TURCOLOGICA 127

Selected Essays on Turkish Linguistics: The Anadolu Meeting

Proceedings of the 20th International Conference on Turkish Linguistics

Edited by
Fatma Hülya Özcan Önder, Tuncay Karalık, Bayram Çibik, İlknur Civan Biçer and Samet Deniz

Harrassowitz Verlag

Sonderdruck aus/Offprint from

Selected Essays on Turkish Linguistics: The Anadolu Meeting

Proceedings of the 20th International Conference on Turkish Linguistics

Edited by
Fatma Hülya Özcan Önder, Tuncay Karalık,
Bayram Çibik, İlknur Civan Biçer
and Samet Deniz

2024
Harrassowitz Verlag · Wiesbaden

TABLE OF CONTENTS

CORPUS LINGUISTICS

SOCIOLINGUISTICS

LANGUAGE ACQUISITION

BILINGUALISM

LANGUAGE DISORDERS

The phonological nature of the Turkish front glide

Stefano Canalis (Boğaziçi University)

Semra Özdemir (UC San Diego)

Utku Türk (University of Maryland, College Park)

Ümit Tunçer (Boğaziçi University)

Abstract

The phonological system of Turkish includes the palatal glide /j/. Here we argue that, despite its phonetic realization being usually a semivowel, this segment is unspecified for the feature [sonorant] (it is never contrastive for that feature, and it never patterns with sonorant consonants), and does not form a natural class with vowels. We offer six pieces of evidence to prove our point. 1) Turkish /j/ never interacts with vowel harmony. 2) Turkish /j/ does not trigger hiatus resolution strategies. 3) Turkish allows several Sonorant–Obstruent clusters word–finally; however, compared to liquids and nasals, the distribution of /j/ is much more restricted. It only occurs in some loanwords, most obstruents never occur after it, and even the few attested clusters are broken by an epenthetic vowel. 4) [æ] is an allophone of /e/ before tauto–syllabic liquids and nasals, but not before /j/. 5) The distribution of the allophones of /j/ is similar to that of the allophones of /v/. 6) A preliminary phonetic survey suggests that Turkish /j/ (as well as the other [+continuant] consonants) may display friction and partial devoicing, at least utterance–finally.

Keywords: glides, phonological features, phonological contrast, underspecification

1. Introduction[1]

The phonological system of Turkish is routinely assumed to include the palatal glide /j/ (see e.g. Zimmer & Orgun, 1992, p. 43; Kornfilt, 2000, p. 487; Göksel & Kerslake, 2005, p. 6; Erguvanlı Taylan, 2015, p. 45). The goal of this paper is to argue that, although it is phonetically an approximant (in most environments, at least), the phonological behavior of this segment is best accounted for when assuming it is not a sonorant segment. While the phonology of Turkish provides ample evidence for the consonantal, [+voice] and [+continuant] specification of /j/, this segment does not participate in phonological processes that involve sonorant consonants, and it triggers or undergoes processes that never crucially involve the class of sonorants. We argue that this phonological behavior depends on the patterning of phonological contrasts in the Turkish consonantal system. We suggest that the features [+continuant] and [+voice], together with place features, are sufficient to contrast /j/ with any other Turkish

1 We would like to thank Furkan Dikmen, Elan Dresher, Sumru Özsoy, two anonymous reviewers and audiences at ICTL 20 and OCP 18 for their help, comments and suggestions. Any remaining shortcomings are our own. The research of the first author was funded by Boğaziçi University's Bilimsel Araştırma Projeleri Koordinatörlüğü [Pr. No: 16021, 'Syllabic phonology'].

consonant, whereas /j/ has no contrastive value for [sonorant]. Therefore, /j/ is predicted not to pattern phonologically with [+sonorant] segments. We will formalize this intuition adopting the Successive Division Algorithm (Dresher, 2009) for the specification of contrastive feature values.

Our paper is organized as follows. In section 2 we discuss some general properties of glides and lay out our assumptions about contrastivity. In sections 3 and 4 we present five different pieces of evidence showing that Turkish /j/ never patterns with vowels or sonorant consonants. In section 5 we report our sixth piece of evidence, that is some preliminary results of an acoustic study suggesting that the underspecification of [sonorant] in /j/ may have a phonetic counterpart: at least utterance–finally, /j/ is closer to a (voiceless) fricative than to an approximant. Finally, in section 6 we present our conclusions.

2. Theoretical background

2.1 The ambiguity of glides

The phonological properties of glides are notoriously difficult to capture, to the extent that Hyman (1985, p. 77) argued that they are "[p]erhaps the most problematic segment type for all theories of phonology". This difficulty mainly stems from their variable behavior. In many cases they pattern with high vowels, essentially being their predictable allophones outside of syllable nuclei; this has led some phonologists (e.g. Durand, 1986; Kaye & Lowenstamm, 1984) to assume that glides are always vowels underlyingly. However, in some languages glides pattern with consonants (Levi, 2011; p. 342), with both types of glides sometimes occurring in the same languages (Levi, 2011; p. 353). Some frameworks try to capture the dual nature of glides ascribing both 'vocalic' and 'consonantal' properties to them. This is essentially what most mainstream generative phonology has done since Chomsky and Halle's (1968, p. 354) proposal to specify their major class features as [–consonantal, –syllabic, +sonorant]; glides would share the feature [–consonantal] (i.e., "with[out] a radical obstruction in the midsagittal region of the vocal tract", Chomsky & Halle, 1968, p. 302) with the class of vowels, and [–syllabic] with the class of non–syllabic consonants. A more radical and recent approach is to assume the existence of two types of phonologically distinct glides: underlyingly 'consonantal' glides and derived 'vocalic' glides (Herman, 1994; Levi, 2004, 2008, 2011).

