Sonorant Restrictions in Kyrgyz

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1. Introduction

Many languages impose restrictions on the distribution of sonorants. In several Turkic languages (Kipchak: Kyrgyz, Kazakh, Bashkir, Karakalpak; Siberian: Tuvan, Sakha/Yakut), sonorant onsets are restricted depending on the preceding context. They often alternate with obstruent counterparts in a process known as desonorization: for example, the /l/ in /dan-lar/ 'pieces' desonorizes to [d] in the output form [dan-dar].

All previous accounts of this phenomenon (Kazakh: Baertsch & Davis, Yakut: Baertsch & Davis, Jang; Kyrgyz: Gouskova) have attributed this to the syllable contact law (SCL) (Murray & Vennemann, 1983), a hypothesis favoring falling sonority and disfavoring rising sonority in cross-syllabic consonant clusters. The SCL is a principle used to capture a claimed cross-linguistic generalization: languages avoid rising sonority across a syllable boundary. Thus, under this law, [al.ta] is preferred over [at.la], since the rise in sonority from [t] to [l] is dispreferred, whereas a fall in sonority from [l] to [t] is preferred.

However, Turkic desonorization presents a challenge for the syllable contact law. I examine the details of the pattern for Kyrgyz, and propose an account for it based on the Licensing By Cue (LBC) framework (Steriade, 1997), in which perceptual information about the distinctiveness of contrasts is encoded as constraints in the grammar. I will show that languages which restrict sonorants after a syllable boundary also restrict them word-initially, a pattern not accounted for under the SCL, but predicted by my account. In addition, I will show that a SCL-based approach wrongly predicts that different segments should pattern together in desonorization, whereas my account predicts that they pattern independently, a prediction borne out by a cross-linguistic survey.

2. Data

In order to test whether an SCL or an LBC-based approach fares better, I explore in detail the distribution of sonorants in Kyrgyz. I examine a lexicon of around two thousand words[1] provided in Hebert & Poppe (1964) in order to provide data about the distribution of sonorants in Kyrgyz monomorphemically. I compare these facts with the behavior of suffixes whose initial segments alternate between sonorant and obstruent allomorphs. From this examination, we will see that several sonorants are restricted in word-initial position, and that these are precisely the sonorants that are also restricted post-consonantally, a correlation unaccounted for by the SCL.

2.1. Kyrgyz syllable structure

In Kyrgyz, onset clusters are not permitted and coda clusters are highly restricted. Syllables are maximally of the form CVC_1C_2; coda clusters must be of falling sonority, and C_2 must be an obstruent ([tɨntʃ] but not *[tɨst], *[tɨsn]). Although non-word final coda clusters are rare, they are attested: [dʒu.murt.qa] 'egg' and [ars.tan] 'lion'.

These restrictions on consonant clusters allow us to focus our attention on examples with simple onsets and codas, without loss of generality.

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[1] Kyrgyz lexicons include a large class of unassimilated Russian loanwords, which I will disregard; all mentions of loanwords will refer to nativized loanwords.

2.2. Sonorant-obstruent alternations

The distribution of sonorants which alternate with obstruents is presented below, using evidence from sonorant-initial suffixes which in certain contexts surface as obstruent-initial. As no suffixes begin with /j/ or /r/, evidence of how they pattern is lacking.

$C_1 \backslash C_2$	l	n	m	T
j	yes	mixed	yes	yes
r	mixed	no	yes	yes
l	no	no	yes	yes
n	no	no	yes	yes
m	no	no	yes	yes
T	no	no	yes	yes

Table 1: Kyrgyz coda-onset clusters with sonorant-obstruent alternation

In Kyrgyz, suffixes starting with the alveolar nasal /n/ desonorize to [d] after consonants. On the other hand, the labial nasal /m/ never desonorizes. Let us examine the suffixes in the table below:

(1)

stem ends in:	V	j	r	l	N	T
-ACC	bala-nɨ	**aj-dɨ**	**qar-dɨ**	**bal-dɨ**	**dan-dɨ**	**qɨz-dɨ**
-1SG	bala-mɨn	aj-mɨn	qar-mɨn	bal-mɨn	dan-mɨn	qɨz-mɨn
	'child'	'moon'	'snow'	'honey'	'piece'	'girl'

