Adjacent Consonants and the Universality of Sonority Sequencing Principle in Dotyali Dialects: Syllable Contact Analysis

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Abstract

This paper presents on all the possible adjacent consonant letters in Dotyali, one of the descendant language of Sanskrit, mainly spoken in Shudoor Paschim Nepal [sʊdʊrə-pəssɪmə] (Far-western) and compares the results of their phonological changes in seven local contemporary speech (dialects): Doteli, Dadeldhuri, Bajhangi, Achhami, Baitadeli, Darchuli and Bajureli. Based on the corpus data from the field survey conducted in between July-September 2017 on a list of 1000 frequently used Dotyali words, this paper comes with a conclusion that even the onset clusters with rising sonority profile (except glides) are broken up by vowel epenthesis or simplify the clusters by deletion. It is revealed that dialects, except from the Achhami and Bajureli, the consonants with different degree of sonority across the syllable boundary tend to be changed due to syllable contact to meet Sonority hierchy, but the sonority distance between two consonants (coda and onset consonants) varies, therefore phonological changes like assimilation, dissimilation, desonorization, contact anaptyxis, contact methasis etc. goes differently. The phonological changes in Bajureli occurs mainly due to other separate independent constraints.

Keywords: Dotyali Dialects; Sonority Sequencing Principle; Syllable Contact; Survey

A. Introduction

Dotyali is an umbrella term that embodies all its contemporary 7 dialects, which was the official language of "Doti Kingdom (1238-1790 AD)" [1], [2] in the western part of Nepal (present Shudoor Paschim Province) and its surrounding districts and boarder districts of India, which forms a unique system in phonetics, grammar, vocabulary and written literature different from other Indian languages as Nepali, Hindi, Maithili, Sanskrit etc.. In its past 800 years, the pronunciation of vocabulary has changed a lot. For example, "unbroken" [əkʰəɳɖə] becomes / akʰəɳɭə, akʰəɳɭə / in dialects. In this study, we can’t determine the exact time of such phonological changes of adjacent consonants across the syllable boundary, we only summarize how the syllable contact repairs wide variety of sonority sequences (i) falling and flat, (ii) rising and narrow on its input form (formal or the written form) in the different contemporary speech (out put).

Dotyali exhibits moderately complex syllable structure and the most elaborate
permitted syllable is CGVX ( X= short vowel/ a consonant, as in “believe” / pæt.tʃæv.nu / -CVC-CGVV.CV), shows that the only permissible sequence at onset is the consonant+glide (CG/j ,ː/ ) [3] that follows an ‘optimal syllable’. Sonority Sequencing Principle (SSP) predicts that the sonority increases towards the nucleus, then decreases away from the nucleus towards the coda [4 ]. The CGVX structured syllable in Dotyali is restricted in monosyllabic words and word final position [3] that creates the possibility of adjacent consonant sequences across the syllable boundary. Here at least the two basic questions arise: (i) Do all consonants are permissible at coda? What types of consonant sequences are permissible in Dotyali dialects? Do the adjacent consonants (input form) and their sound changes (output form) in Dotyali dialects is induced by syllable contact?

The basic idea about the syllable contact is that languages try to avoid the sequence of rising sonority (bad contact) across the syllable boundary [5], [6], [7]. “Syllable Contact Law” holds that syllable breaks favor decreasing sonority and demands the sonority distance between the coda the following adjacent onset initial be as large as possible[8]. The notion of a sonority distance stratum*DIST+6 stresses that each constraint encompasses with the sonority rise of 6 interval (both kinds of sequences: fricative-glide or stop-rhotic) [4]. The above mentioned phenomena at least for Dotyali dialects are debatable because not all the dialects follow sonority hierarchy across the syllable boundary. Even the dialects that respect syllable contact law do not strictly makes the sonority distance by 6 interval points, as not all the preferred coda consonants are [+sonorant] and preferred onset initials are [-sonorant]. However, syllabification of Dotyali dialects cannot be affected by sonority hierarchy (bad contact) or sonority distance, as consonant clusters are strictly restricted. Regarding input clusters at onset, the epenthesis breaks up all types of onset consonant clusters (CC) and epenthesis site is determined by syllable contact,i.e, the contact epenthesis is peripheral if C1 is more sonorous than C2 (CCV → VC.CV), but epenthesis is internal if C1 is less sonorous than C2 (CCV → CV.CV). For example “Female” Stri (CCCV) is pronounced as /is.ti.tr/ is.tə.tr/ (i.e [CCCV] input→VC.CV.CV(output) [3], where edge epenthesis [i] emerges before sibilant because of the falling or flat sonority between /st/, but internal epenthesis in rising sonority (between/ʈʃ/). Here the two different predictions that syllable contact analysis predicts meet here: (i) The inserted vowel before the cluster breaks the cluster but don’t interrupt falling/ flat sonority clusters (sequences). (ii) The internal epenthesis breaks up the clusters and the sequences that have bad contact get changed (rising sonority).

