Coda Cluster Simplification and the Emergence of Sonorants in Korean

Yuji Kuwamoto

Akita National College of Technology

1

1. Introduction

- Avoidance of clusters
  - Epenthesis (major)
    - Ex. Japanese; sutoresu < stress (eng.) (in loan words)
    - Ex. Arabic; min l-baiti > mina-l-baiti (morphophonologically)
  - Deletion
    - Ex. Cantonese; kʰasi < cas(t) (eng.) (in loan words from Yip 1993)
    - Ex. Korean; ɔps-ta > ɔp(s)-ta (morphophonplogically)

- Epenthesis or deletion?
  - Yip (1993, 2002) → perceptual saliency
  - Paradis & LaCharité (1997) → threshold principle
        →Takano's (forthcoming) analysis
            Why does deletion take place?
- Loan words or other lexicon?
- Onset clusters or coda's?

The syllable structure of Korean

- In Korean, neither onset cluster nor coda cluster is allowed in the output.
- Coda clusters in underlying lexicons are simplified; ie. either segment is deleted.
  - How does these deletions take place?
    - → Hirano (1995, 1996)

Sonorantization at syllable boundaries in Korean

- Projective feature geometry (Kuroda 2003)
  - nasalization or lateralization?
  - Is assimilation progressive or regressive?
- Why does the sonorantization take plece?
- Which is preferred, nasals or laterals?

2. Coda simplification in Korean

Korean Consonant Inventory (General)

p	t	tʃ	k
pʰ	tʰ	tʃʰ	kʰ
p'	t'	tʃ'	k'
	s		h
	s'		
m	n		ŋ
	l (r)		

(ʰ: aspirated, '; emphatic)

Korean Coda Inventory

-p   -t   -k

-m   -n   -ŋ

-l

neutralization

-k
-kʰ } -k
-k'

-t
-tʰ
-tʃ
-tʃʰ } -t
-s
-s'
-h

-p
-pʰ } -p

(*-p', *-t', *-tʃ')

Underlying coda clusters
(11 patterns)

- -lk,   -lm,   -lp,   -lp^h

- -ks,   -ps,   -ls

- -nh,   -lh

- -ntʃ,   -lt^h

- –(l)k;   hɯlk → hɯk   "soil"
- –(l)m;   salm.ta → sam.t'a   "to boil"
- –(l)p;   palp.ta → pap.t'a   "to step"
- –(l)pʰ;   ɯlpʰ.ta → ɯp.t'a   "to chant"
- –k(s);   nɔks → nɔk   "soul"
- –p(s);   ɔps.ta → ɔp.t'a   "not to exist"
- –l(s);   kols → kol   "direction"
- –n(h);   manh.ta → man.tʰa   "to be many"
- –l(h);   ilh.ta → il. tʰa   "to lose"
- –n(tʃ);   antʃ.ta → an. t'a   "to sit down"
- –l(tʰ);   haltʰ.ta → hal.t'a   "to lick"

Deletion; syllable edge or not?

- Syllable edge preserving (4);
  - -(l)k, −(l)m, −(l)p, −(l)p^h
  - related constraint; Syllable Contiguity (Rosenthall 1994)

- Syllable edge deleting (7);
  - −k(s), −p(s), −l(s), −n(h), −l(h), −n(tʃ), −l(t^h)

  4:7   −−−   There is no remarkable contrast between them!

Is the segment with the higher sonority deleted?

- Yes (6);
  - -(l)k, −(l)m, −(l)p, −(l)p^h, −k(s), −p(s)
- No (5);
  - −l(s), −n(h), −l(h), −n(tʃ), −l(t^h)

--- There is no remarkable contrast, either!

Does laterals tend to be deleted?