Phonetically, glides often have more constriction, shorter duration, and less amplitude than high vowels, but sometimes data on their phonetic realization may be conflicting; it may be variable across languages, and even within the same language parameters such as the degree of constriction may depend more on the surrounding sounds than the glide itself (Levi, 2011, pp. 342–344). As for shorter duration, the existence of geminate glides in some languages (see Maddieson, 2008, for a review) casts doubts on its universality as a phonetic correlate of glides. Interestingly for our argument, phonological glides are not necessarily phonetic approximants, but can be phonetic fricatives as well, and phonological fricatives can be realized as phonetic approximants. An instance of the first mismatch is Sanskrit: the non–nuclear allophone of Sanskrit /u/ before a vowel is the fricative [v] (Levi, 2011, p. 349).

An instance of the second mismatch is Slave (Athabaskan): before a front vowel, /ɣ/ can be realized either as [ɣ] or as [j] (Rice, 1989, p. 33).

These combined facts suggest that the phonetic properties of a glide do not always provide straightforward and uniform information about its phonological status, and what looks as a prima facie sonorant and non–consonantal segment may not pattern as such in the phonology of a language. As we will argue in sections 3–5, Turkish /j/ is such a segment: although typically realized as an approximant, it is not phonologically [+sonorant] and it does not form a natural class with vowels.

2.2 Phonological features and contrastivity

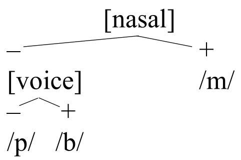
Glides are a prime example of a sound class whose phonological behavior and place within the contrast system of a language cannot be predicted only on the basis of its phonetic attributes. This is a problem for theories that hold that, besides capturing contrast and natural classes, one of the roles of phonological features is providing relatively detailed information about the phonetic realization of segments. However, there is growing evidence that the instantiation of identical feature specifications is not constant across languages, and speakers know fine phonetic details of their own language that are neither universal nor automatic (among many others, see Cohn, 2011, for a summary), which casts doubts on the premise that a great deal of the phonetic detail of a given segment should be determined by the phonological features the segment consists of.

An alternative view is that phonological features are essential to account for contrast and natural classes, but only partially determine the phonetic substance of segments. While their definition must ultimately include reference to phonetic properties, such properties are only relative and contextual; they do not refer to specific articulatory configurations or positive acoustic attributes, but only to phonetic differences among segments. One implication of this viewpoint is that the same feature may have rather different phonetic implementations cross–linguistically. This may be especially relevant for segments that are notorious for their varied behavior cross–linguistically, such as the class of glides.

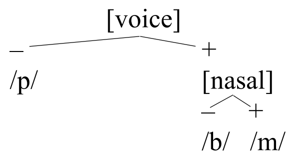
A related hypothesis is the idea that only contrastive properties are phonologically relevant; what phonology 'sees' in the phonetic make–up of a phoneme is what contrasts it with the other phonemes within a phonological inventory, rather than the whole bundle of its phonetic properties. This hypothesis has a long history in phonology, yet at the same time has repeatedly been questioned, not least because the criteria to identify which features are contrastive in a given segment have often remained implicit and unclear (for instance, a pair of segments may be distinguished by more than one feature, making it unapparent which of them is contrastive and which is not).

A recent attempt to solve these problems and revive the hypothesis that phonology only operates on contrastive features assumes that phonological contrast is determined in a hierarchical fashion (see Dresher, 2009, and references therein for a summary). According to this hypothesis, inventories are successively subdivided assigning contrastive feature values at each step of the hierarchy of features, until every phoneme has received a distinct phonological representation (hence the name 'Successive Division Algorithm' for the algorithm formalizing this idea). The order of features in the hierarchy is supposedly not universal, allowing for differences in contrastive specifications even between languages with similar, if not identical, inventories. For example, the consonantal (sub)system /p b m/ must contrast the features [voice] and [nasal], but two different feature hierarchies (and thus two different feature specifications) are possible (Dresher, 2009, pp.15–16):

(1a)
Ordering [nasal] > [voice]



(1b)
Ordering [voice] > [nasal]



We cannot do justice here to the arguments supporting this hypothesis due to space constraints. We limit ourselves to observe that a consequence of this approach is the possibility of having segments that remain featurally unspecified (for example, /m/ is unspecified for [voice] in (1a), while /p/ is unspecified for [nasal] in (1b)). If phonology only operates on contrastive features, any rule or constraint that refers to a feature [F] should ignore a segment unspecified for [F].