/n/ displays a slightly different pattern when it is found stem internally. The addition of the 3.POSS suffix /-I/ bleeds epenthesis which would have otherwise prevented [n] from following a consonant:

(2)

	/mojn/	/qarn/
BARE	mojun	qarɨn
-3.POSS	mojn-u	qard-ɨ
	'neck'	'stomach'

Although underlying /rn/ surfaces as [rd], undergoing desonorization of /qarn-I/ to [qardɨ], underlying /jn/ surfaces as [jn], without desonorization of /mojn-I/ to *[mojdu].

The desonorization of /l/-initial suffixes occurs in fewer contexts than /n/, and differs slightly depending on the suffix. The suffix -lɨq desonorizes in one more context than the suffix -lar, namely qar-dɨq (with desonorization) versus qar-lar (without). The invariant suffix -da, with underlying /d/, is presented below for contrast.

(3)

stem ends in:	V	j	r	l	N	T
-PL	bala-lar	aj-lar	qar-lar	**bal-dar**	**dan-dar**	**qɨz-dar**
-NOMINALIZER	bala-lɨq	aj-lɨq	**qar-dɨq**	**bal-dɨq**	**dan-dɨq**	**qɨz-dɨq**
-LOC	bala-da	aj-da	qar-da	bal-da	dan-da	qɨz-da

2.3. Distribution of sonorants within morphemes

The synchronic facts from suffixal alternations show us part of the picture regarding the distribution of sonorants, but an examination of the Hebert & Poppe (1964) lexicon reveals a broader picture. For the first time, we see a link between word-initial sonorants and post-consonant sonorants: it is precisely the set of sonorants that are restricted post-consonantally that are also restricted initially.

2.4. Word-medial sonorants

We have already seen the distribution of word-medial clusters across morphemes; an examination of these clusters within a morpheme yields a larger pattern.

The distribution of post-consonantal n in single morphemes mirrors the pattern seen earlier across morphemes. We have already seen evidence that jn is allowed in Kyrgyz while *rn isn't, i.e. the lack of desonorization in /mojn-I/ → [mojnu] and the presence of it in /qarn-I/ → [qardɨ]. Further evidence supporting jn but *rn comes from words which do not participate synchronically in the sonorant-obstruent alternation: Kyrgyz has [qajnar] 'source' unchanged from Old Turkic, but has [tɨrmaq] 'claw' compared to *tɨrnaq* in Kazakh and most other Turkic languages. In the Hebert & Poppe lexicon, there are 15 tokens with jn, but only two with rn: both contain the root ørnøk 'sample, pattern', ultimately a loanword from Armenian *orinak*.

We have seen earlier that m does not desonorize; the word-internal facts mirror this, as m appears after all sonorants and obstruents in the lexicon.

The question of whether the behavior of l in /qar-lar/ → [qar-lar] or in /qar-lɨq/ → [qar-dɨq] should be taken as default can also be addressed by examining the lexicon. The lexicon only contains two tokens of rl, both of which are formed from the verbalizing/causative morpheme /-lA/.[2] However, Kyrgyz has karlɨgač 'swallow, swift', with a less common variant kardɨgač. The relative paucity of rl is contrasted with 22 tokens of jl; no tokens contain ll, ml, nl, or ŋl. Although the morpheme-internal clusters do not strictly pattern either with /-lAr/ or /-lIk/, they suggest that the behavior of /-lIk/ may be the default pattern.

The only other sonorant which appears post-consonantally is r, which occurs after j in 15 tokens in the lexicon, such as in the root yjrøn- 'to learn'. No tokens of /r/ after any other sonorant were found. The glide /j/ does not occur after any consonant in the lexicon.

2.5. Initial sonorants

The Hebert & Poppe lexicon provides evidence that several sonorants are highly restricted in Kyrgyz word-initially. The only unrestricted sonorant is m: it occurs word-initially in 30 percent of the total occurrences of m (90 initial/299 total). Many of these occurrences are native Turkic words (muz < Old Turkic *buz*).

