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This thesis was submitted by its author to the School of English and American Studies, Eötvös Loránd University, in partial fulfilment of the requirements for the degree of Bachelor of Arts. It was found to be among the best theses submitted in 2025, therefore it was decorated with the School's Outstanding Thesis Award. As such it is published in the form it was submitted in **overSEAS 2025** (http://seas.elte.hu/overseas/2025.html)

EÖTVÖS LORÁND TUDOMÁNYEGYETEM
Bölcsészettudományi Kar

ALAPSZAKOS SZAKDOLGOZAT

A zönge a japánban: A Lyman-törvény újraértelmezése

Voicing in Japanese: Decomposition of Lyman's Law

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2025

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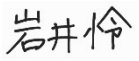

Date: April 15, 2025 signed by Iwai Rei

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Abstract

This thesis aims to decompose Lyman's Law from the historical point of view; a law which is the only potential evidence showing that Japanese is a voicing language. The goal is to give some new insights to Japanese laryngeal phonology. As for the theoretical framework, I employ Avery & Idsardi's (2001) dimension theory to show the underlying laryngeal specifications. It turns out that there was no laryngeal contrast in Japanese in its most ancient layer of vocabulary, which makes it untenable to refer to voicing in the formulation of Lyman's Law. A two-way contrastive GT system emerged through a series of changes involving the unmarked obstruents and the floating nasality that precedes them, which shows that the constraint affected floating nasality, not voicing. The productivity of post-nasal voicing as well as sequential voicing in relation to OCP effects will also be discussed. Lastly, I will discuss how the phonological contrast of Modern Japanese is phonetically achieved to raise doubt about what underlying laryngeal specifications are needed to capture its laryngeal oppositions.

Key words: Lyman's Law, laryngeal phonology, Laryngeal Realism, Laryngeal Relativism, voicing, floating nasality, sufficient discriminability

1. INTRODUCTION

Japanese is considered a voicing language, having a laryngeal contrast of voiced vs voiceless. This claim is based on the general assumption that Japanese has phonetic contrast of voiced vs voiceless (Nasukawa 2005b: 80). In addition, this is also supported by Lyman's Law (LL), a phonotactic constraint that bans the occurrence of more than one voiced obstruent within a morpheme (Vance 2016). The rationale behind this is that the voiced series of obstruents are phonologically marked, therefore, the co-occurrence of voiced obstruents violates the Obligatory Contour Principle (OCP) (Ito & Mester 2003). The challenge for any account of laryngeal phonology of Japanese is that the strict CV structure of the language prevents us from observing phonological interactions among the obstruents, such as Regressive Voicing Assimilation (RVA) and cross-word sandhi phenomena involving the obstruents. The goal of this thesis is to decompose Lyman's Law from the historical point of view and to give some new insight into the laryngeal phonology of Japanese.

In section 2, I discuss Laryngeal Realism and argue that phonetics is not a reliable ground in identifying the phonological nature of a language. Thus, while Laryngeal Realism is problematic because of its reliance on phonetics as the basis for determining the active laryngeal feature of a language, Laryngeal Relativism (Cyran 2014, 2017; Scheer 2015) stands on Kaye's (2005) Phonological Epistemological Principle, which says it is only phonological behaviour that discloses the phonological nature of a language. In this thesis, I employ the terms GW (glottal width) and GT (glottal tension) proposed by Avery & Idsardi (2001) to describe the underlying specification of obstruents.

As it turns out, LL seems to be the only phonological evidence proving that Japanese is a voicing language. How LL operates in Modern Japanese (MoJ) in relation to sequential voicing is discussed is section 3. The limited distribution of voiced obstruents in MoJ, discussed in section 4, indicates that there was no laryngeal contrast in the obstruents in Japanese in its

most ancient period, as showcased by its primary layer of vocabulary, Yamato Japanese (YJ). LL, a phenomenon operative in YJ, as a constraint on voicing turns out to be problematic in a language without phonological voice. As an alternative, in section 5 and 6, I will argue the constraint behind LL is not based on voicing but nasality, which was present as a floating element without a skeletal slot to link to. I will discuss how the two-way contrastive system emerged by observing the distribution of floating N, as well as the change in its segment status.

