Alveolars on the verge of a nervous breakdown

Markus A. Pöchtrager, Boğaziçi University, markus.pochtrager@boun.edu.tr

This paper presents a new analysis of affrication of *d/t* in Japanese, (various dialects of) Brazilian Portuguese, and Québec French, as well as a general theory of affrication.

Problem. In Japanese (Labrune 2012, Yoshida 1996, 2001), *t–tʃ–ts* stand in a special relationship with each other, such that *t* occurs before [a, e, o], *tʃ* before [i] and *ts* before [ɯ]. (Analogously for the triplet *d–dʒ–dz*.) The distribution of *tʃ–ts* (and *dʒ–dz*) can easily be modelled as the spreading of the element **I** from a nucleus onto the onset in the case of *tʃ/dʒ*. What is less clear is why an alveolar stop is only allowed before a non-high vowel, but breaks down into an affricate before high vowels. The problem becomes even more vexing once other, slightly different affrication patterns are brought in. Several dialects of Brazilian Portuguese (Cristófaro-Silva 2003) have *tʃ/dʒ* before [i] but *t/d* elsewhere. Again, palatalisation is readily explicable as the spreading of **I**, but affrication is not. Lastly, Québec French (Kaye 1989) has *ts/dz* (not *tʃ/dʒ*) before [i/ɪ] and [y/ʏ] but *t/d* elsewhere. What is particularly instructive is that affrication occurs without palatalisation.
This paper argues that those three cases can be unified and that the affrication/palatalisation patterns are derivable from general principles. The analysis is couched within Government Phonology (GP) 2.0 (Pöchtrager 2006, Kaye & Pöchtrager 2013).

Proposal. From the above facts we can extract a descriptive generalisation: Affrication (though not necessarily palatalisation) occurs before a nucleus that contains **I** by itself, [i], or one that is empty, [ɯ]. This is true of all three languages. The following questions ensue:

(a) What do these two kinds of nuclei (or their complement set) have in common?
(b) What singles out alveolar stops for affrication, while labials or velars stay unaffected?
(c) What is the link between (a) and (b) that explains affrication?

P1, ad (a). Pöchtrager (2009, in press) and Živanovič & Pöchtrager (2010) presented a theory of phonological binding that restricts the distribution of elements within phonological representations. Crucially, positions annotated with **I** and those without any annotation (empty positions) have the same binding requirements, i.e. they cannot be bound. This was argued for on the basis of an in-depth analysis of Putonghua, where the sequences **(d)ya*/**(d)wa* as well as **(d)way* are out, while *(d)yaw* is grammatical. The argument runs as follows: Onglides sit in a higher position than offglides, i.e. onglides can bind offglides. In **(d)ya*/**(d)wa*, the offglide position is empty (no glide following *a*) and bound by the onglide (*y*/*w*), hence both forms are out. In **(d)way* the onglide *w* binds the offglide *y*, ruling out **(d)way*. Empty offglides and the offglide *y* (element **I**) function alike. In *(d)yaw* the onglide *y* binds the offglide *w* (element **U**), but since there no binding restrictions on **U**, the structure is licit. The same asymmetries come back in English (diphthong *oy* but **ew*), cf. Pöchtrager (2009, in press). This is exactly what we need for grouping [i] and [ɯ] together.

P2, ad (b). In many earlier versions of GP, alveolars were characterised by the element **A**. In GP 2.0, **A** is replaced by structure, based (amongst other things) on data like these: In English, long vowels before clusters only occur if both members of the cluster are alveolar: *haunt* vs. **haump*, **haunk*. That is, longer structures are made possible by (the "alveolar element") **A**. Examples like those are also found in German, Finnish, Hungarian etc. (Pöchtrager 2012, 2013). Since **A** consistently interacts with structure, it must be structural itself. Under such a reinterpretation, objects that contained old **A** are now structurally bigger than those without. Thus, alveolars are bigger than velars or labials, readily explaining why in English it is *d/t* that undergo lenition (tapping): They are the biggest objects and thus easy targets. This also extends to vowel reduction (typically of non-high vowels) in unstressed position as e.g. in Portuguese or Catalan (Harris 1997): Unstressed *o/e* is reduced to *u/i*. Again, this is expressible as the loss of structure in the weak part of the foot. Lastly, extra size is the key to affrication as well.