- /l/ is deletied (4);
  - -(l)k, –(l)m, –(l)p, –(l)p^h
- /l/ is preservied (3);
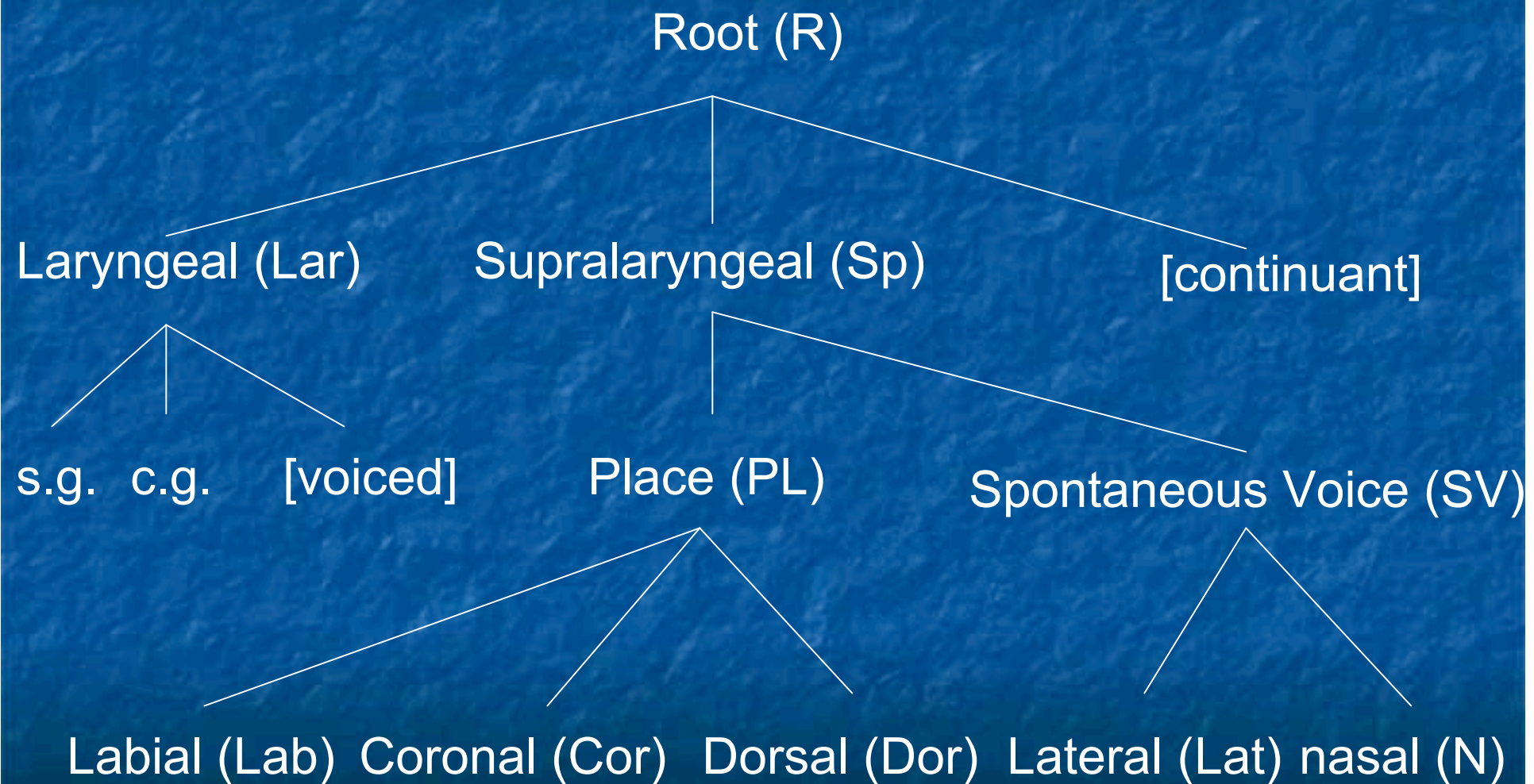 - –l(s), –l(h), –l(t^h)

  →There is no contrast.

- NB nasals are preserved without exception;
  - –(l)m, –n(h), –n(tʃ),

14

Hirano's (1995, 1996) analyses

- Parse-Place, Parse-SV (Spontaneous Voice)
- Hirano's Feature Geometry (FG)
  - Underspecification theory (Archangeli 1988)

Hirano's (1996: 2) FG

Root (R)

Laryngeal (Lar)   Supralaryngeal (Sp)   [continuant]

s.g. c.g.   [voiced]   Place (PL)   Spontaneous Voice (SV)

Labial (Lab) Coronal (Cor)   Dorsal (Dor) Lateral (Lat) nasal (N)

16

With PL node (the most complex)

/P/   /Ph/   /m/   /k/

R   R   R   R

Sp   Lar   Sp   Sp   Sp

PL   PL   PL   SV   PL

Lab   Lab   Lab   Dor

17

With SV node, without PL node

/n/

R
|
Sp
|
SV

/l/

R
|
Sp
|
SV
|
Lat

Without PL nor SV node
(the simplest)

