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Minimal word constraint in Turkish final devoicing

Basic pattern. Final devoicing in Turkish is more intricate a pattern than in other final devoicing languages (like German or Russian). Voiced fricatives never undergo this process (*kaz* "goose.Nom" - *kaz-ɨ* "id. Acc"). Word-final voiced stops always devoice in bisyllabic (or bigger) roots: *kitap* "book.Nom" - *kitab-ɨ* "id. Acc". Alongside with their regular devoiced form, some loans also display non-devoiced forms (*etüd-ü* "study.Acc" - *etü[t]* / *etü[d]* "id. Nom"). This appears to be a learned or spelling pronunciation: it does not withstand the generalization for the native vocabulary, where bisyllabic or bigger roots devoice without exception.In monosyllabic CVC roots, voiced stops may (*tat* "taste.Nom" - *tad-ɨ* "id. Acc") or may not devoice (*saʤ* "sheet metal.Nom" - *saʤ-ɨ* "id. Acc"). Whether or not a monosyllable undergoes final devoicing cannot be predicted: it is a lexical property of roots (e.g. Inkelas 1995). Finally, stops may also be lexically voiceless (both in mono- and bisyllabic roots), as in *top* "ball.Nom" - *top-u* "id. Acc" and *sepet* "basket.Nom" - *sepet-i* "id., Acc".

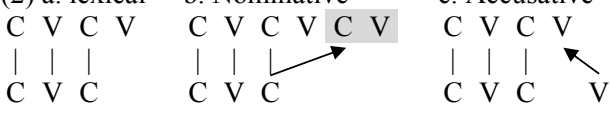
Size constraint. Inkelas & Orgun (1995) have added an observation to the puzzle: final stops in CVC monosyllables behave as described (they may or may not devoice), but in CVCC monosyllables they side with bisyllables: they always devoice (*garp* "west.Nom" - *garb-ɨ* "id. Acc"). Using moras, the relevant descriptive generalization equating CVCVC and CVCC is "voiced stops always devoice iff the root is at least bimoraic" (coda Cs moraic, last C extrametrical). The same may be expressed in Strict CV, but this doesn't matter for our purpose.

Three-way contrast. Followed by other authors, Inkelas & Orgun (1995) analyze the three-way distinction between voiceless, devoicing and non-devoicing CVC roots in terms of Laryngeal Realism (Iverson & Salmons 1995, Honeybone 2005), as under (1). We subscribe.

(1)	laryngeal distinctions in Turkish			
a.	C^{L} phonologically voiced	no devoicing	saʤ - saʤ-ɨ	Non-devoicing stops are phonologically specified as such and therefore cannot devoice (1a: they bear L (or [voice])). By contrast, devoicing stops are neutral consonants C° 1b, which are unspecified (or underspecified) for voicing: they take on voicing from their environment in intervocalic position (passive voicing), otherwise are voiceless. Finally, voiceless stops are phonologically specified as such (1c: they bear H (or spread glottis)) and therefore cannot be passively voiced.
b.	C° phonologically unspecified	devoicing	tat - tad-ɨ	
c.	C^{H} phonologically voiceless	voiceless anyway	top - top-u	

Analysis. Inkelas & Orgun's (1995) analysis is based on two crucial moves regarding the data: the whole class of monosyllabic voiced devoicing words (1b) is dismissed ("the virtual nonexistence of alternating final plosives in (C)VC roots…" p.778), and the learned /spelling pronunciation whereby some loans afford undevoiced pronunciations (the aforementioned *etüd* class) is taken seriously. We argue that both options regarding data selection are unwarranted. A word class represented solely by loans is suspicious, and the fact that the words in question also afford the regular voiceless pronunciation is not mentioned by Inkelas & Orgun. If these two data points are corrected, their analysis of the size restriction is not workable anymore. Rather, we argue that (virtual) geminates are the crucial ingredient of the size restriction. When spelt out by themselves (i.e. without suffixes), roots that are too small (2a) geminate their final consonant in order to meet the minimal word size (we use Strict CV representations where the minimal word size is defined as "encompassing at least two nuclei, final empty nuclei being ignored"). This gemination uses epenthetic syllabic constituents, the grey-shaded empty CV unit under (2b). When a suffix is added, whether V-initial as under (2c) or C-initial, the minimal word size is met and no gemination occurs. Non-devoicing of CVC roots is then a consequence of gemination: geminates do not devoice (reminiscent of geminate integrity).