P3, ad (c). Given that positions annotated with **I** and empty positions form a set for binding, cf. (P1), I will argue that in the case of affrication we are dealing with a violation of binding. Without going into the exact shape of the tree, it is clear that the additional structure characterising *d*/*t* must contain a position that can bind following [i]/[ɯ]. In order to remedy this violation, affrication occurs, which, I submit, consists in the removal of one layer of that extra structure in *d*/*t*. (Another layer remains to guarantee that *ts*/*dz* are alveolar.) Following [u] will be unproblematic as **U** has no binding requirements, cf. (P1). Whether the resulting affricate *ts*/*dz* palatalises to *tʃ*/*dʒ* will depend on whether the following **I** spreads or not, but that is independent of affrication. Note also that mid-vowels like [e] do not trigger affrication, i.e. the **I** contained in [e] must be located in a position that does not violate binding.

Further issues. The present proposal bears a certain similarity to one by Yoshida (2001), who arranges elements in a feature geometrical tree and links affrication to structural properties of that tree. There are at least three differences to the present proposal, however. **1.** The constraints that apply in Yoshida's tree seem rather ad-hoc and tailormade for Japanese, while the current proposal attempts to integrate affrication patterns in several languages into a larger theory of melodic distribution that was originally conceived for distributional patterns in diphthongs, i.e. binding. **2.** Yoshida's account fares well for *tʃ*/*dʒ* but remains rather unclear for *ts*/*dz*. **3.** Yoshida's account is able to express changes from *k*/*g* to *tʃ*/*dʒ* which the present account – correctly, I submit – excludes. In order to go from *k*/*g* to alveopalatal *tʃ*/*dʒ*, not only do we need to add an **I** element (the source of which could be in the environment), but we also need to add extra structure for alveolarity, and this extra structure can neither simply come out of nowhere nor can it come from the environment (typically a following [i]). The prediction is then that such changes are not phonological, and as such we would expect them to be highly idiosyncractic and exceptional. Italian and Polish have such alternations, and of course the prediction that they are subject to a host of exceptions is correct, cf. Italian *di*[k]*o*/*di*[tʃ]*i* 'I/you say' but *evo*[k]*o*/*evo*[k]*i* 'I/you evoke'. This incorrect prediction is avoided by the present model, which also has a larger empirical fit than its predecessors.

References. Cristófaro-Silva, Th. 2003. Palatalisation in Brazilian Portuguese. In: S. Ploch (ed.) *Living on the Edge.* Berlin & New York: Mouton de Gruyter. 243–257. ♦ Kaye, J. 1989. *Phonology: A Cognitive View.* Hillsdale, NJ: Lawrence Erlbaum. ♦ Kaye, J & M. A. Pöchtrager. 2013. GP 2.0. *SOAS Working Papers in Linguistics.* 16. 51–64. ♦ Harris, J. 1997. Licensing Inheritance: an integrated theory of neutralisation. *Phonology.* 14. 315–370. ♦ Labrune, L. 2012. *The Phonology of Japanese*. Oxford: Oxford University Press. ♦ Pöchtrager, M. A. 2006. *The Structure of Length.* Phd dissertation, University of Vienna. ♦ Pöchtrager, M. A. 2009. *Diphthong$_i$,* e$_i$ *know thyself$_i$. Binding in Phonology.* Paper at the "17th Manchester Phonology Meeting", 28–30 May 2009, Manchester/UK. ♦ Pöchtrager, M. A. 2012. *Deconstructing A.* Paper at the "MFM Fringe Meeting on Segmental Architecture", 23 May 2012, Manchester. ♦ Pöchtrager, M. A. 2013. *Alveolars, size and lenition.* Paper at the "21st Manchester Phonology Meeting", 23–25 May 2013, Manchester. ♦ Pöchtrager, M. A. In press. Binding in Phonology. In: H. van Riemsdijk & M. van Oostendorp (eds.): *Representing Structure in Phonology and Syntax.* Berlin: Mouton de Gruyter. ♦ Yoshida, Sh. 1996. *Phonological Government in Japanese.* Canberra: The Australian National University. ♦ Yoshida, Sh. 2001. An Element-Based Analysis of Affrication in Japanese. In: J. van de Weijer & N. Tetsuo (eds.) *Issues in Japanese Phonology and Morphology.* Berlin: de Gruyter. 193–214. ♦ Živanovič, S. & M. A. Pöchtrager. 2010. GP 2, and Putonghua too. *Acta Linguistica Hungarica.* 57:4. 357–380.