All other sonorants (n, l, r, j) occur much less frequently in the word-initial position. Less than five percent (19 initial/428 total) of n occurrences were initial, out of which none are native Kyrgyz words. The n-initial words include both loans from Perso-Arabic (nan 'bread') and Russian (načal'nik 'supervisor'). l and r were found in the initial position 1-2 percent of the time (9/521 and 9/626 respectively), chiefly in Russian loanwords. Earlier r- and l-initial borrowings (generally from Persian) take on an epenthetic vowel: ɨras < *rast* 'correct', ɨlaj < *lāy* 'silt', as do more assimilated Russian loanwords (ileker < *lekar'* 'healer').

Only two words begin with the glide j (out of 268 occurrences of graphemes containing j), both of which are unassimilated Russian loanwords.

$C_1 \backslash C_2$	j	r	l	n	m	T
j	no	yes	yes	yes	yes	yes
r	no	no	rare	no	yes	yes
l	no	no	no	no	yes	yes
n	no	no	no	no	no[3]	yes
m	no	no	no	no	no[4]	yes
T	no	no	no	no	yes	yes
#	no	no	no	no[5]	yes	yes

Table 2: Kyrgyz coda-onset clusters and initials within morphemes.

[2] The behavior of this morpheme after r seems unpredictable: note načar-la, zar-la versus ɨr-da, dajar-da as the preferred forms. For most r-final stems however, both variants of /-lA/ are attested.

[3] The lack of monomorphemic nm clusters can be explained due to a restriction on heterorganic nasals: for example, nb and np also do not appear.

[4] The lack of monomorphemic mm clusters can be explained as a restriction on morpheme-internal geminates: for example, kk does not appear in the lexicon, whereas kt occurs 43 times.

[5] Loanwords may appear with initial n.

The full paradigm of word-medial and initial sonorants in Kyrgyz can be observed in the table above.

3. The implementation

After surveying the behavior of Kyrgyz sonorants across morphemes, we have seen that n and l are the only two sonorants which undergo desonorization. Moreover, a bigger picture emerged when we drew our attention to the word-internal distribution of Kyrgyz sonorants: the set of sonorants restricted from initial position was the same set of sonorants restricted in any post-consonantal context.

In this section, I will build up a proposal which accounts for desonorization of each of the two segments, relying on markedness constraints which make reference to the context which triggers desonorization. The markedness constraints I will introduce will ultimately be grounded in the lack of perceptibility of certain contrasts in various contexts, due to the lack of cues in such contexts. For now though, I refer not to the cues which will underlie the proposed constraints, but instead to their context as shorthand.

In order to account for the behavior of [n], let's recall the desonorization pattern for suffix-initial [n]:

stem ends in:	V	j	r	l	N	T
-ACC	bala-nɨ	**aj-dɨ**	**qar-dɨ**	**bal-dɨ**	**dan-dɨ**	**qɨz-dɨ**

To account for the fact that suffixal [n] desonorizes unless after a vowel,[6] we will introduce the following constraint:

***[n]/ lacking preceding V** (abbreviated as *[n]/¬{V_}).

This constraint must outrank IDENT-NASAL in order for an input form such as /qar-nɨ/ to undergo desonorization. Constraints against other repairs which would result in a post-vocalic [n] (e.g. vowel epenthesis before [n]) must also outrank IDENT-NASAL.

(4) Tableau illustrating *[n]/¬{V_}:

/qar-nɨ/	*[n]/¬{V_}	DEP-V	IDENT-NAS
☞ a. qardɨ			*
b. qarnɨ	*!		
c. qarɨnɨ		*!	

So far, our contextual markedness constraint does not encode a preference for lower-sonority repairs. In other words, nothing yet determines the output form of n as long as the output is not a nasal.

In order to derive denasalization from [n] to [d] instead of [l] in (5), I posit a general low-ranked constraint against lateral features (*[+LAT]), coupled with a high-ranking constraint IDENT-[LAT] to protect inputs with laterals. Other low-ranked constraints would need to be posited alongside *[+LAT] to ensure [d] is the favored output form, for example a constraint violated by [r]. I assume there to be a general hierarchy of low-ranked constraints corresponding to the markedness of a particular feature. In such a system, coronal stops are less marked than nasals, laterals, and rhotics, and would emerge as the default output of the desonorization process in (5).