Sonority shows the resonance of one sound segment in relation to another [5],[6]. Sonorous sounds are more prominent in amplitude and length than less sonorous sounds. In binary terms, the sonorants [+son] (glides-liquids– nasals) are more sonorous than the obstruent [-son] (fricatives – affricates -stops), However, only this binary grouping is insufficient in Dotyali, as there exists a hierarchy of sonority even within its obstruent. The Sonority Scale (Most sonorous -Least sonorous) of Dotyali consonant can be assumed: [+son] glides14 > rhotics13 (ːr/):>lateral12 > nasals11 >
[\text{-son}] voiced aspirated affricate¹⁰ > voiced aspirated stops⁹ > voiced unaspirated fricatives⁸ > voiced unaspirated affricate⁷ > voiced unaspirated stops⁶ > voiceless aspirated affricate⁵ > voiceless aspirated stops⁴ > voiceless unaspirated fricatives³ > voiceless unaspirated affricate² > voiceless unaspirated stops¹ [⁴].

Dotyali shares most of the consonant letters used in Devanagari writing system, but not all of them phonologically make distinction in its speech which are presented in the table 1. Consonant in brackets are observed as allophones.

| Consonant | Stops | Affricates | Nasals | Laterals | Trills | Fricatives | Appimnents |
|-----------|-------|------------|--------|----------|--------|------------|------------|
|            | VI    | Vd         | VI     | Vd       | Vd     | Vd         | Vd         |
| Bilabials  | p     | p          | b      | b        | m      | w          |
| Dentals    | t     | tʰ         | d      | d        | n      | l          | r          | s         |
| Alveolars  | t     | tʃ         | d      | dʒ       | η      | (t)        | (s)        |
| Retroflexes| t     | tʰ         | d      | dʒ       | η      | (t)        | (s)        |
| Palatals   | k     | k          | g      | g        | η      | j          |
| Velars     | kʰ    |            |        |          |        |            |
| Glottals   |       |            |        |          |        | fi         |

Table 1. Dotyali Consonant Inventory [³]

[ŋ] is the allophone of [ŋ] before glide [j] as in “here”[ŋja/ŋæ], it gets dentalized [n] in between vowels and at coda; [ʂ] only exhibits in Sanskrit loanwords and usually gets dentalized [s], it is often pronounced [kh] followed by other sibilant due to dissimilation. Similarly, separate letter for the retorization of trill [r] and retroflex stops [ɽ] is common in Old Dotyali writing, which only exists in contemporary speech [ɽ]. Moreover, not all the Dotyali consonant segments have equal distribution in its syllable. The distributional restrictions of Dotyali consonant phoneme is shown in table (2), where the symbols: _ marks phonetic environment, # marks syllable boundary, #_ marks beginning of a syllable, /V_V/ marks intervocalic position, /V_Cv/: at coda (proceeding syllable), and /vc_v/ marks at onset initial (following syllable).

| Phoneme | Word Initial | Word Medial Position |
|---------|--------------|----------------------|
|         | /#_V/       | /V_V/                | /V_Cv/ | /VC_v/ |
| [ŋ]     | -            | +                    | +      | +      |
| [ʃ]     | +            | -                    | -      | -      |
B. Methodology

This paper employed a list of 1000 frequently used Dotyali words “The Basic Vocabulary for Dotyali Dialects Survey” compiled by Bhatta for Ph.d dissertation [3], that includes most of the commonly used words from the book “The History and Spoken Language of That Time”[9], and “Vocabulary for the Nepalese Language Survey (LinSuN)” [10].

The field survey in 7 dialects: Dhunga-Doti, Babangaun-Dadeldhura, Shaphe-Achham, Martadi-Bajura, Golai-Bajhang, Patan- Baitadi, Gartaula-Darchula, was completed in between July-September 2017. The seven male native speakers without any academic degree and above 60 years from their respective district, who live within a small particular area and have very little communication with the people of other language communities were selected for the corpus data. During this survey, Praat and "Feifeng language field survey software" developed by Professor Pan Wuyun and others from Shanghai Normal University was employed and the sampling rate of recording was 44100HZ and the length of recording (waveform) each word was 5 seconds. Before recording, the speaker were asked to be familiar with the words from our vocabulary list to make sure that he knows each word and can pronounce it accurately in his native tongue. Then, the recording materials were transcribed using International Phonetic Alphabet.