To continue with, I discuss how phonological contrast is phonetically achieved from the point of view of Laryngeal Relativism. In section 7, I illustrate the potential phonetic interpretations of unmarked obstruents in YJ by observing the sound change of historical */p/, which underwent different series of changes depending on its position. The tendency of maintaining laryngeal contrast in terms of sufficient discriminability (Cyran 2014) in YJ is suggested from the perspective of diachronic change in section 8. Lastly, I will show that the way in which underlying contrast is realised on the surface is complex in MoJ, and cannot be simply discussed along the line of 'voicing' and/vs 'aspiration'. This will potentially lead on to substance-free phonology, in which the underlying specification is free of any innate substance, discussed briefly at the end of the thesis.

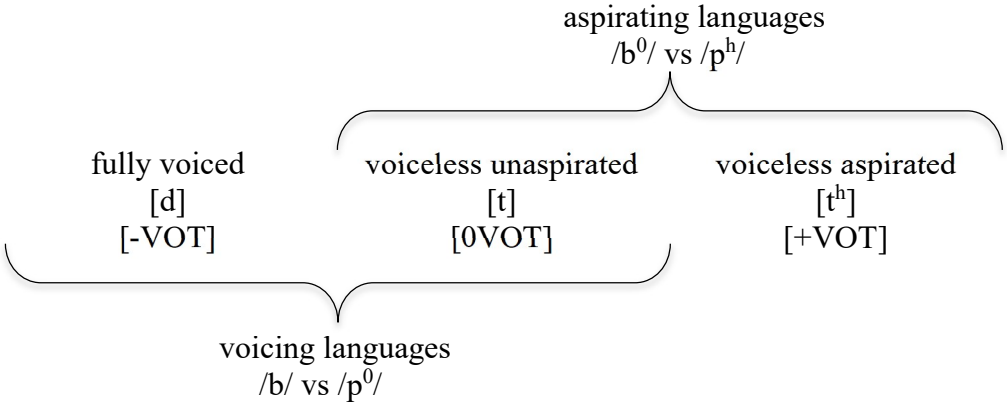
2. THEORETICAL BACKGROUND

Before arguing the laryngeal specification of obstruents in MoJ, I will discuss two approaches to laryngeal phonology: Laryngeal Realism and Laryngeal Relativism. The aim is to examine what underlying laryngeal specifications are needed. Even though Japanese is categorised as a voicing language (Avery & Idsardi 2001), this framework does not successfully account for the complexity concerning the phonetic cues that are used to maintain the laryngeal contrast in MoJ. I will rather take the view of Laryngeal Relativism, which makes the case more plausible by rejecting the principle of bi-uniqueness between phonetic facts and phonological representation.

2.1 Laryngeal Realism

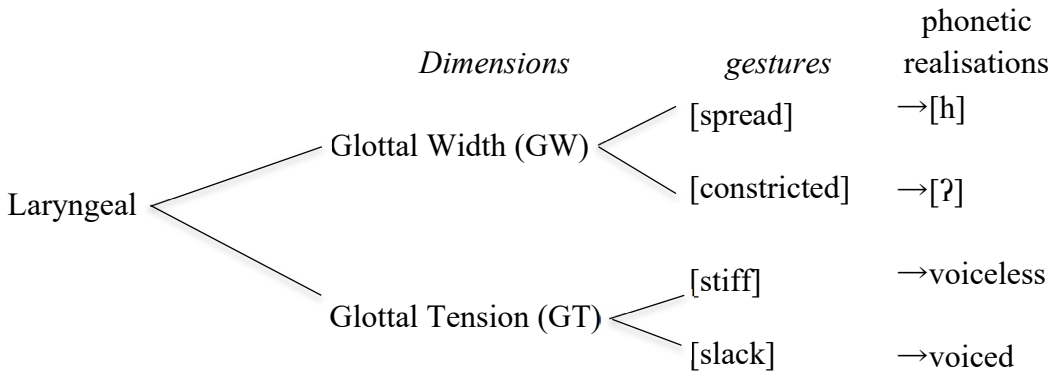
Different from the traditional binary approaches rooted in SPE (Chomsky & Halle 1968), Laryngeal Realism is novel in that it employs the unary approach to features in which laryngeal contrast in two-way contrastive systems is represented by a single underlying/phonological feature. The continuum of Voice Onset Time (VOT) determines whether a language is an aspirating language or a voicing language as shown in (1).