(5) Tableau illustrating low-ranked constraint *[+LAT]:

/aj-nɨ/	*[n]/¬{V_}	DEP-V	IDENT-NAS	*[+LAT]
☞ a. ajdɨ			*	
b. ajlɨ			*	*!
c. ajnɨ	*!			
d. ajɨnɨ		*!		

I show below that the constraints introduced do not affect a post-vocalic [n], nor laterals in the input:

[6] This fact will soon be recouched in terms of the n-d contrast not being sufficiently distinct unless post-vocalic.

(6) Tableau illustrating high-ranked constraint IDENT-[LAT]:

/bala-nɨ/	IDENT-[LAT]	*[n]/¬{V_}	DEP-V	IDENT-NAS	*[+LAT]
☞ a. balanɨ					*
b. baladɨ				*!	*
c. badanɨ	*!			*	

Now let's recall that desonorization of [n] works slightly differently when stem-internal. Underlying /rn-/ goes to [rd] (/qarn-I/ → [qardɨ]), while underlying /jn-/ stays as [jn] ([mojn-I] → [mojn-u]). This differs from suffixal desonorization of [n], as /j-n/ with suffixal /n/ does desonorize to [j-d] (recall /aj-nI/ → [ajdɨ]).

In order to account for this fact, we cannot introduce only a higher-ranked faithfulness constraint protecting stem segments; if we do so, the /n/ in /qarn-I/ would not be allowed to desonorize. We need such a constraint to be dominated by an additional markedness constraint to distinguish the two cases:

***[n]/ lacking preceding vowel, glide** (abbreviated as *[n]/¬{[-cons]_}).

In tandem with this constraint, we shall have an IDENT constraint targeting [n] in the stem. Our new markedness constraint will be violated by /qarn-I/, motivating desonorization as a fix. Our new constraint will not be violated by /mojn-I/, in which case a higher-ranked IDENT-NAS$_{stem}$ will protect the [n], preventing the lower ranked *[n]/¬{V_} from preferring [mojdu].

(7) Tableaux illustrating IDENT-NAS$_{stem}$:

/qarn-ɨ/	*[n]/¬{[-CONS]_}	DEP-V	IDENT-NAS$_{stem}$	*[n]/¬{V_}
☞ a. qardɨ			*	
b. qarnɨ	*!			*
c. qarɨnɨ		*!		

/mojn-u/	*[n]/¬{[-CONS]_}	DEP-V	IDENT-NAS$_{stem}$	*[n]/¬{V_}
☞ a. mojnu				*
b. mojdu			*!	
c. mojunu		*!		

The new markedness constraint is also used in accounting for desonorization of word-initial segments. Although such a process is not visible synchronically, this process is useful in accounting for the dearth of word-initial [n] in the lexicon. With this constraint, we have achieved a unified analysis for word-medial and word-initial desonorization.

(8) Tableau illustrating *[n]/¬{[-cons]_}:

/na/	IDENT-PL	*[n]/¬{[-CONS]_}	IDENT-NAS$_{stem}$
☞ a. da			*
b. na		*!	
c. ma	*!		

We should take care to note that the markedness constraint above should target not all nasals but just [n]. This is to account for the fact that [m] never exhibits desonorization: it occurs initially in native stems and post-vocalically both in native stems and after a morpheme boundaries. The underpinnings of a markedness constraint that targets [n] but not [m] will be explored below, in section 3.1.1.