/tʰ/   /s/   /tʃ/   /h/

R   R   R   R

Lar   Sp   Sp   [cont]   Sp   [±cont]   Lar

19
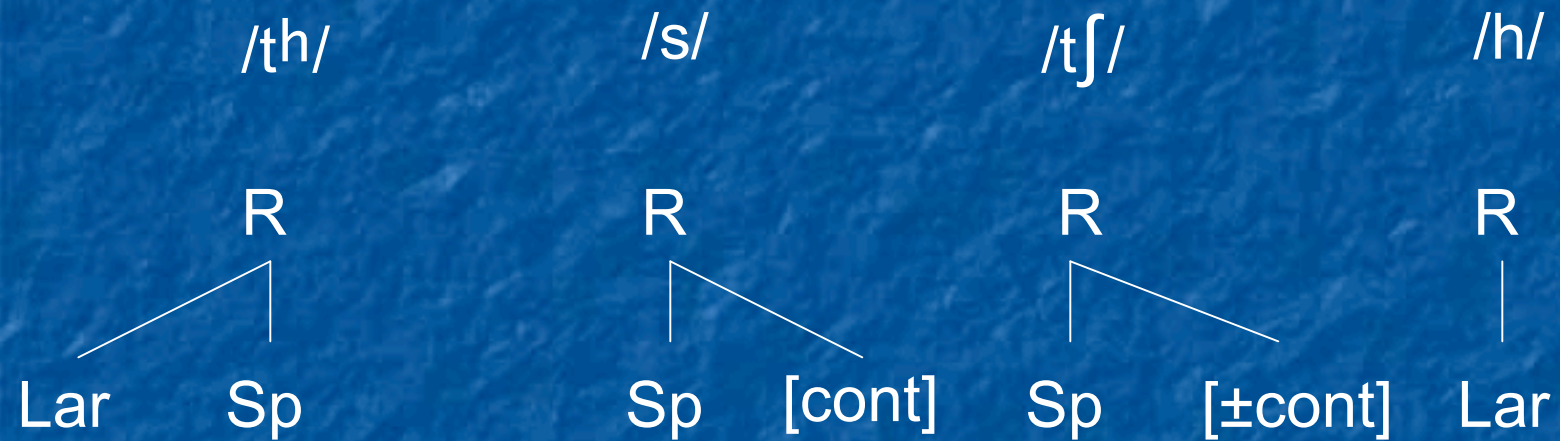
Structural complexity

- Parse-Place >> Parse-SV
- The hierarchy

p		n		t^h
p^h	>	l	>	s
m				$t\int$
k				h

Problems

- Why are coronals deleted? ← Obstruents are the main codas in Korean including Coronals (-p, -t, -k)

- Are aspirates or affricates more complex segments than non-aspirates or obstruents?

Coda conditions

- Complex codas are prohibited.
- Coda neutalization;
  - Aspirated or affricated consonants are neutralized to the normal obstruents (-p, -t, and -k).
  - Fricatives are prohibited at coda position (*-s, *-s', and *-h).
    - →Coda Condition (CodaCon): Only /p, t, k, l, m, n, ŋ/ are allowed as codas in Korean (Choi 2002: 30).
- Segments with higher sonority tend to be deleted?

An Optimality Theoretic approach (Prince & Smolensky 1993)

- The related constraints;
  - *Complex Coda: Coda clusters are prohibited.
  - CodaCon (Choi 2002)
  - Ident [F]: Correspondent segments have identical values for feature [F]
  - *Margin/x: X cannot be at a syllable margin.
- Ranking;

*CompCoda, CodaCon >> Ident >> *M/lat >> *M/nas >> *M/obs

ɔps.ta → ɔp.t'a

/ɔps/	*CompCoda	CodaCond	Ident
ɔps	*!		
☞ ɔp(s)			
ɔ(p)s		*!	
ɔ(p)t			*!

salm.ta → sam.t'a

/salm/	*Comp Coda	Coda Cond	Ident	*M/lat	*M/nas
salm	*!				*
sal(m)				*!	
☞ sa(l)m					*

25

palp.ta → pap.t'a

/palp/	*Comp Coda	Coda Cond	Ident	*M/lat	*M/obs
palp	*!				*
pal(p)				*!	
☞ pa(l)p					*

26

ɯlpʰ.ta → ɯp.t'a

/ɯlpʰ/	*Comp Coda	Coda Cond	Ident	*M/lat
ɯlpʰ	*!			
☹ ɯl(pʰ)				*
ɯ(l)pʰ		*!		
ɯ(l)p			*!	