(2) a. lexical b. Nominative c. Accusative



What geminacy protects against is the phonological alteration of the consonant. In regular L systems with final devoicing, the L is removed in word-final position by a phonological process. This is disallowed when the consonant is a geminate, thus devoicing is blocked (1a). In bisyllabic roots, however, the L may be removed since here the C^L is not a geminate. Neutral C° (1b) is phonologically unspecified and receives passive voicing from the environment upon phonetic interpretation (as in Acc *tad-ɨ*). In regular H systems with final devoicing, the phonetic interpretation of C° word-finally is voiceless (Nom *tat*). A geminate C° as under (1b) is a case in point: unlike under (1a), no prime needs to be removed, and its pronunciation is voiceless due to phonetic interpretation, whether simple or geminate. Finally, nothing happens to C^H (1c) in the phonology: it is pronounced voiceless, whether singleton or geminate.

Final geminates are virtual. Final geminates under (2b) are so-called virtual geminates: they arephonologically geminate, but phonetically singleton. This configuration is found in many languages: English agma is a (partial) geminate /ŋg/ phonologically, which is pronounced singleton [ŋ] (e.g. Hammond 1997). In Norwegian (e.g. Kristoffersen 2007: 210ff), long vowels that occur in unsuffixed roots (common gender) shorten when the neuter suffix -t is added: *peen* - *pen-t* "pretty.comon gender, id. neuter). When the root-final consonant happens to be -t as in *søøt* "soft.common gender", we know that adding the neuter suffix produces an underlying /-tt#/ cluster, which like all other clusters shown shortens the preceding vowel: *søt* "soft.neuter". However, the /tt/ is pronounced as a singleton [t], rather than as a geminate [tt]. In Turkish, lexical geminates as in *ha[tt]-ɨ* "line.Acc" appear as singletons word-finally: *ha[t]* "id. Nom". Since geminates instantiate coda-onset sequences, there is no reason why they should degeminate phonologically: word-final coda-onset clusters RT, TT and RR are legal: *sert* "hard", *zapt* "conquest", *alarm* "alarm". We conclude that in Turkish, phonological geminates are pronounced singleton in word-final position.

VOT. The three-way laryngeal system of Turkish (1) is also reflected in VOT. In a typical two-way language, one category has a VOT around zero (neutral consonants C°), while the other is either significantly negative (L languages: prevoicing) or significantly positive (H languages: aspiration). But in Turkish, there is no consonant type with a VOT around zero (Kallestinova 2004). Rather, voiceless initial stops ptk have +53 VOT, against voiced initial stops bdg displaying -43 VOT (Öğüt et al. 2006, averaged over the three stops and 30 participants). This suggests the presence of both laryngeal specifications L (or [voice]) and H (or [spread glottis]). A similar spread VOT pattern in Swedish leads Ringen & Helgason (2008) to the same conclusion of a 3-way laryngeal distinction in a 2-way contrast language.

Voice assimilation (VA). Turkish allows for coda-onset clusters word-finally (*örf* "custom.Nom") and before consonant-initial suffixes (*örf-ler* "id. pl."). But CCC clusters are disallowed in monomorphemic strings, and are repaired in loanword adaptation (*elektirik* < *electric*, *asturonot* < *astronaut*, etc.). We conclude that morphologically complex CC-C clusters are not computed in one domain: *örf-lAr* is [[örf] lAr] where the root-final cluster is computed in the inner domain and then frozen (just like the cluster [ksθs] in English *sixths* [[[siks]θ]s], which is impossible within a morpheme). This is confirmed by the fact that the voicing of root-final stops is always identical when word-final and when occurring before a C-initial suffix (*sadʒ* - *sadʒ-ɨ* - *sadʒ-lar*, *tat* - *tad-ɨ*, *tat-lar*): in both contexts, the voice value is acquired upon domain-final computation. Now consider that in Turkish, suffix-initial stops may either take on the voicing of the preceding segment (-tA / -dA "locative": *sadʒ* - *sadʒ-ɨ* - *sadʒ-da* "sheet metal. Loc", *tat- tad-ɨ* - *tat-ta* "taste.Loc"), or come with their own fixed voicing. In the latter case, stop clusters disagreeing in voicing are produced. Thus *-ken* "converb marker (CV)" begins with a fixed voiceless k: *atʃ* - *atʃ-ɨ* - *atʃ-ken* "hungry.CV", *sadʒ* - *sadʒ-ɨ* - *sadʒ-ken* "sheet metal.CV", the latter form bearing a [dʒk] cluster. Conversely, *-gil-ler* "as a whole" has an initial fixed voiced g: *turuntʃ* - *turundʒ-u* - *turuntʃ-gil-ler* "citrus", producing the cluster [ntʃg] in

turunʧ-gil-ler. If a C° were involved in clusters that disagree in voicing, it should be passively voiced, i.e. receive voicing from the (phonetic) environment. Since this is not what we see, clusters disagreeing in voicing suggest that no C° is involved: both consonants are specified for voicing ($C^{H}C^{L}$ or $C^{L}C^{H}$). Stops like in -tA / -dA, though, are C° unspecified for voicing. Thus the behaviour of VA confirms that Turkish contrasts three types of stops: C^{L}, C^{H} and C°.