C. Result and Discussion

3.1 Rising sonority and Syllable Contact

Generally, rising sonority at syllable boundary remains unchanged in Achhami and Bajureli dialect and syllable contact cannot strengthen the sonority of coda or weaken the sonority of adjacent onset initial. Only the obstruent-nasal sequence in verb gets repaired in Achhami. Other some minor changes like devoicing, loss of aspiration and internal epenthesis are not because of syllable contact but due to an independent constraint that aspirated are restricted at coda or onset initial. The bad
contact at syllable boundary gets repaired in other dialects, some examples are given below.

**Obstruent-sonorant sequence**

**Fricative, affricates, plosives - liquids**

a. All the Obstruent – liquid → no change/ Achhami and Bajureli:

- sn, sm, sr, sl (ex. "ladder" lɪsno, "calcify" b̥əsma, "real "əslə, "a kind of tree "k̥əsrə)
- dʒr, pr→ no change, (ex. "thunder" bədʒrə, "well grow" səprənə )
- dʃl→ dʃl, (ex. " grow" bəʃlə→bəʃlə) 

Though the voiced consonant at coda gets devoiced but it is not due to syllable contact as it could not repair sonority hierarchy. In addition, the devoicing increases rising sonority interval, which goes the opposition of syllable contact law.

b. Other dialects:

- sn, sm, sl→ internal epenthesis, (ex. lɪsno→lɪsənə, b̥əsma→b̥əsəmə, əslə→əsələ)
- sr → rs , ( contact metathesis ), (ex. k̥əsrə→k̥ərsə)
- dʒr , pr→ Contact epenthesis, (ex. bədʒrə→bədʒərə/ bədʒəro, səprənə→səpəɾənə/ əpəɾədə)
- dʃl→tʃl (retorization), (ex. bəʃlə→bəɾəʃlə, bəɾəʃlə, bəɾəʃlə)

Contact epenthesis (anyptysix) , contact metathesis , retorization of stops (sonorization) changes rising sonority into falling sonority. Coda ([dʃl]) losses aspiration and got retorized not because it is restricted but for strengthening coda.

**Plosives/ affricates –nasal**

a. All plosives/ affricates –nasal → no change / Bajureli

b. All plosives/ affricates- nasal → regressively assimilated / Baitadeli and Darchuli.

- Voiceless plosives /affricates – nasal ([obs-son]) → ([obs-obs]), (ex. "pluck" t̥pnu→t̥ppa/t̥ppə, "put" rakbnu→rakbə/û/rakbəə)
- Voiced aspirated plosives /affricates - n([obs-son]) → ([obs-obs]), (ex. "mix"gabhno→gabənə/gabbə)

The voiced aspirated coda first loss aspiration, then the onset initial gets assimilated. However the regressive assimilation weakens the sonority of onset initial and changes the rising sonority sequences into null sonority sequences.

c. Other dialects:

- Voiceless plosives /affricates - n([obs-son]) → ([obs-obs]) , desonorizes the onset initial, (ex. t̥pnu→t̥pdə/ t̥pəu, rakbnu→rakbə/û/rakbəə)
- Voiced aspirated plosives /affricates – n([obs-son]) → ([obs-obs]) desonorizes the onset initial, (ex.gabhno→gabənə/gabbə)

First the onset gets desonorized (become obstruent) , than coda obstruent gets devoiced (weakened) in order to repair the sonority hierarchy between the coda and the onset.
Exceptions:
- /ʃ, ʈ, dʒ/→ ([obs-son]) progressively assimilated / all dialects
  except Bajureli, (ex. "squeak" /ʃɪmoʊno→ /ʃɪmoʊ]; /ʃɪmoʊ]; /ʃɪmoʊ]),
- /pʰn→ internal epenthesis (ə) / all dialects expect Bajureli (ex. "own"
  /apʰəʊ→/apʰəʊi, apʰəʊ, apʰəʊ)

Nasal-liquids
a. /ml, n̥l→ no change / Achhami and Bajureli, (ex. “lemon” /əmla /mla, “basket”
  /n̥lə)

b. /ml, n̥l→ internal epenthesis (ə/i) / Other dialects, (ex. /əmla→əmlə/imla, nəŋlo→
  nəŋlo)

Obstruent-Obstruent
Voiceless-voiced
a. /kd→ no change/ Achhami and Bajureli, (ex. "can do" /səkdo)

b. /kd→ gd (progressively assimilated) / Other dialects, (ex. /səkdo→səgado)

  Coda strengthening through progressive assimilation, changing rising sonority
  sequences into equal sonority sequences.