27

Exceptional examples

- –lp^h → –p^h → –p ;
  - Deletion & deaspiration
- –lk –(l)k ⌢ –l(k)
  - ilk.ta → ik.t'a / ilk.ko → il.k'o   "to read, sentence final form / adverbial form "
- –lp –(l)p ⌢ –l(p)
  - palp.ta → pap.t'a   "to step"
  - yɔ.tɔlp → yɔ.tɔl   "eight"
  - nɔlp.ta → nɔl.t'a / nɔlp.tʃɔk → nɔp.tʃ'ɔk
                     "to be wide / widely opened"

The summary of this section

- The idiosyncrasy of laterals (cf. Kuwamoto 2007);
  - The emergence of /l/ at a coda position is not so clear.
- On the contrary, nasals /m/, /n/ are always preserved regardless of their position;
  - -n(h), -n(tʃ), -(l)m

29

3. Sonorantization at syllable boundaries in Korean

3.1. Nasalization

- -p/-t/-k + m-/n- → -m/-n/-ŋ + m-/n- (regressive assmilation)

    - kap.ni.ta → kam.ni.ta   "to come (formal)"
    - k'otʃʰ.no.ri → k'on.no.ri

                        "seeing cherry blossoms"
    - pak.mul.kwan → paŋ.mul.kwan   "museum"

- -m/-ŋ + l- → -m/-ŋ + n- (progressive)
  - sim.ri → sim.ni   "mentality"
  - koŋ.ryoŋ → koŋ.nyoŋ   "dinosaur"

- -p/-k + l- → -m/-ŋ + n- (reciprocal ←
  Kuroda 2003 classified it as "regressive")
  - ip.ryɔk → im.nyɔk   "input"
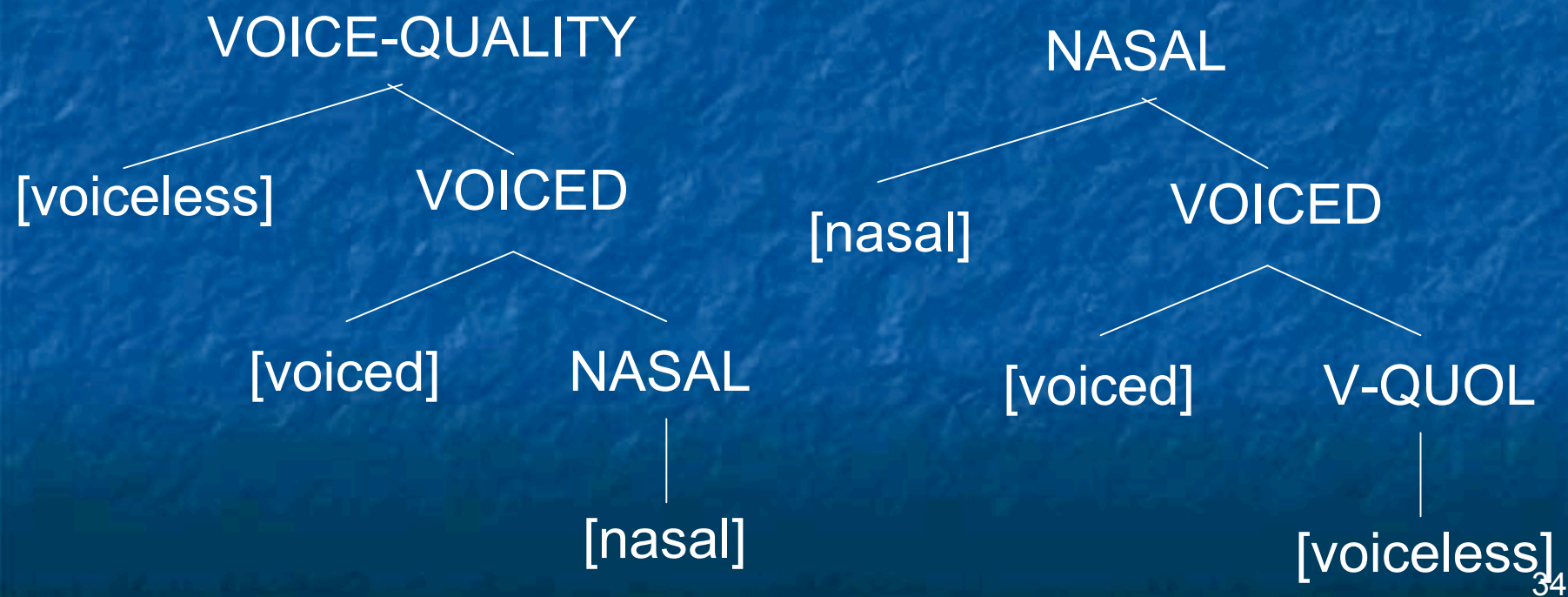 - sik.ryo → siŋ.nyo   "foodstuff"