3.0.1. Accounting for [l] desonorization

So far, we have only considered the desonorization of [n]. In order to account for the desonorization of [l], we would consider an analogous account, with the complication that [l]-desonorization is sensitive to morphology as shown in two different suffixes, although taking one form as default:

(9)

stem ends in:	V	j	r	l	N	T
-PL	bala-lar	aj-lar	qar-lar	**bal-dar**	**dan-dar**	**qɨz-dar**
-NOMINALIZER	bala-lɨq	aj-lɨq	**qar-dɨq**	**bal-dɨq**	**dan-dɨq**	**qɨz-dɨq**
-LOC	bala-da	aj-da	qar-da	bal-da	dan-da	qɨz-da

Based on the above facts, we shall propose the following two markedness constraints, each corresponding to a context in which [l] desonorizes:[7]

***[l]/ lacking preceding vowel, glide** (abbreviated as *[l]/¬{[-cons]_})
***[l]/ lacking preceding vowel, glide, r** (abbreviated as *[l]/¬{[+s(on),-n(as),-l(at)]_})

To illustrate these constraints, let us start with the behavior of /-lɨq/. When following vowels or glides, /-lɨq/ does not desonorize.

(10) Tableau illustrating *[l]/¬{[-cons]_}:

/aj-lɨq/	*[l]/¬{[-CONS]_}	IDENT-LAT
☞ a. ajlɨq		
b. ajdɨq		∗!

However, once we find /-lɨq/ following [r], our new markedness constraint is violated, triggering desonorization as a repair.

(11) Tableau illustrating *[l]/¬{[-cons]_}:

/qar-lɨq/	*[l]/¬{[-CONS]_}	IDENT-LAT
☞ a. qardɨq		∗
b. qarlɨq	∗!	

In the same context, /-lar/ does not undergo desonorization. We will need a more specific IDENT constraint to protect the [l] in /-lar/:

(12) Tableau illustrating IDENT-LAT$_{-lar}$:

/qar-lar/	IDENT-LAT$_{-lar}$	*[l]/¬{[-CONS]_}	IDENT-LAT
☞ a. qarlar		∗	∗
b. qardar	∗!		∗

Currently, the suffix /-lar/ would not undergo desonorization. In order to account for the desonorization of /-lar/, we need to include the other markedness constraint introduced above, undominated:

(13) Tableau illustrating *[l]/¬{[+s(on),-n(as),-l(at)]_}:

/qan-lar/	*[l]/¬{[+S,-N,L]_}	IDENT-LAT$_{-lar}$	*[l]/¬{[-CONS]_}	IDENT-LAT
☞ a. qandar		∗		∗
b. qanlar	∗!		∗	∗

3.1. A perceptually driven account of desonorization

So far, I have introduced into our grammar markedness constraints which are sensitive to the lack of a particular class of preceding segments, and I have remained agnostic as to the characterization of such classes. In this section, I explore the possibility that the class of preceding segments is perceptually determined.

[7] As in the previous section, these constraints rely on classes corresponding to cues to the l-d contrast, which are not currently defined. As such, these constraints are a conjecture about contexts which are relevant to the perception of laterality.

I adopt an idea that has been pursued in the work of Steriade and Flemming: phonological grammars encode information about perceptibility. More specifically, our grammar will encode constraints which are violated when an output form contains a segment which is not sufficiently perceptually distinct from another segment in that context, or in other words, it lacks enough cues to that contrast.

3.1.1. Nasals

Let us rexamine the following markedness constraint:

(14) ***[n]/ lacking preceding V** (abbreviated as *[n]/$\neg$\{V_\}).

Why would a constraint encode the requirement that [n] be preceded by a vowel under a perceptual approach? The most straightforward answer would be that a preceding vowel is essential to hosting a cue for the contrast between [n] and [d]. The possibility that vowels host better cues this contrast is quite reasonable, since it is well attested that vowels host anticipatory nasalization which provides an external cue to the presence of a following nasal versus oral consonant.

Although this constraint is stated as being violated whenever it is not the case that a vowel precedes [n], what actually underpins this constraint is its basis in perceptual properties. Let us refer to three different contexts for the perception of nasality, each with a different degree of perceptual distance between the nasalized and non-nasalized form: Δ(V-Ṽ) $>$ Δ(j-j̃) $>$ Δ(r-r̃). We can denote each delta value as supplied by the function Δ_{nas}. This leads us to the following constraint:

(15) **(X)N:** Δ_{nas}**(X)**$\geq$ Δ_{nas}**(V)**, violated by each nasal N which does not meet the following condition: N must be at least as perceptually distinct from its oral counterpart as it is in the context in which X (which precedes N) is a vowel

The metric of determining nasalization is left open: it could be duration of the nasalization, the perceived degree of nasalization, or a combination of the two; all that is crucial for our purposes is that nasalized vowels are more readily perceived as nasalized than nasalized glides, which are in turn more nasalized than any other sonorant. (Oral obstruents cannot be partially nasalized.)