Unaspirated-aspirated
a. Unaspirated-aspirated→no change or coda drop off / Achhami and Bajureli, (ex.
  “slate” /pətʃərə→pətʃərə, pətʃə)

b. Unaspirated-aspirated→no change / Baitadeli and Darchuli
  Regarding the sequence of unaspirated and their aspirated counterpart, the above
  mentioned dialects respect the rising sonority with just a single sonority interval.
  Unaspirated-aspirated→progressively assimilated/ Other dialects, (ex. /pətʃərə→
  pətʃə)

  Only in Doteli, Dadeldhuri and Bajhangi dialect strictly coda gets weakened to
  repair bad contact sequences.

Exception:
- /dd̥→ dd/d̥d̥ ( get assimilated in all dialects ) ( ex. “Buddha” /bʊdd̥ə→bʊddə,
  “worm” /ɡɑdd̥e→ɡɑd̥d̥e). Both process (regressive/progressive) changes rising
  sonority into equal (null) sonority.

Plosive-affricate
a. /ptʃ, bdʒ→ no change / Achhami and Bajureli, (ex. “lock” /kəptʃə)

b. Other dialects:
  - /ptʃ→ bdʒ (ex. /kəptʃə→kəbdʒə)
  - /bdʒ→ no change (ex. /kəbdʒə→kəbdʒə/ kəbdʒə)

Plosive-fricative
Generally, plosive-fricative sequences are rarely found in Dotyali and its dialects. Only /ks/ sequence very frequent in Sanskrit loanwords that gets repaired in two ways:

(i) Coda drops off, (ii) Assimilation.

a. kʂ→tʃ[tʃ]/g[tʃ] / Doteli, Dadeldhuri, Bajhangi, Baitadeli, (ex. "monster"
   rakʂasə→raʃtʃ[ʃ]esə/ raŋəsə, “witness” sakʂi→səʃi )
   First the affrication of sibilant weakens the onset, then only the coda gets strengthened through progressive assimilation and repairs the bad contact. Another way is coda/ initial drop.

b. kʂ→tʃ[tʃ]/, tʃ/ Other dialects, (ex. rakʂasə→raʃtʃ[ʃ]esə, sakʂi→səʃ)  

3.2 Falling sonority and Syllable Contact

The changing of adjacent consonant across the syllable boundary mainly occurs not for maintaining sonority distance. Except from Bajureli, the less the sonority distance, the more adjacent consonant tend to repair sonority.

Sonorant-sonorant

Retoric- Liquids

a. rl→no change /Achhami and Bajureli, (ex. "may die" mərla)

b. rl→internal epenthesis (ə) / other dialects, (ex., mərla→mərəla/ mərəlo)
   Though the sequence faiths the falling sonority across the syllable boundary but sonority interval is less, therefore internal epenthesis breaks the sequence in other dialects except Achhami and Bajureli.

Retoric- nasal

a. rn, rm→no change/ Bajureli, (ex.,"graze" tfəɾnu→tfəɾnu)
   mn→dd/ Achhami, Baitadeli, (ex. tfəɾnu→tfəɾnu/ tfəɾnu)
   m→dd/ other dialects, (ex. tfəɾnu→tfəddo/tfəddə)

b. rm→internal epenthesis (ə) / all dialects except Bajureli, (ex. "shyness"
   səɾma→səɾma)

c. rm→rn / Achhami, Baitadeli and Bajureli, (ex. "River (name)" kəɾəli→kəɾəli)
   (only appear in noun)
   rm→no change / other dialects
   Coda [r] gets reversely assimilated in Achhami and Baitadeli and reduces sonority interval. In other dialects the onset nasal first gets desonorized, then only the coda gets progressively assimilated, the process goes like: tfəɾnu→tfəɾdu→tfəddo, -rn→rd→dd.

Lateral- nasal

In→ll / except Bajureli (ex. "fall" dəɾlu→dəɾlu, dəɾla)
   Regressive assimilation in dialects except Bajureli (In→ll) changes of falling sonority sequence into equal (null) sonority sequence.

Sonorant-obstruent

Rethoric (Trill ) - stops/ affricates / fricative

Rhetoric and obstruents makes the greatest sonority distance in between coda and onset initial, they generally do not change in dialects. But, Bajhangi and Darchuli
dialect tend to maintain less sonority distance between coda and onset, therefore africates in onset get strengthened by a single sonority interval. Except Bajureli, Bajhangi and Darchuli, other dialects weaken the onset and maintain higher sonority distance.