(1) Voicing languages and aspirating languages based on Honeybone (2005)



To achieve minimal representation of phonological contrast in a system, Avery and Idsardi (2001) introduced the notion of dimensions, which are phonetically completed with different gestures, see (2).

(2) Dimensions and gestures (Avery & Idsardi 2001: 42)[1]



In this model, only the dimensions can be contrastive, not the gestures. A dimension contains an antagonistic pair of gestures, which are contextually selected: [stiff] or [slack] for the GT dimension, [spread] or [constricted] for the GW dimension. In English as an aspirating language, for instance, /C^{GW}/ is completed with [spread] and realised with aspiration in strong positions: word-initially and before stressed vowels, as in *tea* [t^{h}íj] and *appear* [əp^{h}íː]. In weak positions, however, /C^{GW}/ is completed with [constricted], resulting in glottalization as in *sit* [sɪ^{ʔ}t] [2].

Avery and Idsardi (2001: 50) claim that the marked obstruents show invariant acoustic or articulatory cues in strong positions, especially in the word-initial position. That leads to pre-voicing of /C^{GT}/ ([-VOT]) in voicing languages as opposed to aspiration appearing on /C^{GW}/ ([+VOT]) in aspirating languages. The phonetic realisation in the strong positions is one of the cues in determining whether a language is a voicing language or an aspirating one in this framework. Honeybone (2005) calls this the narrow interpretation of voice: obstruents with long lead VOT have active vocal fold vibration, which is a manifestation of the phonologically marked 'voice'. Similarly, if a language has aspirated obstruents, this aspiration must stem form

[1] The other dimension, Larynx Height is not discussed in this thesis.

[2] A single dimension pairs up the antagonistic gestures, but these gestures are not necessarily exclusive but will never contrast. For example, /t/ in *neutron* shows both aspiration (which is realised as devoicing of the following /r/ in this case) and glottalisation, which indicates that this /t/ is ambisyllabic. That is, this /t/ belongs to both the coda of the first syllable and the onset of the second syllable (Anderson & Ewen 1987: 61).

underlying ‘h’, ‘H’ (or any other similar source feature). In essence, Laryngeal Realism relies on phonetics. The summary is shown in (3).

(3) Aspirating languages and voicing languages

categorisation	phonetic contrast	laryngeal contrast
voicing languages e.g. Hungarian, Polish	[-VOT] vs [0VOT] (distinctive in voicing)	$/b^{GT}/$ vs $/p^{0}/$
aspirating languages e.g. English, Icelandic	[0VOT] vs [+VOT] (distinctive in aspiration)	$/b^{0}/$ vs $/p^{GW}/$

Nevertheless, the case of Swedish is problematic for Laryngeal Realism, for example. In Swedish, fully voiced obstruents contrast with voiceless aspirated ones, which seems to be a case of over-specification. Laryngeal Realism has to resort to claiming that both GT and GW are active in Swedish, which is criticised by Cyran (2017: 480) as a bias rooted in bi-uniqueness. The analyses in Laryngeal Realism are rooted in phonetics, that is, they assume that phonological representation can be directly read off from the phonetic cues and vice versa.

2.2 Laryngeal Relativism

Laryngeal Relativism (Cyran 2014) reacted against Laryngeal Realism based on the Phonological Epistemological Principle (Kaye 2005). Cyran (2017) claims that it is only phonological behaviour that can be relied on in determining the phonologically active laryngeal element of a language. In Cyran's view, the only phonological phenomenon is delinking of a feature; all the others are phonetic in nature. Cyran demonstrated how unreliable phonetics can be in his analysis of two versions of Polish: Warsaw Polish (WP) and Cracow-Poznań Polish (CPP). Cyran analyses the behaviour of the word-final obstruents in the sandhi environment before sonorants/vowels and compares them in the two versions of Polish. He emphasises that

the relationship between phonetics and phonology is arbitrary. Phonetic voicing does not have to originate in /C^{GT}/ (as in WP), but can be the consequence of enhanced passive voicing of /C^{0}/ in a GW system (such as CPP). That is, this enhancement with voice plays a role in achieving sufficient discriminability from a /C^{GW}/, which is realised without phonetic aspiration. The summary is shown in (4) below.