3.2. Lateralization

- -t/-n + l- → -l + l- (regressive)
  - ti.kɯt.ri.ɯl → ti.kɯl.li.ɯl   "t & l (ᄃ, ᄅ)"
  - sin.ra → sil.la   "Silla (dynasty)"
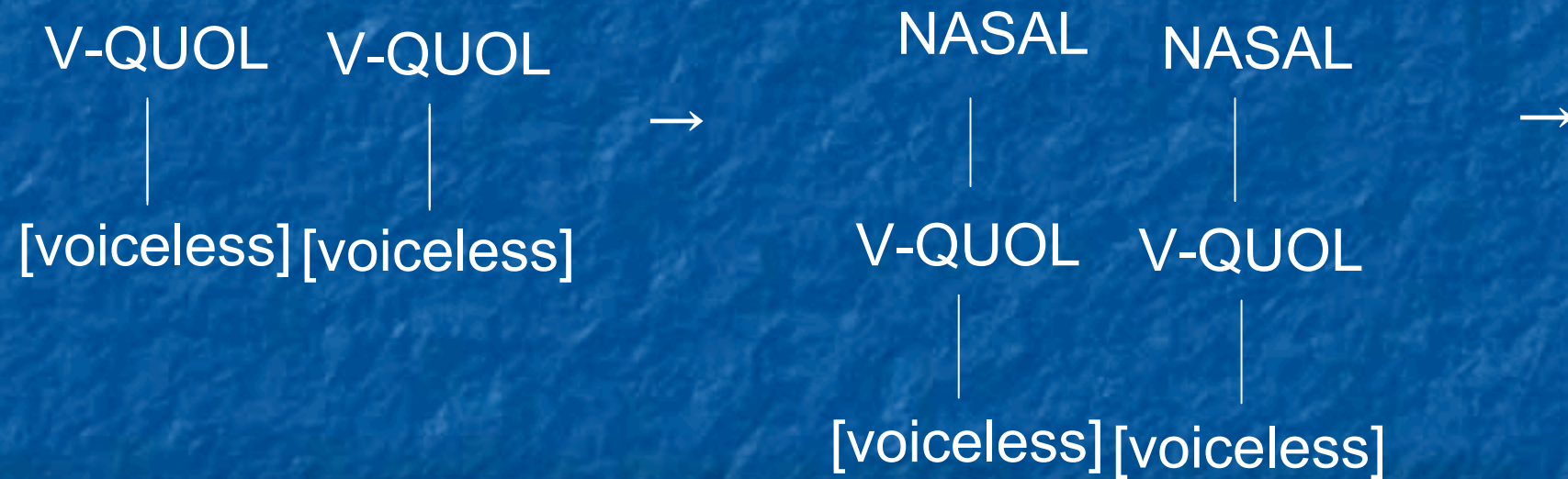

- -l + n-   → -l + l- (progressive)
  - sɔl.nal → sɔl.lal   "New Year's Day"
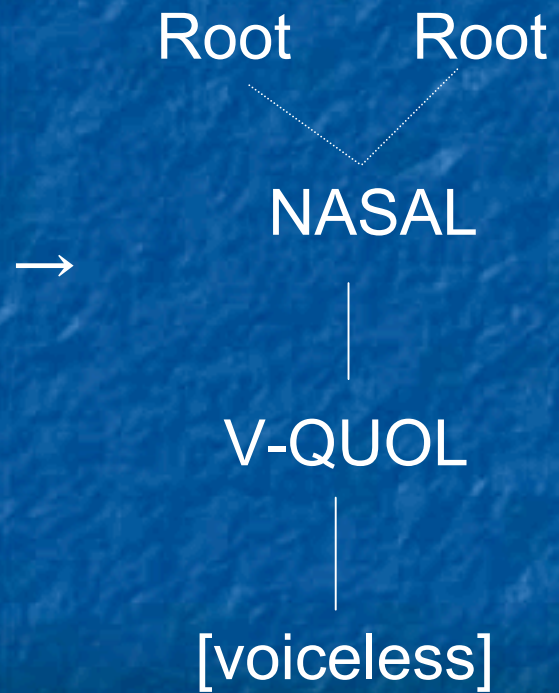
3.3. Kuroda's (2003) analysis