Bajani and Darchuli
a. rtʃ→rdʒ (voicing) / in nouns, (ex. “spend” kʰəɾtʃə→kʰəɾdʒə)
   - rdʒ→rdʒə (aspiration), (ex., “loan” kəɾdʒa→kəɾdʒə)

b. rtʃʰ→no change / nouns
   - rtʃʰ (rtʃʰə) → a syllable insertion ([ən]) / in verbs (except Achhami and Bajureli)
     (ex. "die" məɾtʃə→məɾəɾʃə, -rtʃʰə>ɾʃəɾʃə-)

c. r-voiced aspirated→ lose aspiration / except Bajhangi and Darchuli, (ex."dead body" məɾdʒ→morda)

Lateral- stops/ affricates / fricative

Generally, the adjacent of lateral and other stops and affricates remains unchanged in all dialects, few exception:

a. ld→dl /Bajureli (ex. “Turmeric” fələdo→fələlo
   Change of falling sonority into rising sonority through contact metathesis.

b. lk→lɡ (voicing) / Bajhangi (ex. "pecify" pəlka→pəlɡa)

c. ld→no change / Achhami and Bajureli
   ld→ld/ld/ Bajhangi, (ex. "pit" kəldo→kəldo /kʰədʒɔ)
   ld→lɡ (devoicing) / Other dialects (ex. kʰədʒο→kʰəlɡo)

d. ltʃ→ldʒ (voicing )/except Achhami and the Bajureli (ex. "lock" taltʃa→talḍʒa)
   ltʃ→ldʒʰ (aspirated) in Bajhangi and Baitadeli (ex. taldʒa→talḍʒʰa)
   ldʒʰ→ldʒ (loss aspiration) /except Bajhangi and Baitadeli (ex. taldʒa→talḍʒʰa)

Nasal- stops/ affricates / fricative

a. ndʒ, nʰ→ndʒ, nʰ (dissimilated) / Achhami and Bajureli (ex. “unbroken” akʰəndʒ→akʰəndʒ)
   ndʒ, nʰ→ŋl (regressively assimilated) / other dialects (ex. akʰəŋlə→akʰəŋŋə)
   In order to achieve the less sonority distance in falling sequences, the coda or the onset gets weakened through contact dissimilation and assimilation

b. ŋk→ŋk / only before schwa, (ex..g. "shell" səŋkʰə→səŋkə)
   ŋŋ→ŋŋ (coda drops off) / Doteli, Dadeldhuri and Achhami, (ex." aspicious” məŋɡələ, məŋɡələ, məŋlə)

c. m, n- aspirated plosives/affricates (pʰ, tʃʰ, kʰ, bʰ, dʰ) → lose aspiration (before schwa) / except Bajhangi, (ex."skirt” dʒʱəmpʰə→dʒʱəmpə, “serious” gəmbʱə→gəmbə, "father-in-law" samdʱɨ→samdɨ/ samdɨ)
   m- unaspirated stops and fricatives ( t, tʃ, dʒ, k, d, p ) → no change/ Doteli, Dadeldhuri and Achhami
   mt, mtʃ→ coda drop off (vowel gets nasalized) / except Doteli, Dadeldhuri and Achhami
   (ex., "pine" səmto→sɨʃo, "tweezers" tʃimtʃa→tʃɨtʃa, "Spoon" tʃəmtʃa→tʃɨtʃa)
d. ms→ms/ ns/ŋs (no regularity (sonority preserved), (ex.: "break"
    bid̥omsə→bid̥uŋsə, bid̥onsə)
    ns→tʰ (affrication)/ Achhami and Bajureli, (ex. "human" mənsə→məntəə, mantə)
    ns→no change / other dialects

Obstruent-obstruent (falling sonority)

Fricative-plosive

Achhami and Bajureli:

a. st, sb→no change (ex. "same/similar" dʒəstəɹ→dʒəstəɹ/dʒəstəɹ)

b. stʰ→st (ex. "Surname" ōwəstʰi→ɔstɪ/əbstɪ)

Baitadeli and Darchuli:

a. st, sd, → ss (regressively assimilated) (ex. dʒəstəɹ→dʒəssəɹ, “Sitting”
    bəsda→bəssa)

b. stʰ→tʰtʰ in (ex. “Surname” ōwəstʰi→ɔtʰtʰi)

Other dialects:

a. st→ss (regressively assimilated) (ex. dʒəstəɹ→dʒəssəɹ)

b. σd, stʰ→tʰtʰ (ex. “Sitting” bəsda→bətʰtʰa, “Surname” ōwəstʰi→ɔtʰtʰi)