Although it is quite easy to claim that nasalization of the preceding vowel provides an external cue to the nasality of [n] in contrast to [d], our system here has further perceptual implications.

First, if [n] cannot be licensed without external cues, that means that [n] does not have sufficient internal cues, neither for nasality nor for place. Nasals lack release bursts which are important internal place cues for oral stops, but have nasal murmur. However, since Kyrgyz [n] never contrasts with variants differing in place such as [m], VC and CV formant transitions always provide sufficient cues to place. Indeed, Malecot (1956) shows that formant transitions are a strong place cue for nasals. Kyrgyz is conforms with the cross-linguistic tendency that coronal nasals contain relatively low information during their duration as opposed to during their vowel transitions. For Kyrgyz, this tendency is even stronger: the nasal duration does not contain enough information.

A consequence of incorporating internal cues into our cue-based markedness constraint is that we have a simple way to account for the difference in behavior between [m] than [n]. In fact, the constraint above as written overapplies: it needs to be adjusted to apply only to alveolar nasals, since [m] is licensed in Kyrgyz in all contexts and never desonorizes. The importance of nasal duration will allow us to account for this fact: the internal nasal murmur during the closure for [m] is longer than for [n]. Previous experimental work has shown that there is a cross-linguistic tendency for the duration of /m/ to be longer than that of /n/, and that this tendency does hold across all contexts in Kyrgyz (Akhmatov, 1971).[8] As such, let us adjust the above constraint as follows:

(16) (15') **(X)N:** (Δ_{nas}**(X)**$\geq$ Δ_{nas}**(V)**) $\vee$ **DUR(N)**$\geq$**DUR(m)**, violated by each nasal which does not meet the following condition: N must be at least as perceptually distinct from its oral counterpart as it is in the context in which X is a vowel, unless N has a longer duration than [m]

[8] For example, initial [m] is 56-86 milliseconds, versus 50-60 for initial [n].

A second implication of a system that privileges preceding cues to nasality is that preceding (anticipatory) nasalization is a perceptually stronger cue than carryover (following) nasalization on vowels. Although no experimental data exists to demonstrate this for Kyrgyz, this asymmetry is supported by (Jeong, 2012), who hypothesizes both from a cross-linguistic survey and a novel perception experiment that "anticipatory nasalization is more easily perceived than carryover nasalization", even when carryover nasalization is acoustically strong.

3.1.2. Laterals

The salience of anticipatory external cues to the n-d contrast are better documented than those for the l-d contrast. I hypothesize that the tendency for privileging the preceding external cues is stronger for [n] than for [l]. Perhaps this is reflected internally to Kyrgyz by the fact that [n] desonorizes in more contexts than [l] does. This tendency should also hold cross-linguistically, as can be seen in section 5. Karakalpak is a language which has desonorization of [n], but lacks desonorization of [l]. The converse pattern is not attested in Turkic: no language desonorizes [l], but not [n].

(17) Karakalpak pattern:

stem ends in:	V	j	r	l	N	T
-ACC	bala-nɨ	**aj-dɨ**	**qar-dɨ**	**bal-dɨ**	**dan-dɨ**	**qɨz-dɨ**
-PL	bala-lar	aj-lar	qar-lar	bal-lar	dan-lar	qɨz-lar
-NOMINALIZER	bala-lɨq	aj-lɨq	qar-lɨq	bal-lɨq	dan-lɨq	qɨz-lɨq
-LOC	bala-da	aj-da	qar-da	bal-da	dan-da	qɨz-da

