong reduction will be restricted to one of the vowels,[a] or [u], and this is exactly the case. An interesting result is that neologisms with affricates are recurrent with the vowels [a,u] in stressed and unstressed positions – [tʃurma] tchurma 'neologism from class (turma)' or [tʃã] 'Tcham, a band name' - which we interpret as a result of the abstraction related to (affricates+vowel [u,a]) being adapted to new environments.

Traditional analysis of palatalization in BP only address the contexts where an affricate occurs without relating it to other phonological phenomenon. We claim that this perspective limits the understanding of BP phonology in general and furthermore, offers only a partial view of palatalization and its consequences. The limitations imposed on traditional views reflect the lack of interaction amongst, apparently, unrelated issues. Our analysis argues that what is traditionally viewed as palatalization in fact expresses the adaptation of coordinated articulatory routines (aspiration in alveolar stops, reduction and deletion of unstressed segments in word-final position) and the network connections of abstract phonological patterns (syllables, words or constructions). A consequence of this analysis is that the organization of phonological grammar is understood as the interaction of stable abstract patterns and variable emergent patterns, as predicted by dynamic and complex approaches.

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