Plosive-plosive

a. d̥t, d̥d→r/ʈ, dʒ/ɽ (respectively) / except Bajureli
   (ex. “a lot” bəd̥tʰa→bəta, "growth" bəd̥də→bəd̥da, bəʔda), coda strengthened,
   onset strengthened through dissimilation and assimilation

b. d̥t/ʃd→ʒ, ʃd (coda weakened and) / Bajureli (ex. bəd̥tʰa→bəta, bəd̥də→
   bəʔda)

3. 3 Equal (null) sonority and syllable contact

Nasals

a. mn→no change/ Bajureli (ex. "move" ɡəʊmən))
   mn→mm (assimilated) / Baitadeli and Darchuli (ex. ɡəʊmən→ɡəʊməm, ɡəʊməm)
   mn→md (dissimilated) / other dialects, (ex. ɡəʊmən→ɡəʊmdə)

b. nm→internal epenthesis/ Bajangi, Achhami, and Darchuli, (ex."birth"
   dʒənəmə→dʒənəmə)
   nm→no change/ other dialects

Plosives

a. pt, pk→no change/ all dialects, (ex. "week" səptəʃə→səptəʃə/ səpta)

b. pt→coda drop off / Doteli, Dadeldhuri, Baitadeli, and Darchuli, (ex. "pour
   (move)" ɡəʊptə→ɡəʊtə)

c. kt→k (transposition) / except Bajureli, (ex."flesh" ʃəktə→ʃətə)

   From the above mention examples and roles of syllable contact in different
   dialects, it is cleared that Bajureli not only has preserved most of the ill-formed
   sequences (obstruent-sonorant, nasal-liquids, plosive-affricate, voiceless-voiced,
   unaspirated-aspirated) in which the latter one (onset initial) is higher in sonority than
the former one (coda), even the well-formed adjacent consonant gets metathesized and strengthen the sonority of onset initial. Moreover, Achhami and Bajureli prefer the onset initial be more sonorous than preceding coda and the greater the sonority distance, the better. If the sonority distance is less, the coda tends to drop off or weakened by de-sonorizing, devoicing, diapasonsation etc. Except Achhami and Bajureli dialects, the syllable contact over ill-formed adjacent consonants and sonority distance in a word treats differently. Baitadeli and Darchuli prefer the smaller the distance, the better. But, Doteli, Dadeldhuri and Bajhangi favor the greater the fall of sonority in between the coda and onset initial, the better. The less the sonority fall be repaired by internal epenthesis or simply by other phonological process. That is just opposite in Bajureli and Achhami. In other words, less-more sonorous adjacent consonant are very frequent in Bajureli and Achhami, more- less sonorous adjacent consonant are frequent in Doteli, Dadeldhuri and Bajhangi.

1. Conclusion
This comparative study shows that though syllable contact constraints works out mostly but not fully, Syllable contact in OT can be marginal in some dialects of the same language. In case of Dotyali dialects, though most of the dialects are faithful to Syllable contact law, still the syllable contact can not be the characteristic of Dotyali, because even the dialect that prefer syllable and syllable slope also respect the two consonant with the same sonority across the syllable boundary and the sonority rise/fall greater than 1 sonority interval over a syllable boundary are also acceptable, which is not just limited within obstruent-obstruent, voiceless-voiced, unaspirated-aspirated sequences and vice versa. The Syllable Contact in Dotyali dialects play an important role to structure the dialectal phonology but it doesn’t exactly require codas to be as sonorant as possible, and onsets to be as non-sonorant as possible.

This study is the summary of all the possible adjacent consonants and their sound change due to syllabus contact that makes the dialects phonologically unique. As these dialects are spoken in a small area and have on influence eachother, the syllable contact rules alone may not be sufficient for the shape of dialectal phonology. However, we believe that our first step findings will support further research on Dotyaly and its dialectal phonology.

2. Appendix

| Vocabulary |
|---|
| Rising Sonority Sequences |

| Gloss with IPA ( Formal lg) | Doteli | Dadeldhuri | Bajhangi | Achhami | Baitadeli | Darchuli | Bajureli |
|---|---|---|---|---|---|---|---|