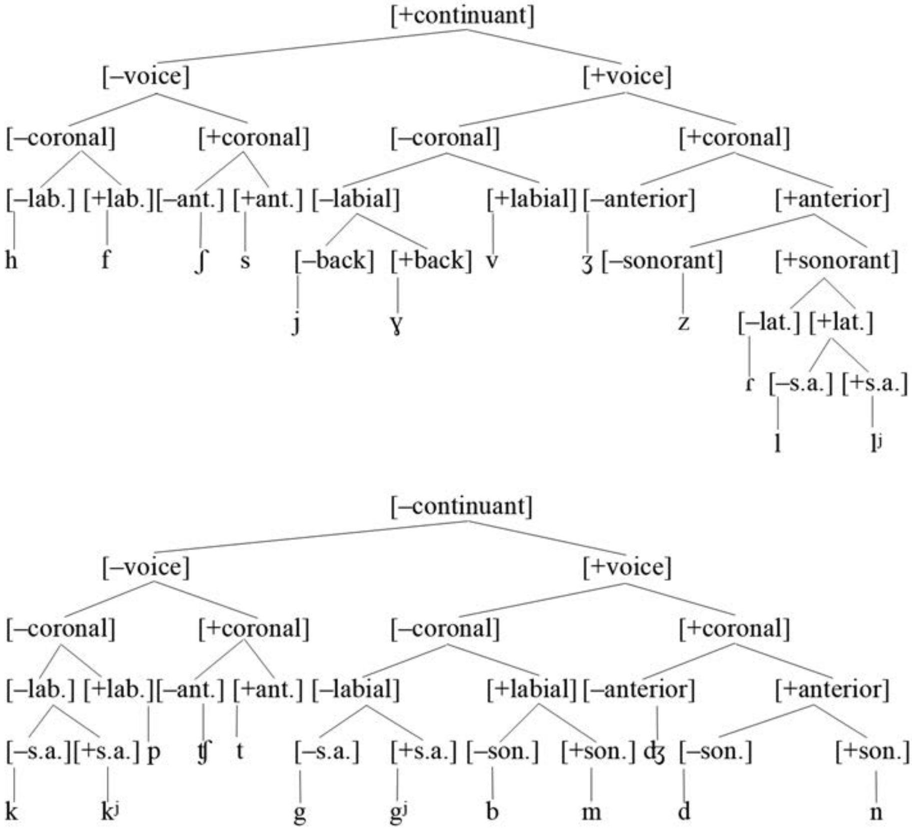
As we have seen in section 2.1, glides are traditionally assumed to be [–consonantal, –syllabic, +sonorant]. A number of theoretical and empirical problems arise from the features [consonantal] and [syllabic] (see e.g. Hume & Odden, 1996; Goldsmith, 2011, p. 169), which raises questions about their use not only for glides, but more generally for any segment. In any case, even if [consonantal] were a tenable feature, Levi (2004, 2008, 2011) demonstrates that in some languages, including Turkish, glides only pattern with consonants. In section 3 we present evidence suggesting that Turkish /j/ never patterns with vowels, i.e. the other class of segments assumed to be [–consonantal]. As for [sonorant], in section 4 we present evidence suggesting that Turkish /j/ never patterns with sonorants, and we claim this follows from it being unspecified for the feature [sonorant]. Consequently, /j/ cannot form a class with the other sonorant consonants even if (in most environments) it has the phonetic attributes of a sonorant.

We derive the underspecification of /j/ with respect to [sonorant] from the contrastive hierarchy of Turkish consonants we assume in (2).[2] We claim that the feature having the widest scope among Turkish consonants is [continuant]: all consonants are either contrastively [–continuant] or [+continuant]. The features [voice], [coronal], [anterior][3], [labial], [back] and [sonorant] have progressively narrower scope; the rather low position of [sonorant] means that specifying /j/ as [+continuant, +voice, +coronal, –labial, –back] is sufficient to contrast it with any other Turkish consonant, even if it is unspecified for [sonorant].

2 The variety we consider is Istanbul Turkish. We assume the consonantal inventory /p t k kʲ ʧ b d g gʲ ʤ f s ʃ v ʒ h n m ɾ l lʲ j ɣ/. The last consonant – the so–called 'soft g' – is a velar fricative or approximant for some speakers, but for many others it has no intrinsic phonetic content; either it is an approximant whose place is determined by the adjacent vowels, or it lengthens the preceding vowel. For such speakers, /ɣ/ can be analysed as an underlyingly empty consonant position (Clements & Keyser, 1983, p. 71).

3 In line with a widespread assumption (see e.g. Hall, 1997), we consider [anterior] to be relevant only for [+coronal] consonants.

(2) [continuant] > [voice] > [coronal] > ([anterior]) > [labial] > [back] > [sonorant] > [lateral] > [secondary articulation][4]



3. Evidence for the consonantal nature of [j]

In this section, we will discuss Turkish /j/'s interaction with vowel harmony and hiatus to show that it is an instance of what Levi (2004) calls 'phonemic' or 'underlying' glides. The standard definition of [consonantal] (see section 2.1) implies that glides should be the [–syllabic] counterparts of vowels; apart from [syllabic], pairs such as /j/ and /i/ would be featurally identical (since both are [–consonantal]), and therefore should be expected to form natural classes. However, in some languages glides only pattern with consonants, meaning that either [consonantal] is not a valid feature (cf. Hume & Odden, 1996) or such 'consonan-

4 Following the spirit of Clements and Hume's (1995) model of feature geometry, we assume the palatalized consonants /k^j g^j l^j/ have, along with their primary place tier, a vowel–place tier that includes a [–back] feature; in (2) we represent the presence/absence of this tier as a binary feature called [±secondary articulation] (or [±s.a.] for reasons or brevity).

tal' glides should be underlyingly different from vowels (see Levi, 2004, for a discussion of various representational solutions).

3.1 Interaction with vowel harmony

One diagnostic for determining whether a glide is underlyingly closer to vowels or consonants in a language is testing whether the glide triggers vowel harmony as vowels do. Levi (2001, 2004, 2008, 2011) uses these criteria to argue that Turkish /j/ is an underlying glide. As for vowel harmony, Turkish vowels in suffixes assimilate in backness and roundness to the final vowel of the root. For example, the high vowel in the accusative case marker –*I*[5] may surface as [i], [ɯ], [u], or [y] (3).

(3)		Nom	Acc	Gloss
	a.	[kʲelʲ]	[kʲelʲi]	'bald'
	b.	[at]	[atɯ]	'horse'
	c.	[telʲevizjon]	[televizjonu]	'television'
	d.	[økʲyz]	[økʲyzy]	'ox'
	e.	[koj]	[koju]	'cove'
	f.	[koj]	*[koji]	'cove'

What is important to note is that while the vowels in (3a)–(3d) trigger vowel harmony, the glide in (3e) (which is, supposedly, [–back, –round]) is entirely transparent to vowel harmony. If the glide [j] did indeed participate in vowel harmony, we would expect to see *[koji], which is not attested. The vowel that precedes the glide determines which vowel will surface in the suffixes. Its transparency to vowel harmony indicates that [j] is underlyingly a consonant.