- Kuroda's (2003: 93f.) proposal for Feature geometry under VOICE-QUALITY and its Projection Reversal (The upside down projection takes place at a sonorant site).
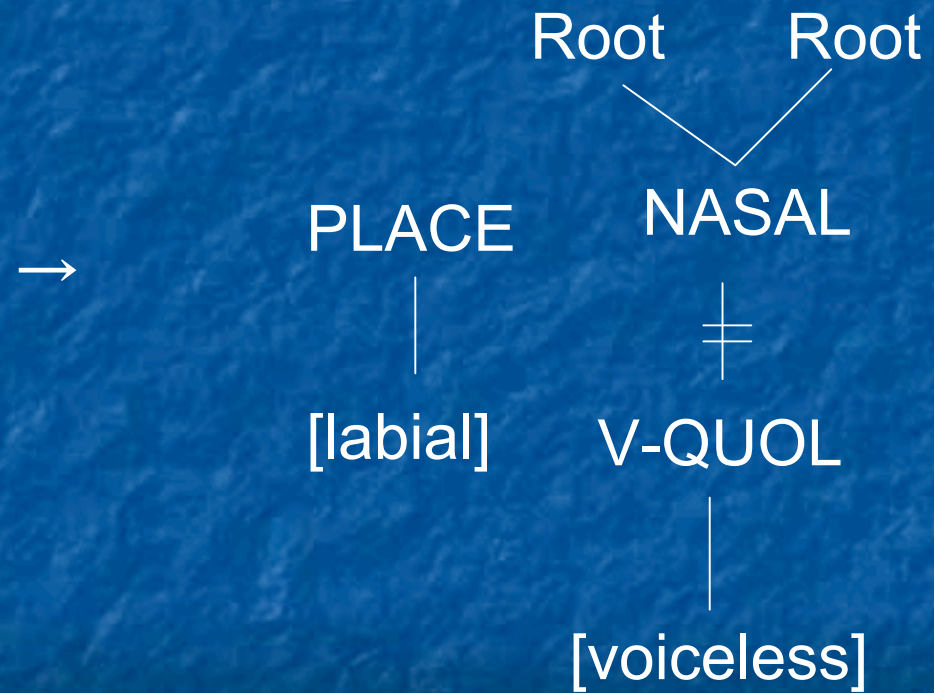
VOICE-QUALITY

[voiceless]   VOICED

                [voiced]   NASAL

                              [nasal]

NASAL

          [nasal]   VOICED

                    [voiced]   V-QUOL

                                    [voiceless]

Nasalization; -p.l- → -m.n-

V-QUOL   V-QUOL   →   NASAL   NASAL   →

[voiceless] [voiceless]   V-QUOL   V-QUOL

[voiceless] [voiceless]

Spread NASAL

Structure preservation
(delink V-QUAL if PLACE
dominates **[labial]**)

Root　　Root

Root　　Root

NASAL

→

→

PLACE　　NASAL

|

|

V-QUOL

[labial]　V-QUOL

|

|

[voiceless]

[voiceless]
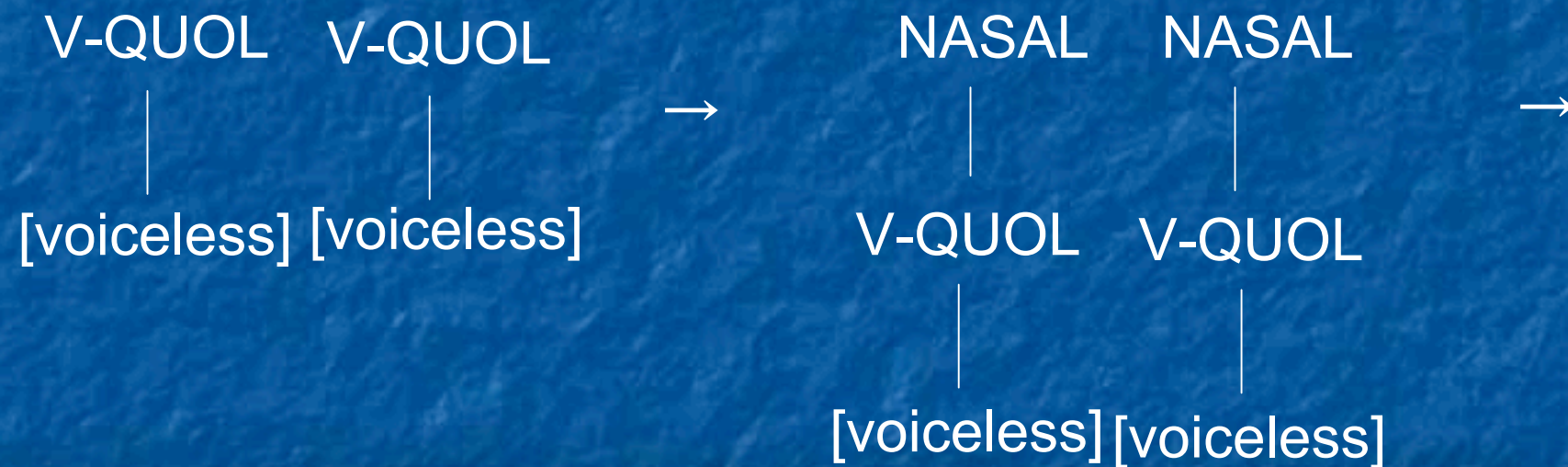
36

Nasalization; -k.l- → -ŋ.n-

Spread NASAL

Structure preservation
(delink V-QUAL if PLACE
dominates **[dorsal]**)