The perceptual justification offered here is entirely speculative. This account must rely on similarities between the cues to the l-d contrast and those to the n-d contrast. In particular, we must also assume that closure duration itself of [l] is short enough for the internal cues to be insufficient by themselves, and that the strongest cue to the l-d difference is from the preceding anticipatory transition. One avenue to look would be the anticipatory resonance effects of liquids such as those found in Southern British English (Heid & Hawkins, 2000): vowel formants before instances of l and r were affected by coarticulation, and were used in an experiment to predict whether a word had l or r when the conditioning liquid was cut out of the speech sample. For Kyrgyz, future work should show whether the preceding vowel hosts the strongest cue to the l-d contrast. For now, I offer a stand-in Δ function Δ_{color}, with the same relational properties as Δ_{nas} above. Our constraint in (18) could be rewritten as (19):

(18) ***[l]/ lacking preceding vowel, glide** (abbreviated as *[l]/$\neg${[-cons]_})

(19) **(X)l:** Δ_{color}**(X)**$\geq$ Δ_{color}**(j)**, violated by the presence of a lateral which does not meet the following condition: the lateral must be at least as perceptually distinct from its non-lateral counterpart as in the context in which X is a glide

So far, I have shown that our analysis works best when we posit that the perceptual similarity of nasals and laterals with their homorganic stops is what underlies our constraints, and not sonority per se. Desonorization is not based on a discrete conceptualization of sonority but instead driven by the leveling of a contrast in a context in which it falls under some threshold of perceptual distance.

4. Previous analyses

Previous accounts of this phenomenon have invoked the concept of sonority, centering on the hypothesis that desonorization is driven by the difference in sonority between the C_2 that desonorizes and the preceding C_1. Specifically, these accounts rely on the hypothesis that falling sonority contours are better tolerated across a syllable boundary, as part of the SCL.

Since the SCL is stated as a general tendency for cross-syllabic clusters to be of falling sonority, it should apply to any pair of consonants. For the case of a language like Kyrgyz, this would mean that a single threshold of sonority distance (SONDIST) between two segments should be enough to account for whether a given segment pair is permitted across a syllable boundary, abstracting away from segment-specific details.

Gouskova (2004) presents such an analysis of desonorization in Kyrgyz, based crucially on the function SONDIST, which calculates SONDIST given a cluster: *sonority*(C_2) - *sonority*(C_1). The account implements a ranking of *DIST constraints of the form ... *DIST+1 ≫ *DIST0 ≫ *DIST-1 ... These constraints abstract away from referring to specific segments or classes of segments; thus, such constraints would target clusters with the same sonority distance as a class, regardless of the specific segments. The ranking reflects the SCL: negative SONDIST values (sonority falls) are favored over positive ones (sonority rises). In Gouskova (2004), languages vary as to between which two *DIST constraints IDENTF is located. Her examination of the data yielded the following placement for Kyrgyz: *DIST-3 ≫ IDENT-F ≫ *DIST-4.

However, there is in fact no possible default placement for Kyrgyz. [jl] and *[rn] both have a SONDIST of -2: [jl] is permitted whereas *[rn] is banned. Moreover, *[jn] has a larger SONDIST (i.e. greater sonority drop) than [jl]. We would predict that the ban on *[jn] should implicate a ban on [jl]. However, [jl] is in fact tolerated while *[jn] is banned, desonorizing to [jd]. Thus, no placement of IDENT constraints in the *DIST hierarchy would yield the right results.

These challenges can be fixed only under a modification of the SONDIST-based account in which we lose the unifying force of the account: ensuring that cross-syllabic clusters pattern together, regardless of the identity of the segments. Since we would lose much of the premise on which this account was based, it is evident that the notion of sonority fails to play a direct role in the licensing of Kyrgyz sonorants. Instead, the cue-based analysis introduced in section 3 is better motivated and better accounts for the data.

Any implementation of SCL falls short on two additional points. First, under SCL, /m/ should pattern like other sonorants and desonorize just as /n/ does; its lack of desonorization can only be attributed to a property other than sonority. Second, SCL can only account for desonorization of segments following a syllable boundary, which is only a partial account of the phenomenon. Desonorization does not only affect word-medial consonants, but word-initial consonants as well. Just as sonorants desonorize word-medially after consonants in Kyrgyz, the same sonorants are restricted from occurring word-initially. Accounts using SCL are silent on word-initial behavior.