(4) The difference in the laryngeal contrast between Warsaw Polish and Cracow-Poznań Polish (Cyran 2017)

phonetic realisation	laryngeal contrast		characteristics
[-VOT] vs [0VOT]	WP	/C^{GT}/ vs /C^{0}/	a 'true' voicing language: - no phonetic aspiration on /C^{0}/ - actively voiced /C^{GW}/
	CPP	/C^{0}/ vs /C^{GW}/	- no phonetic aspiration on /C^{GW}/ - enhanced passive voicing of /C^{0}/

CPP is one of the cases which Laryngeal Realism fails to account for. CPP is called a 'false' voicing language in that it looks like one because of [-VOT] on the surface. At the same time, this is a false aspirating language in that it does not have phonetic aspiration. In essence, speakers manage to maintain contrast, but the phonetic nature of the contrast does not straightforwardly disclose a particular type of language (here a GT language). The argument about the size of phonology has recently resulted in substance-free phonology (Chabot 2022; Scheer 2022). In this approach, phonology and phonetics are completely independent from each other, which is why phonology cannot hold any substance. Therefore, even Cyran's categorisation along L (for voicing languages) or H (for aspirating languages) is not abstract enough. In terms of substance-free phonology, one series is marked with some symbol and what kind of phonetic cues this is interpreted/translated as is phonologically irrelevant. In my thesis, I use Avery & Idsardi's laryngeal dimensions, an approach which is less phonetically grounded

than Laryngeal Realism, but not completely devoid of phonological content as substance-free phonology or Laryngeal Relativism, in which 'H', for example, is never realised as aspiration in CPP (Cyran 2014).

2.3 Japanese laryngeal phonology

This thesis only focuses on one-way and two-way contrastive systems. Yamato Japanese (YJ), which represents ancient Japanese prior to being influenced in its phonology by loanwords from other languages, arguably shows a language with a single series of obstruents, while MoJ is classified as a two-way contrastive language. More specifically, MoJ is one of the voicing languages (Nasukawa 2005b: 80). However, there is scarce evidence to prove this because MoJ lacks coda obstruents due to the strict CV structure which makes it impossible to observe RVA or cross-word sandhi phenomena. The only evidence that potentially shows that MoJ is a voicing language is the presence of a markedness constraint, known as Lyman's Law (see section 3.4). My aim is to decompose Lyman's Law in order to examine whether there is reliable proof to believe that MoJ is a GT language.

3. OVERVIEW OF MODERN JAPANESE

3.1 The consonant inventory of MoJ

In this thesis, I will discuss /(*p), t, k, s/ and their voiced counterparts /b, d, g, z/. I will also discuss /h/ in relation to */p/ and its historical changes. The phonemehood of other obstruents such as /ʃ/, /ʒ/, /tʃ/ and /dʒ/, shown in parentheses in (5), are arguable because they are not in the system of YJ, that is, they appeared as phonemes under the influence of Chinese.

(5) Consonant inventory of MoJ (excluding Western loanwords)[3]

	labial	alveolar	palatal	velar	glottal
stop	b[4]	t d[5]		k g	
fricative		s z[6]	(ʃ)(ʒ)		h[7]
affricate		(ts)(dz)	(tʃ)(dʒ)		
nasal	m	n			
liquid			r		
glide			j	w	

3.2 The syllable structure of MoJ

The syllable structure of MoJ is limited to CV sequences with two exceptions of coda segments: placeless nasals (N) and the first member of geminates. In other words, no two obstruents can be found next to each other, not even in compounds, which is why RVA and cross-word sandhi phenomena are not testable.