Root   Root

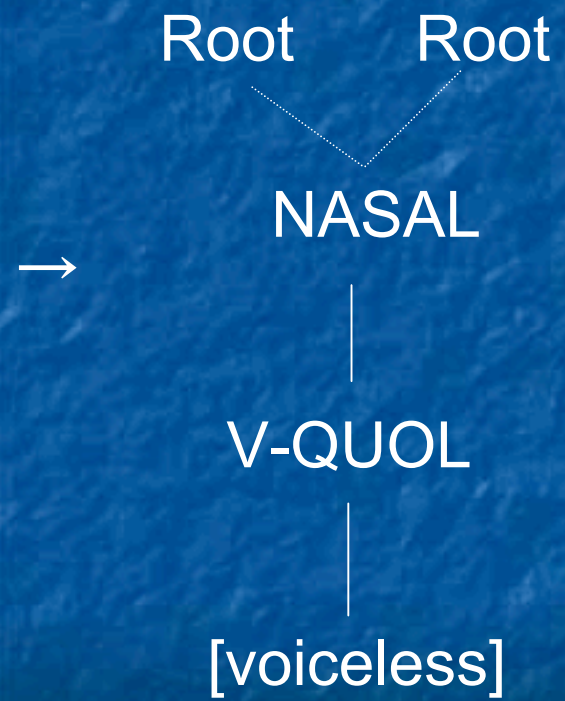   Root   Root

NASAL

…   →   PLACE   NASAL

V-QUOL

                                                            [dorsal]   V-QUOL

[voiceless]

                                                                        [voiceless]

37

Lateralization; -t.l- → -l.l-

V-QUOL   V-QUOL   →   NASAL   NASAL   →

[voiceless] [voiceless]   V-QUOL   V-QUOL

                                      [voiceless] [voiceless]