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| -nl- | basket | ナ | ドロ | なajo | なajo | なajo | なajo | なajo | なajo | なajo | なajo |
| -ml- | lemon | う | マラ | əmla | əmla | əmla | əmla | əmla | əmla | əmla |
| -sn- | ladder | リス | リス | リス | リス | リス | リス | リス | リス | リス |
| -sm - | calcify | ルッホ | レッマ | ɓəgəm | ɓəsar | ɓəsar | ɓəsar | ɓəsar | ɓəsar | ɓəsar |
| -sn- | cough | カンス | カンス | カンス | カンス | カンス | カンス | カンス | カンス | カンス |
| -kr- | cycle | チャク | チャク | チャク | チャク | チャク | チャク | チャク | チャク | チャク |
| -pr- | well | サプリニ | サプリニ | サプリニ | サプリニ | サプリニ | サプリニ | サプリニ | サプリニ | サプリニ |
| -dʒr - | Thunder | バンジャ | バンジャ | バンジャ | バンジャ | バンジャ | バンジャ | バンジャ | バンジャ | バンジャ |
| -sr- | tree | カッホ (N) | カッホ | カッホ | カッホ | カッホ | カッホ | カッホ | カッホ | カッホ |
| -dʒl - | may | バジラ | バジラ | バジラ | バジラ | バジラ | バジラ | バジラ | バジラ | バジラ |
| -dl- | may | サドジャ | サドジャ | サドジャ | サドジャ | サドジャ | サドジャ | サドジャ | サドジャ | サドジャ |
| -dʒl- | may | バドジャ | バドジャ | バドジャ | バドジャ | バドジャ | バドジャ | バドジャ | バドジャ | バドジャ |
| -pn- | pluck | トプン | トブド | トブド | トブド | トブド | トブド | トブド | トブド | トブド |
| -pʰn - | own | アプン | アプン | アプン | アプン | アプン | アプン | アプン | アプン | アプン |
| -tʰn- | speak | श्रोत्रत्व | īṃ | īṃ | īṃ | īṃ | īṃ | īṃ | īṃ |
|-------|-------|----------|----|----|----|----|----|----|----|
| -kʰn | keep  | राखनू  | rakʰn | rakʰd o | rakʰd o | rakʰd o | rakʰd o | rakʰkʰ o | rakʰkʰ o |
| -bⁿ | merge | गाभन | gabn o | gabd o | gabd o | gabd o | gabd o | gabb o | gabn o |
| -dⁿ | grow  | बाँधन | badn o | badd o / badd o | badd o | badd o | badd o | badd o | badd o |
| -kʃ- | monster | राशस | rakṣo | ratʃtʃ ə / ratʃtʃ ə / ratʃtʃ ə | ratʃtʃ ə / ratʃtʃ ə | ratʃtʃ ə / ratʃtʃ ə / ratʃtʃ ə |
| -ṛ- | witness | साँक्षी | sakṣi | sāṭi | sāṭi | sāṭi | sāṭi | sāṭi | sāṭi |

Falling Sonority Sequences

| -ṛk- | pastur e | खर्क | kʰark ə | kʰark ə | kʰark ə | kʰark ə | kʰark ə | kʰark ə | kʰark ə |
|-------|----------|------|--------|--------|--------|--------|--------|--------|--------|
| -ṛtʰ - | dies  | मृद | martʰ ə | maraṅ tʰ ə | maraṅ tʰ ə | maraṅ tʰ ə | maraṅ tʰ ə | maraṅ tʰ ə | mortʃ ʰə |
| -ṛbʰ | conceive | गर्भ | garbh ə | garb ə | garb ə | garbh ə | garb ə | garb ə | garbh ə |
| -rdʒ - | loan  | कर्ज | kardʒ ə | kardʒ ə | kardʒ ə | kardʒ ə | kardʒ ə | kardʒ ə | kardʒ ə |
| -rdʒ ḳ - | wither ed | मुर्ज | mordʒ ə / mordʒ ə | mordʒ ə / mordʒ ə | mordʒ ə / mordʒ ə | mordʒ ə / mordʒ ə | mordʒ ə / mordʒ ə | mordʒ ə / mordʒ ə |
| -ṛs- | hot/be at | बर्ष | bœrsa | bœrsa | bœrsa | bœrsa | bœrsa | bœrsa | bœrsa |
| -rm- | modes ty | सर्म | sœrm ə | sœrm ə | sœrm ə | sœrm ə | sœrm ə | sœrm ə | sœrm ə |
| -rn- | graze | चर्चा | त्यानु | त्याड्दु | त्याड्दु | त्याड्दु | त्यान्नु | त्यान्नु | त्यान्नु |
|------|-------|-------|--------|--------|--------|--------|--------|--------|--------|
| -rn- | River | कर्णा | कर्णअ | कर्णअ | कर्णअ | कर्णअ | कर्णल | कर्णल | कर्णल |
| may die | मर्ला | मर्ला | मर्ला | मर्ला | मर्ला | मर्ला | मर्ला | मर्ला |
| -lt- | rudun | फा | पँटो | पँटो | पँटो | पँटो | पँटो | पँटो |
| -ld- | turner | हल्दो | हल्दो | हल्दो | हल्दो | हल्दो | हल्दो | हल्दो |
| -lt- | upside | उल्टो | उल्टो | उल्टो | उल्टो | उल्टो | उल्टो | उल्टो |
| -ld- | pit | खा | k̑ल्डो | k̑ल्डो | k̑ल्डो | k̑ल्डो | k̑ल्डो | k̑ल्डो |
| -lk- | pecify | पल्का | पल्का | पल्का | पल्का | पल्का | पल्का | पल्का |
| -ltf- | padloc | ताल्फा | ताल्फा | ताल्फा | ताल्फा | ताल्फा | ताल्फा | ताल्फा |
| -ldz | entangle | अल्द्ज़ा | अल्द्ज़ा | अल्द्ज़ा | अल्द्ज़ा | अल्द्ज़ा | अल्द्ज़ा | अल्द्ज़ा |
| -ln | lazy | अल्ल्छ | अल्ल्छ | अल्ल्छ | अल्ल्छ | अल्ल्छ | अल्ल्छ | अल्ल्छ |
| -ln | fall | ढल्नु | ढल्नु | ढल्नु | ढल्नु | ढल्नु | ढल्नु | ढल्नु |