(6) The segments in the coda position (Labrune 2012: 134–135)

a. placeless nasals: N

sanpo /sa**N**po/ [sa**mp**o] ‘walk’,

tonda /to**N**da/ [to**nd**a] ‘fly PST’,

kangae /ka**N**gae/ [ka**ŋg**ae] ‘thought’

hon /ho**N**/ [hoɴ] ‘book’

sensei /se**N**sei/ [sẽ(**n**)**s**eː] ‘teacher’

[3] This is based on Labrune (2012: 59), Kubozono (2015: 6) and Pintér (2015: 123).
[4] The lack of the voiceless counterpart will be discussed in section 7.
[5] /t/ and /d/ are realised as [tʃ] and [dʒ] before /i/, [ts] and [(d)z] before /u/ and [t] and [d] elsewhere respectively.
[6] /s/ and /z/ are realised as [ʃ] and [dʒ] before /i/ and [s] and [z] elsewhere respectively.
[7] /h/ is realised as [ç] before /i/ and [ɸ] before /u/ and [h] elsewhere.

b. the first member of geminates

kappa /ka**p**pa/ ‘kappa’ (mystical water dwelling creature)

motto /mo**t**to/ ‘more’

sekken /se**k**keN/ ‘soap’

kissaten /ki**s**sateN/ ‘coffee shop’

The coda nasals in (6a) are underspecified for their place of articulation (PoA). There is obligatory place assimilation to the following consonant.[8] As for the geminates [9] in (4b), based on the obligatory contour principle (OCP), which prohibits consecutive identical features in a certain domain in the underlying representation, one of the members of geminates is an empty consonantal slot on the skeleton to which the material from the other member is linked. The left- or right- headedness of geminates is language-specific. I propose that geminates in Japanese are right-headed, i.e., the first member of geminates is an empty consonantal slot (_p, _t, _k, _s), which dovetails with the fact that the pre-consonantal position is strictly limited in Japanese and can only allow for an underspecified nasal and an empty consonantal slot. Due to the strict syllable structure, the positions in which I discuss obstruents are confined to the word initial and the intervocalic.

3.3 Sources of MoJ words

MoJ words are predominantly composed of Yamato Japanese (YJ) morphemes and Sino-Japanese (SJ) morphemes. The former refers to the words that originate in Japan, while the latter are the loanwords from Chinese, later adapted to Japanese.

[8] Labrune (2012: 134–135) listed the possible realisation of coda nasals including nasalisation of the preceding vowels when the nasals are followed by /h/, /s/ and /z/. However, they are just phonetic realisations, something beyond the limits of the present discussion.

[9] MoJ as well as YJ and SJ lacks voiced geminates (Labrune 2012: 16–18). However, this matter is beyond the scope of this thesis. Note, however, that YJ had no phonological voice.

(7) Lexical classes in MoJ (Labrune 2012: 13–14)

a. Yamato lexemes: the native words

b. Sino-Japanese lexemes, introduced from China beginning in at least 4C.

c. Loanwords: the recently borrowed lexemes from foreign languages, predominantly from Western languages, from the 16th century.

d. Foreign words: the class for non-integrated foreign words with a degree of adaptation into Japanese which is not as advanced as that of loanwords

e. Hybrid words: compounds made up of words or morphemes belonging to different classes of lexemes

a. Onomatopoeia and ideophones

The distinction of the strata is relevant for their different phonological behaviours. Although literature often distinguishes Archaic Japanese (before 794), Old Japanese (794–1350) and Middle Japanese (1350–1603), I will employ the distinction rooted in the strata (YJ vs SJ), rather than in the periods because the influence of Chinese loans (of SJ) and the phonological changes that were potentially triggered by them were more gradual, making it therefore difficult to grasp the picture at a specific point in history coinciding with a traditional demarcation into periods. Western loans will not be discussed in this thesis for their different behaviour from YJ and SJ (with some exceptions of early loans). In addition, mimetic words, which Japanese is rich in, need to be excluded, as well, for the same reason.

3.4 Lyman's Law

MoJ has a two-way contrastive system, in which there is contrast of /t/ vs /d/, /k/ vs /g/, and /s/ vs /z/ in all positions as shown in (8)[10].