3.2 Interaction with hiatus

Another piece of evidence comes from allomorph selection in consonant–final roots (Levi, 2004, p. 53). When a suffix otherwise starting with a vowel attaches to a vowel–final word, a consonant–initial allomorph is used to avoid a hiatus (Kabak, 2007, p. 1380).

One such suffix alternating between a vowel–initial and a consonant–initial allomorph is the possessive suffix. As shown below, the possessive suffix surfaces as –*I* when preceded by a vowel (4a), but as –*sI* when preceded by a consonant (4b). Crucially, it takes the –*I* form when preceded by a glide (4c).

(4)		Nom	Poss	Gloss
	a.	[jɯlan]	[jɯlanɯ]	'snake'
	b.	[boɾu]	[boɾusu]	'pipe'
	c.	[koj]	[koju]	'cove'
	d.	[koj]	*[kojsu]	'cove'

5 The capital character *I* here is an archiphoneme that stands for high vowels which are underspecified for both backness and roundness. Thus, '–I' means that the suffix may either surface as –[i], –[ɯ], –[u], or –[y] depending on the previous vowel. Similarly, the possessive suffix '–sI(n)' may surface as one of the following forms: –[si], –[sɯ], –[su], or –[sy].

Taken together with its interaction with vowel harmony, we can conclude that the Turkish glide [j] is underlyingly a consonant and does not have vowel–like characteristics.

4. Evidence for the non–sonorant nature of [j]

Having discussed the consonantal nature of Turkish [j], we will now explore whether or not [j] is [+sonorant]. We will argue that it is not a sonorant phonologically, focusing on three different phonological phenomena: (i) consonant clusters in coda position, (ii) the lowering of /e/ when preceded by a sonorant in the same syllable, and (iii) parallelisms between Turkish /j/ and /v/. These phenomena will illustrate that glides in Turkish do not pattern with the natural class of sonorants.

4.1 /j/ in consonant clusters

One piece of evidence for the discrepacy between [j] and sonorants in Turkish phonotactics comes from Turkish syllable–final consonant clusters. The canonical syllable structure in the native Turkish lexicon is (C)V(C). However, C1C2 clusters are possible in word–final position (see e.g. Underhill, 1976; Erguvanlı Taylan, 2015). Erguvanlı Taylan (2015, pp. 48–50) provides the following list of possible final consonant clusters (5).

(5) a. [+sonorant] + [–sonorant]: *kalp*, *dorp*, *renk*, *harf*
b. [–sonorant, +continuant] + [–sonorant, –continuant]: *aşk*, *çift*, *serbest*
c. /k/ + /s/: *boks*, *faks*

Erguvanlı Taylan (2015) does group [j] with the other sonorant consonants and gives examples such as /sɯlajt/ and /pejk/ (to which recent loanwords from English, such as [lajk], [tejp], [fejk] from *like*, *tape*, *fake* could be added), suggesting that consonant clusters with [j] are instances of (5a). However, she also notes that lexical items with glide+C clusters are extremely restricted and are loanwords in Turkish. Furthermore, glides are typically followed by a stop (as are fricatives in (5b)), whereas glide+fricative final clusters are very rare. Significantly, sonorant consonants, i.e. liquids and nasals, have more combinatorial possibilities, being able to be followed by stops, affricates and fricatives (e.g. [døɾt] ‘four’, [kalʲp] ‘heart’, [dinʧ] ‘vigorous’, [zarf] ‘envelope’).

Another relevant aspect is how Turkish speakers adapt loanwords with a consonant cluster. When a consonant cluster is prohibited in Turkish, speakers insert an epenthetic vowel within it. This epenthetic vowel is always used when a borrowed word has a word–initial CC cluster (6), since they are not allowed in Turkish.

(6)		Original	Adapted	Gloss
	a.	[brɑkəli] (EN)	[buɾokoli]	‘broccoli’
	b.	[smuði] (EN)	[sumuti]	‘smoothie’
	c.	[gʁi] (FR)	[gɯɾi]	‘grey’

On the other hand, this epenthetic vowel surfaces only in some word–final clusters. Most loanwords containing [+sonorant] + [–sonorant, +continuant] clusters in coda position do not necessitate an epenthetic vowel (7a–b), except for those containing [j] as the first consonant in $–VC_1C_2$ clusters (7c–e), giving rise to synchronic vowel/zero alternations.

(7)		Original	Adapted	Acc	Gloss
	(a)	[haɾf] (AR)	[haɾʲf]	[haɾʲfi]	'letter'
	(b)	[elf] (EN)	[elʲf]	[elʲfi]	'elf'
	(c)	[kajf] (AR)	[kʲejif]	[kʲejfi]	'pleasure'
	(d)	[hajf] (AR)	[hajɯf]	[hajfɯ]	'sorrow'
	(e)	[χajr] (AR)	[hajɯɾ]	[hajɾɯ]	'charity'

In sum, the behavior of [j] does not align with sonorants. The data presented by both Erguvanlı Taylan (2015) and us show that [j] cannot easily form a consonant cluster with [+continuant] sounds, even if consonant clusters that contain [j] and stops are attested in loanwords. Given this more limited distribution, we conclude that [j] does not align with other sonorants (5a), but is closer to the non–sonorant continuants (5b).