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| -ŋ-t- | unbroken | ḍh | ŋh | ŋh | ŋh | ŋh | ŋh | ŋh | ŋh |
|---|---|---|---|---|---|---|---|---|---|
| -ni- | bell | ḍh | ŋh | ŋh | ŋh | ŋh | ŋh | ŋh | ŋh |
| -ŋk- | fan | ḍh | ŋh | ŋh | ŋh | ŋh | ŋh | ŋh | ŋh |
| -ŋg- | auspicious | ḍh | ŋh | ŋh | ŋh | ŋh | ŋh | ŋh | ŋh |
| -mt- | pinefruit | ḍh | ŋh | ŋh | ŋh | ŋh | ŋh | ŋh | ŋh |
| -mṭ- | tweezers | ḍh | ŋh | ŋh | ŋh | ŋh | ŋh | ŋh | ŋh |
| -mṭʃ- | spoon | ḍh | ŋh | ŋh | ŋh | ŋh | ŋh | ŋh | ŋh |
| -mpʃ- | gawn | ḍh | ŋh | ŋh | ŋh | ŋh | ŋh | ŋh | ŋh |
| -mb- | serious | ḍh | ŋh | ŋh | ŋh | ŋh | ŋh | ŋh | ŋh |
| -md- | explain | ḍh | ŋh | ŋh | ŋh | ŋh | ŋh | ŋh | ŋh |
| -md | father-in-law | संगीतम् |
|----|---------------|----------|
| -ntf | people | मान्येः |
| -ms | demolition | विधंस्कृ |
| -st | similar | जस्तैः |
| -sd | Sitting | बस्ताः |
| -st^b | Surname | अवस्ति |
| -tʃk | grab | पोत्का / पोत्का |
| -dʰt | extra | बोध्ता |
| -dʰd | growing | बोध्दा |
| -mn | roam | घुमु |

**Equal Sonority Sequences**

| -nm | birth | जन्म |
|----|-------|------|
| -pt | week-long | सप्ताह |
| -tk- | lad | जा | त्क | džat | džat | džat | džat | džat | džat | džat | džat |
|---|---|---|---|---|---|---|---|---|---|---|---|
| -kt- | piece | चो | कटो | tʃok | tʃok | tʃok | tʃok | tʃok | tʃok | tʃok | tʃok |
| -ptʃ- | padlock | क | प्चा | kaptʃa | kabdʒa | kabdʒa | kabdʒa | kabdʒa | kabdʒa | kabdʒa |
| -bdʒ- | capture | क | ब्रा | kabdʒa | kabdʒa | kabdʒa | kabdʒa | kabdʒa | kabdʒa |
| -kd- | can | स | क्दो | sako | saga | saga | saga | sako | saga |
| -ttʰ- | stick | लट्ठी | latṭʰi | latṭʰi | latṭʰi | latṭʰi | latṭʰi | latṭʰi | latṭʰi |
| -ttʰ- | slate | पत्थर | pattʰe | pattʰe | pattʰe | pattʰe | pattʰe | pattʰe |
| -ddʰ- | Bouddha | बौध | boddha | boddha | boddha | boddha | boddha | boddha |
| worm | गडडे | godḍe | godḍe | godḍe | godḍe | godḍe | godḍe |

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