5. Typological and implicational predictions

My account also fares better with respect to the attested languages which exhibit desonorization. I made several main predictions, the first of them being that the word-medial desonorization of a segment implies its absence word-initially.[9] This prediction holds true, but is harder to falsify within Turkic: Old Turkic lacked initial nasals and liquids to begin with, apart from early nasal variants of b-initial words (Erdal, 2004). As such, all modern Turkic languages with word-medial desonorization of n, l, or m will lack the corresponding initials. However, the existence of several languages which restrict certain segments both initially and word-medially supports such a prediction. Korean lacks initial /l∼r/, and onset /l/ becomes [n] after consonants (excluding geminates, which are allowed). Panyjima (Australian) lacks initial and post-consonant laterals (Flack, 2001). Old Tamil lacks initial or post-consonant laterals; it also lacks alveolars/retroflexes initially or after consonants apart from homorganic nasals, but dentals are allowed in all positions (Lehmann, 1994). Other languages like Mongolian seem to ban initial /l/, but permit [l] post-consonantally.

The second prediction under my account is that desonorization of each of the segments n, l, and m should be independent, based on on the specific phonetic properties of these segments in a particular language. This can be observed from the table below.

[9] The converse need not hold: Kazan Tatar (Kipchak Turkic) lacks native word-initial sonorants (l and n), but permits sonorants after obstruents, and does not exhibit desonorization.

	l desonorizes	n desonorizes	m desonorizes
Bashkir (Poppe, 1964)	mostly no	yes	no
Karakalpak ((Menges, 1947))	no	yes	yes
Kazakh (Somfai Kara, 2002)	yes	yes	yes
Kyrgyz	yes	yes	no
Sakha (Krueger, 1962)	yes	weak yes	no
Tuvan (Harrison, 2000)	sometimes	yes	weak yes

Table 3: Cross-linguistic desonorization of suffixal onsets across morphemes

For any particular segment, the contextual cutoffs for desonorization is determined by language-specific perceptual facts, and may differ from language to language freely for for each segment. Under a SONDIST-based account, a language with desonorization should see all sonorants which may undergo desonorization undergo the process. The differing behaviors of different segments is only tenable with an additional stipulation of segment faithfulness in a way that is uncorrelated with other properties of the language. Any difference in behavior for different segments with regard to sonority difference is unexpected, without independent motivation.

For example, Kazakh and Karakalpak behave identically with respect to [n], which desonorizes after all consonants.[10] A SONDIST-based account would have to stipulate the fact that Karakalpak does not undergo l-desonorization at all with an undominated lateral IDENT constraint, whereas in this paper, l-desonorization is driven by an independent constraint without any stipulation. Table 3 shows six languages which exhibit desonorization. The fact that in only one of these languages, Kazakh, does desonorization occur definitively on all three sonorants suggests that the independent behavior or l, n, and m is the norm as predicted here, and not the exception, as predicted under a SONDIST-based account.

Another advantage of the account proposed here is that we only posit markedness constraints which correspond to natural and attested cutoffs in desonorization. On the other hand, nothing about the SONDIST-based account prevents a language from desonorization after stops but not fricatives, which is a pattern we would expect to find given a standard version of the sonority scale. This is not attested in Turkic; if this were possible, the lack of attestedness would be surprising given the remarkable degree of variation within Turkic. Additionally, we also do not find cutoffs such that desonorization occurs after obstruents but not nasals.

6. Conclusion

In this paper, I have proposed a new account for the distribution of sonorants in Kyrgyz. This account is influenced by a line of work arguing that the phonological grammar encodes perceptual information. I have shown that this proposal accounts for the Kyrgyz data better than the previous standard, based on the Syllable Contact Law, and is in line with other work contesting the existence of an innate stratally-implemented sonority hierarchy. The account proposed here also fares better on cross-linguistic patterns within Turkic.

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[10] They differ from Kyrgyz in that the [n] in stems like /murn-I/ stays as [murnɨ], without undergoing desonorization.

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