4.2 /e/–lowering

The next piece of evidence illustrating that Turkish glides are not specified for [+sonorant] comes from the lowering of /e/ when it is followed by a sonorant coda. The non–high, front, unrounded vowel has three allophones: [e], [æ], and [ɛ] (Göksel & Kerslake (2005, p. 10). [ɛ] occurs word–finally and [æ] occurs in closed syllables before /l/, /m/, /n/, and /r/ (with a few lexical exceptions not discussed here); [e] occurs elsewhere. One acoustic study, namely Gopal and Nichols (2017), provides instrumental evidence for the lack of /e/–lowering before /j/. Their data show that /e/ tokens in syllables with a sonorant coda have substantially higher F1 and lower F2 values (meaning a lower and less front vocalic articulation) than /e/ tokens in any other environment, including glide–ending syllables.

We conducted a similar experiment, asking three native Turkish speakers to produce words containing /e/ in a closed syllable ending in /l ɾ n m j/ (one word for each consonant /l ɾ n m/, two words for /j/; each word was repeated twice). The recordings obtained were measured with *Praat* (Boersma & Weenink, 2022). The F1 and F2 values of all /e/ tokens are reported in Figure 1; they further substantiate the claim that lowering does not take place before /j/.

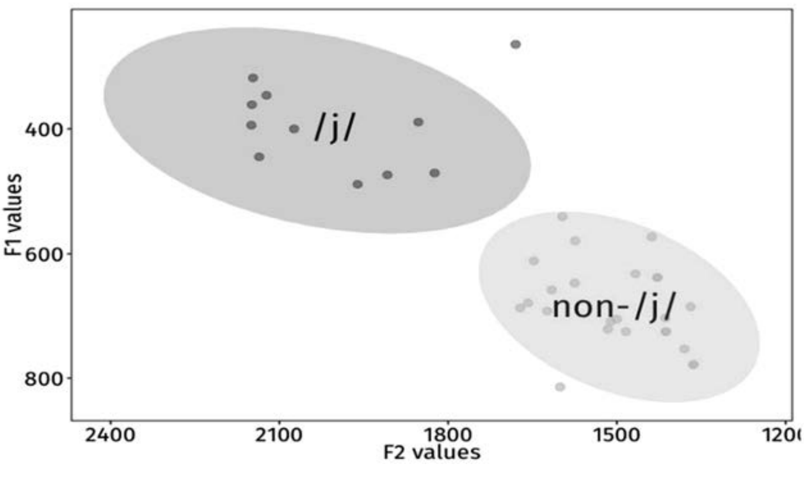


Figure 1. F1 and F2 values of /e/ in closed syllables, /l ɾ n m j/ as codas.

4.3 Absence of /w/ in Turkish

If Turkish /j/ were a sonorant, it would be the only glide in the phonemic inventory of Turkish, as the back glide /w/ is not part of it. This asymmetry would be rather uncommon, since most languages having glides have both. Nevertheless, it might still be considered an accidental gap.

However, the absence of /w/ may reveal something about the absence of the whole class of glides in Turkish. It has often been argued (among many others, see e.g. Martinet, 1952; Maddieson, 1985; Nikolaev, 2022) that a non–native phoneme is more easily borrowed (rather than adapted or deleted) when it fills a gap in the phonological inventory of the receiving language; that is, borrowing of a new sound is more likely to occur if it can be categorized according to phonological oppositions already existing in the receiving language. This seems to derive from a more general synchronic principle (termed Feature Economy by Nick Clements), which is the tendency "to maximise the combinatory possibilities of features across the inventory of speech sounds: features used once in a system tend to be used again" (Clements, 2003, p. 287). For instance, Mazatec (Oto–Manguean) had the bilabial consonants /m/ and /β/ and the voiceless stops /t, k/, but no bilabial stops; it borrowed /p/ from Spanish when the two languages entered in contact (Maddieson, 1985, p. 54). More recently, Nikolaev's (2022, p. 182) typological survey found a partial quantitative confirmation of this tendency, as it revealed that at least some segments that are often borrowed are also often gaps in inventories. Maddieson also mentions the borrowing of /ʒ/ in German, which previously only had the sibilant fricatives /s, z, ʃ/, then acquired /ʒ/ when it borrowed French words (Maddieson, 1985, p. 53). This last example has a close parallel in Turkish, which had the fricatives /s, z, ʃ/ but no /ʒ/, until the latter was introduced through Persian and French loanwords such as French *plage*, *collège*, *logement*, Persian *ežderhâ* > Turkish *plaj*, *kolej*, *lojman*, *erdejha*.

If the category of sonorant glides existed in Turkish (that is, if Turkish /j/ were a sonorant glide), /w/ would thus be expected to be fairly easily borrowed in Turkish, just like /ʒ/ was. However, interestingly, Turkish speakers consistently adapt [w] as [v] in loanwords, such as *Wisconsin* > [viskonsin] and *Washington* > [vaʃinton], where the original glide is not next to a rounded vowel.[6] Anecdotally, this reluctance to borrow [w] seems to be attested even among speakers with a high level of fluency in the languages the loanwords containing [w] are borrowed from. This suggests that the phonological category of glides is altogether absent in Turkish, in line with the hypothesis that /j/ is not a (sonorant) glide.

In fact, the distribution of the allophones of Turkish /j/ is similar (although not identical) to that of /v/, which commonly is not supposed to be a sonorant[7] and would be featurally very similar to /j/ according to our hierarchy in (2). Turkish /v/ is lenited to [ʋ] when intervocalic and followed or preceded by a [+round] vowel, e.g. in /tavuk/ → [taʋuk] *tavuk* 'chicken'. In

6 The other two allophones of Turkish /v/ are [ʋ] and [β]. The former occurs between two vowels if at least one of them is rounded, while the latter occurs in non–intervocalic position next to a rounded vowel (Göksel & Kerslake, 2005, p. 6; Erguvanlı Taylan, 2015, p. 29).