Spread NASAL

Root   Root

NASAL

→

V-QUOL

[voiceless]
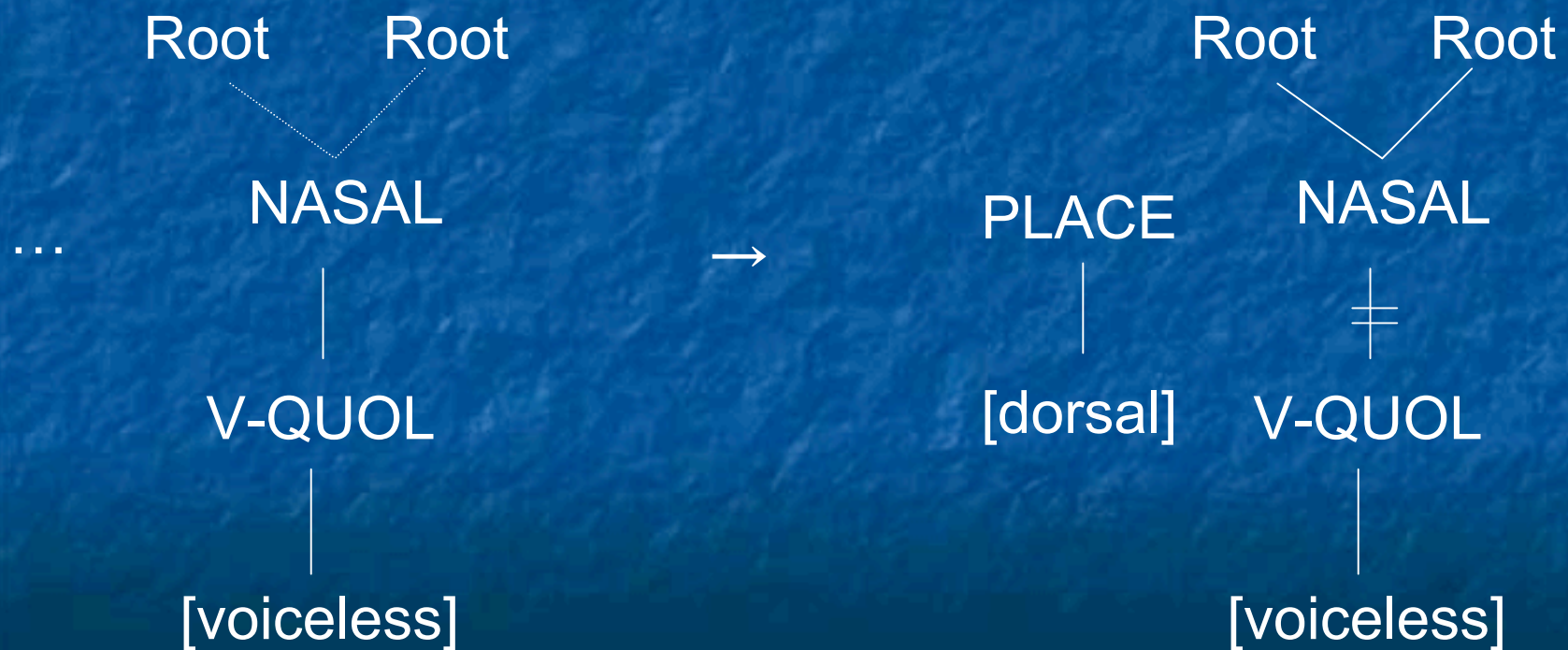
Problems

- Why can [labial] and [dorsal] cause delinking?

- What is the mechanism of the reciprocal assimilation?

- Why is [coronal] related to the lateralization?

Analysis

- The nasalization takes place regardless of their counterpart's sonority; In general, lower sonority is preferred at a syllable edge.
  - Obstruents have lower sonority than nasals.
    - →Obstruents are nasalized.
  - Laterals have higher sonority than nasals.
    - →Laterals are nasalized if not coronals.

- Lateralization takes place only if the counterpart is coronal (/t/ or /n/), and in this case, nasalization cannot take place.

The idiosyncratic behavior of the lateral in Korean

- In Korean loanword phonology, lateral /l/ can be at a syllable boundary only as a gemination /-l.l-/
  - Hirano (1994: 715); ONS-COND
    - Intervocalic /l/ must not be an onset.
  - Choi (2002: 28); Post-consonantal liquid constraint
    - A liquid cannot occur if preceded by another consonant.

4. Conclusions

- In the simplification of coda clusters, nasals of /m/ and /n/ are always preserved, whereas the lateral's emergence is not clear. Both segments tend to be preferred due to their structural simplicity (neither aspirated nor affricated) and their higher sonority.

- This preference may be reflected in the syllable boundary sonorantization. Compared with nasalization, lateralization seems to be idiosyncratic because it takes place only targeting on coronals /n/, /t/.

References (1)

Archangeli, Diana (1988) "Aspects of underspecification theory," *Phonology* 5, 183-207.

Choi, Kyung-Ae (2002) "An overview of Korean loanword phonology," *Journal of Phonetic Society of Japan* vol.6, no.1, 22-33.

Hirano, Hideyuki (1994) "A constraint-based approach to Korean loanwords," *Language Research* vol.30, no.4, 707-739.

Hirano, Hideyuki (1995) "Sosei kouzou no fukuzatsusei to shi'in no sakujo: Chosengo wo shutoshite (Feature Geometry and consonant cluster simplification in Korean and other languages)," *Tohoku University Linguistics Journal* 4, 157-177.

Hirano, Hideyuki (1996) "Saitekiseiriron to bunsetsuon sakujogenshou (An Optimality Theoretic approach to segment deletion)," *Tohoku University Linguistics Journal* 5, 1-17.

Kuroda, S-Y (2003) "Projective feature geometry: A case study in Korean assimilation," *San Diego Linguistic Papers* 1, University of California, San Diego, 83-108.

References (2)

Kuwamoto, Yuji (2007) "Onsetsumatsu ni okeru sokumen'on no sonoritii oyobi onsetsukouzou tono kakawari ni tsuite: Furansugo karano keitaion'inronteki kousatsu (Sonority and syllable structure in relation to laterals in syllable endings: A morphophonological study in French)," *Conference Handbook of the 134th Meeting of the Linguistic Society of Japan*, 258-263

Paradis, Carole & Darlene LaCharité (1997) "Preservation and minimality in loanword adaptation," *Journal of Linguistics* 33, 379-430.

Rosenthall, Samuel (1994) *Vowel/glide Alternation in a Theory of Constraint Interaction*, Ph.D. dissertation, University of Massachusetts.

Takano, Kyoko (forthcoming) "Shakuyougo tekiou ni okeru fukugoutoushi'in no shi'in sakujo wo megutte: Perceptual saliency vs. Threshold Principle (Onset cluster simplification in adopting loanwords: Perceptual saliency vs. Threshold Principle)" Nishihara, Tetsuo, Shin-ichi Tanaka & Koji Toyoshima eds. *Gendai On'inron no Ronten* (Issues of Modern Phonology), Kougakusha, 14p.

References (3)

Yip, Moira (1993) "Cantonese loanword phonology and Optimality Theory," *Journal of East Asian Linguistics* 2, 261-291.

Yip, Moira (2002) "Perceptual influences in Cantonese loanword phonology," *Journal of the Phonetic Society of Japan*, vol.6, no.1, 4-21.