7 A reviewer suggests that this phoneme might be underlyingly an approximant, considering its lack of friction in some environments. From the theoretical perspective we adopt in section 2.2, Turkish /v/ and /j/ are neither fricatives nor approximants phonologically, but continuant consonants unspecified for [sonorant]. We use the symbols /j/ and /v/, in keeping with previous analyses, but in our account both are just [+continuant, +voice] consonants, phonetically closer to a fricative or an approximant depending on the phonological environment.

fast speech, lenition can go further, leading to deletion ([tauk]). Likewise, /j/ can be deleted in fast speech when intervocalic and next to a [–back] vowel: [iji] ~ [ii] *iyi* 'good', [byjyc] ~ [byyc] *büyük* 'big'.

5. Phonetics of Turkish /j/

5.1 Methodology

Optional devoicing has been reported for Turkish liquids "word–finally" (Kornfilt, 1997, p. 487) and "in final position" (Zimmer & Orgun, 1992, p. 44). One acoustic study (Nichols, 2016) has found experimental evidence of devoicing as well as frication of the rhotic before a pause/silence, i.e. utterance–finally, while elsewhere it is realized as an approximant or a tap and only sporadically devoiced. In this section we present the preliminary results of an ongoing study to argue that /j/ too may devoice and fricativize utterance–finally. We interpret this result as supporting our hypothesis that /j/ is unspecified for the feature [sonorant]; the phonetic realization of /j/ is free to vary between more or less constricted allophones due to the underspecification of this particular feature. Since /j/ is [+voice], and voicing and frication are to some degree incompatible (see e.g. Johnson, 2012, p. 156), an approximant realization is generally favoured over a fricative one; however, utterance–finally, where devoicing occurs, a more fricative allophone emerges.

Given the reported devoicing of liquids, one may conclude that optional devoicing affects the class of sonorants, contrary to our hypothesis that /j/ is not specified for [sonorant]. We will present data showing that the target of optional devoicing is in fact the class of continuants: utterance–final fricatives /v z ʒ/ may devoice too, while [+sonorant, –continuant] /n/ and /m/ never devoice.

Building on Nichols' (2016) findings, we compared only utterance–final and word–final position. Nine participants (6 male, 3 female speakers of Istanbul Turkish aged between 21 and 52, mean 32.6; not every participant produced every token) read words ending in a sonorant consonant or a voiced fricative (since it is well known that underlyingly voiced stops obligatorily devoice word–finally in Turkish, they were not included). The words were either within or at the end of a carrier sentence. The data collected were analyzed using *Praat*. As the goal was to quantify the amount of voicing (or lack thereof) and friction, the parameters considered were segment duration (voiceless fricatives tend to be longer than voiced ones), duration of the voiced portion, pulse count (voicing requires glottal pulses), harmonics–to–noise ratio (fricatives have a stronger a–periodic component than approximants, and hence a lower harmonics–to–noise ratio), and the ratio of the voiced portion to the total segment length.

5.2 Results of the phonetic study and discussion

In Table 1 we compare the realizations of /j/ in utterance–internal and utterance–final position. In word–final position /j/ is nearly always voiced, while voiceless allophones may occur utterance–finally. We can observe that on average /j/ has a significantly longer articulation, lower pulse count, shorter voiced portion, and lower harmonics–to–noise ratio in utterance–final position.

Table 1. /j/ in word– and utterance–final position

Mean values of /j/ (tokens=40)	Word-final (n=20)	Utterance-final (n=20)
Phoneme length (ms)	80.13	130.98
Voiced portion duration (ms)	72.25	73.28
Pulse count	11.75	9.63
Harmonics to noise ratio (dB)	11.01	5.55
Voiced portion/length ratio	0.90	0.56

Figure 2 shows the spectrogram of an utterance–final token of the word *koy* 'cove'. The last segment has considerable a–periodic energy at high frequencies, characteristic of fricatives, and shows only faint traces of the vertical striations expected in voiced segments.

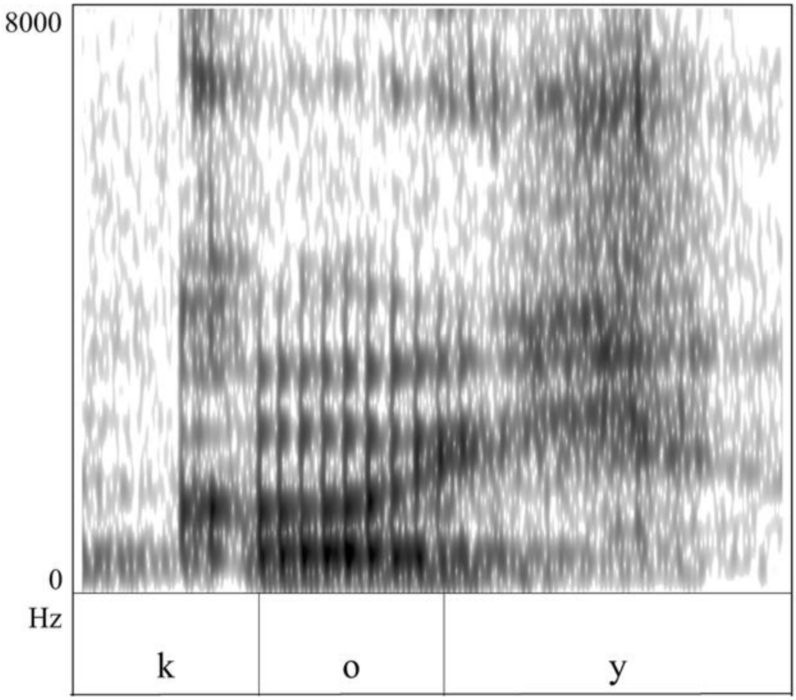


Figure 2. Utterance–final *koy*.

This process is plausibly a facet of a more general rule optionally devoicing utterance–final voiced continuants, i.e. /ɾ/, /l/, /lʲ/, /j/, /v/, /z/ and /ʒ/, with concomitant fricativization if they are approximants (Tunçer & Sanıyar, 2022). Tables 2 and 3 show the lateral /l/ and the rhotic /ɾ/, which show a similar (actually, more intense and systematic, especially for /ɾ/) fricativization/devoicing.

Table 2. /l/ in word– and utterance–final position (Tunçer & Sanıyar, 2022)

Mean values of /l/ (tokens=40)	Word-final (n=20)	Utterance-final (n=20)
Phoneme length (ms)	87.90	162.90
Voiced portion duration (ms)	73.52	70.40
Pulse count	20.24	11.05
Harmonics to noise ratio (dB)	11.47	6.25
Voiced portion/length ratio	0.84	0.43

Table 3. /ɾ/ in word– and utterance–final position (Tunçer & Sanıyar, 2022)

Mean values of /ɾ/ (tokens=40)	Word-final (n=20)	Utterance-final (n=20)
Phoneme length (ms)	83.65	223.55
Voiced portion duration (ms)	83.65	40.10
Pulse count	17.35	6.55
Harmonics to noise ratio (dB)	12.60	4.72
Voiced portion/length ratio	1.00	0.18

The data also reveal devoicing of underlying voiced fricatives, as shown in Table 4, 5, and 6, for /z/, /ʒ/, and /v/ respectively. Usually, they exhibit a more intense degree of devoicing than /j/; in many tokens they did not have any voiced fraction at all.

Table 4. /z/ in word– and utterance–final position

Mean values of /z/ (tokens=8)	Word-final (n=2)[8]	Utterance-final (n=6)
Phoneme length (ms)	69.00	164.00
Voiced portion duration (ms)	69.00	12.50
Pulse count	10.50	1.50
Harmonics to noise ratio (dB)	6.58	3.50
Voiced portion/length ratio	1.00	0.08

Table 5. /ʒ/ in word– and utterance–final position

Mean values of /ʒ/ (tokens=8)	Word-final (n=4)	Utterance-final (n=4)
Phoneme length (ms)	83.50	131.50
Voiced portion duration (ms)	81.50	12.75
Pulse count	11.25	2.00
Harmonics to noise ratio (dB)	7.18	3.90
Voiced portion/length ratio	0.98	0.10

8 The very low number of utterance–final /z/ tokens is not intentional; some of the data turned out to be unusable due to an unnoticed technical problem in a recording session.

Table 6. /v/ in word– and utterance–final position

Mean values of /v/ (tokens=10)	Word-final (n=5)	Utterance-final (n=5)
Phoneme length (ms)	58.00	129.60
Voiced portion duration (ms)	58.00	51.40
Pulse count	6.80	5.40
Harmonics to noise ratio (dB)	12.90	3.08
Voiced portion/length ratio	1.00	0.40

These values suggest that the devoiced tokens of /z/, /ʒ/ and /v/ broadly parallel the devoiced tokens of the approximants in terms of longer total duration and shorter voiced portions. The degree of devoicing varies, as /z/ shows the strongest difference between voiced and devoiced variants while /v/ displays a less intense devoicing, comparable to that of /l/. The voiced variants of /z/ and /ʒ/ exhibit a lower harmonics–to–noise ratio compared to /j/, while the harmonics–to–noise ratio of is fairly uniform across all the devoiced variants. This suggests that while /j/ has considerably less friction than /z/ and /ʒ/ in word–final position, it becomes fricative–like in utterance–final position.

Lastly, the measurements for the nasal sonorant /n/ (Table 7) indicate that it is exempt from optional utterance–final devoicing. As /n/ is [+sonorant, –continuant], this suggests that devoicing targets all [+continuant] phonemes, independently of their value for [sonorant]. To sum up, even if our study is currently based on a limited number of tokens and therefore does not allow definite conclusions, we provisionally surmise that its results show utterance–final continuant consonants, including /j/, may optionally (or, in the case of /ɾ/, nearly categorically) devoice in Turkish.

Table 7. /n/ in in word– and utterance–final position

Mean values of /n/ (tokens=10)	Utterance-final
Phoneme length (ms)	105.08
Voiced portion duration (ms)	93.00
Pulse count	5.70
Harmonics to noise ratio (dB)	9.20
Voiced portion/length ratio	0.89

6. Conclusions

In sections 3–5, we provided evidence that Turkish /j/, despite being phonetically an approximant, cannot be a [–consonantal, +sonorant] phoneme. With respect to the feature [consonantal], unlike vowels, /j/ is inert in vowel harmony and does not trigger hiatus avoidance when adjacent to a vowel. With respect to the feature [sonorant], /j/ never patterns with [+sonorant] consonants. It can only limitedly be the first member of word–final consonant clusters, unlike /l ɾ m n/; unlike 'true' sonorant consonants, it does not trigger lowering of /e/. Furthermore, the distribution of its allophones is similar to that of the allophones of /v/. Lastly, acoustic data also suggest that /j/ is not necessarily a sonorant; similar to other Turkish [+continuant, +voice] consonants, it may be partially devoiced and fricativized.

None of these properties is compatible with a [–consonantal, +sonorant] feature specification for /j/. However, in several languages, phonetic glides are not phonological glides (see section 2.1). Specifically, Turkish /j/ seems to lack any vowel–like and sonorant quality, its phonetically approximant nature notwithstanding. An explanation for this phonological behavior may be found in the pattern of contrasts within the consonantal system of Turkish; the features [+continuant] and [+voice], together with place features, are sufficient to contrast /j/ with any other Turkish consonant, leaving it unspecified for [sonorant]. This account is consistent with the phonological behavior of /j/, as well as with its phonetic implementation; being underspecified for [sonorant], and due to the tension between voicing and friction, it varies between an approximant when voiced, and a fricative when devoiced.

References

Boersma, P., & Weenink, D. (2022). Praat: Doing Phonetics by Computer (Version 6.2.14) [Computer software]. https://www.praat.org/.

Chomsky, N., & Halle, M. (1968). The Sound Pattern of English. New York: Harper & Row.

Clements, G.N. (2003). Feature Economy in sound systems. Phonology 20(3), 287–333.

Clements, G. N., & Hume, E. (1995). The internal organization of speech sounds. In J. Goldsmith (Ed.), Handbook of Phonological Theory (pp. 245–306). Oxford: Basil Blackwell.

Clements, G.N., & Keyser, S. J. (1983). CV Phonology: A Generative Theory of the Syllable. Cambridge, MA: MIT Press.

Cohn, A. (2011). Features, segments, and the sources of phonological primitives. In G.N. Clements & R. Ridouane (Eds.) Where do Features Come from? (pp. 15–41). Amsterdam: John Benjamins.

Dresher, B. E. (2009). The Contrastive Hierarchy in Phonology. Cambridge: Cambridge University Press.

Durand, J. (1987). On the phonological status of glides: The evidence from Malay. In J.M. Anderson & J. Durand (Eds.). Explorations in Dependency Phonology (pp. 79–107). Dordrecht: Foris.

Erguvanlı Taylan, E. (2015). The Phonology and Morphology of Turkish. Istanbul: Boğaziçi University Press.

Goldsmith, J. (2011). The syllable. In J. Goldsmith, J. Riggle, & A.C.L, Yu (Eds.), The Handbook of Phonological Theory (pp. 164–196). Malden (MA): Wiley–Blackwell.

Gopal, D., & Nichols, S. (2017, February 20–22). Sonorant–conditioned mid vowel lowering in Turkish [Conference presentation]. OCP (Old Word Conference on Phonology) 14, Düsseldorf, Germany.

Göksel, A., & Kerslake, C. (2005). Turkish: A Comprehensive Grammar. London: Routledge.

Hall, T. A. (1997). The Phonology of Coronals. Amsterdam: Benjamins.

Herman, R. (1994). La double vie de [w] or the status of [w] in Karuk. Studies in the Linguistic Sciences (Vol. 24, pp. 233–244).

Hume, E., & Odden, D. (1996). Reconsidering [Consonantal]. Phonology 13(3), 345–376.

Hyman, L. (1985). A Theory of Phonological Weight. Dordrecht: Foris.

Johnson, K. (2012). Acoustic and Auditory Phonetics (3rd ed.). Malden, MA: Wiley–Blackwell.

Kabak, B. (2007). Hiatus resolution in Turkish: An underspecification account. Lingua 117(8), 1378–1411.

Kaye, J. D., & Lowenstamm, J. (1984). De la syllabicité [On syllabicity]. In F. Dell, D. Hirst, & J.R. Vergnaud (Eds.), Forme sonore du langage: Structure des représentations en phonologie (pp. 123–159). Paris: Hermann.

Kornfilt, J. (2000). Turkish. London: Routledge.

Levi, S. V. (2001). Glides, laterals, and Turkish vowel harmony. In M. Andronis, C. Ball, H. Elston, & S. Neuvel (Eds.), Proceedings from the Main Session of the Fortieth Meeting of the Chicago Linguistic Society 37 (pp. 379–393). The Chicago Linguistic Society.

Levi, S. V. (2004). The Representation of Underlying Glides: A Cross–Linguistic Study [Ph.D. disser¬tation, University of Washington]. Available from ProQuest Dissertations & Theses Global. (305106050). https://www.proquest.com/dissertations-theses/representation-underlying-glides-cross-linguistic/docview/305106050/se-2

Levi, S. V. (2008). Phonemic vs. derived glides. Lingua 118, pp. 1956–1978.

Levi, S. V. (2011). Glides. In C. Ewen, E. Hume, & K. Rice (Eds.) The Blackwell Companion to Phonology (pp. 341–366). Malden, MA: Wiley–Blackwell.

Maddieson, I. (1985). Borrowed sounds. UCLA Working Papers in Phonetics 61(1), pp. 51–64.

Maddieson, I. (2008). Glides and gemination. Lingua 118, pp. 1926–1936.

Martinet, A. (1952). Function, structure, and sound change. Word 8(1), pp. 1–32.

Nichols, S. (2016, May 18–20). An acoustic study of the Turkish rhotic [Poster Presentation]. 5th International Workshop on Phonetic, Phonological, Acquisitional, Sociolinguistic and Dialect–Geographic Aspects of Rhotics, Leeuwarden, Netherlands.

Nikolaev, D. (2022). A typology of consonant–inventory gaps. Linguistic Typology 26(1), pp. 161–186.

Rice, K. (1989). A Grammar of Slave. Berlin – New York: Mouton de Gruyter.

Tunçer, Ü. C., & Sanıyar, E. (2022). Continuant devoicing in Turkish: Reanalysis of Turkish word–final devoicing. In S. K. Lee, S. Asinari, & S. Lazakovits (Eds.), Proceedings of the Workshop on Turkic and Languages in Contact with Turkic (Vol. 7, No. 1, pp. 164–171). Linguistic Society of America. https://journals.linguisticsociety.org/proceedings/index.php/tu/article/view/5314/5113.

Underhill, R. (1976). Turkish Grammar. Cambridge, MA: MIT press.

Zimmer, K., & Orgun, O. (1992). Turkish. Journal of the International Phonetic Association 22(1–2), pp. 43–45.