(8) The minimal pairs of voiced vs voiceless

a. The word-initial position

toku 'profit' vs *doku* 'poison'

koma 'piece' vs *goma* 'sesame seed'

saru 'monkey' vs *zaru* 'strainer'

b. The intervocalic position

mata 'again' vs *mada* 'as yet'

kaku 'write INF' vs *kagu* 'sniff INF'

asa 'morning' vs *aza* 'bruise'

When a language has a two-way contrast in its obstruents, one of the series is phonologically marked, while the other is unmarked in approaches using unary features. As mentioned above, MoJ is categorised as a voicing language (section 2.3). In our terms, this means the opposition can be conceptualised as C^0 vs C^{GT}. LL, which is brought in to support this claim, prohibits a morpheme from containing more than one voiced obstruent. Ito and Mester (1995: 819) say that **buda* is illicit, as opposed to *huda* 'label, tag' and *buta*[11] 'pig', which are well-formed in YJ. Furthermore, LL, a morpho-phonological regularity productive in YJ words,[12] is believed to

[10] As */p/ underwent phonological changes, there is no opposition of /p/ vs /b/ (see section 7). However, new Western loanwords allow /p/ in all positions including the word-initial and the intervocalic as in /pari/ 'Paris' and /api:ru/ 'appeal'.

[11] The lack of the word-initial voiced obstruents in YJ is discussed in section 4.

[12] SJ words, which make up the other major component of MoJ lexicon sometimes undergoes sequential voicing. In Takayama's (2005: 181) account, the applicability depends on the degree of foreignness of the word: sequential voicing occurs if a word has been integrated into the non-foreign lexicon such as *sira* 'white' (from YJ) + *kiku* 'chrysanthemum' (from SJ) > *sira**g**iku* 'white chrysanthemum'.

block the application of sequential voicing. Sequential voicing is a morpho-phonological phenomenon in which the initial /C^0/ of the second constituent of the compound becomes voiced (Labrune 2012: 112). When the second constituent already contains /C^{GT}/, sequential voicing does not occur, see (9).

(9) Examples of sequential voicing (adapted from Vance 2016: 7)

a. isi 'stone' + ka**b**e 'wall' > isikabe 'stone wall'/**isi**g**a**b**e**

b. isi 'stone' + kame 'turtle' > isi**g**ame 'Japanese pond turtle'

Sequential voicing is known for its inconsistency. First, sequential voicing is almost exclusively productive in YJ words (Ito & Mester 1995: 819). [13] Moreover, its productivity depends on the semantic relationships between the two constituents (Ito & Mester 2003: 86). The aspect of sequential voicing as a morphological process is the basis for their assumption that there is a linking morpheme connecting the two constituents of the compound that triggers voicing of the initial voiceless obstruents in the second constituent. They propose that it is the remnant of the genitive marker *-no-*. Moreover, they claim that the cases where sequential voicing does not occur corresponds to cases in which a genitive marker was unlikely to be used: coordination and OV compounds as shown in (10).

(10) The two cases where sequential voicing is not found (Ito & Mester 2003: 86)

a. Coordination compounds

oya-ko 'parent and child'

(cf. *mai-go* 'lost child')

[13] Western loanwords do not undergo sequential voicing except some early loanwords, such as *kappa* (from Portuguese) in *ama* 'rain' + *kappa* 'waterproof' > *ama**g**appa* 'waterproof' (Labrune 2012: 23).

b. OV compounds

sakana-turi ‘fish-catching, catching fish’

(cf. *iso-duri* ‘beach-catching, fishing on a beach’)

LL is only sensitive to obstruent voicing; sonorants are transparent, which shows that spontaneous voicing does not intervene in the process as in the case of onset /m/ in (9b).[14] Furthermore, Ito and Mester (2003: 89) see LL as a manifestation of more general constraint, the OCP. This principle shows that Japanese is a GT language because having more than one voiced obstruent within a morpheme violates the OCP on account of the dimension GT.

3.5 Vowel devoicing in MoJ as GW enhancement

This phenomenon mainly affects the high vowels /i/ and /u/ in (11a, b), the other vowels can potentially be affected, too (11c, d). This is triggered by the surrounding /C^0/, especially when a high vowel is couched between two /C^0/ (Avery & Idsardi 2001: 48).

(11) Examples of vowel devoicing in MoJ (adapted from Labrune 2012: 35)

a. *hiku* [ɕi̥kɯ][15] ‘pull INF’

b. *aki* [ˈaki̥] ‘autumn’

c. *haka* [ha̠ˈka] ‘tomb’

d. *keshou* [ke̠ˈʃoː] ‘make up’

[14] Sonorants do not have a prime for voicing, as seen in Element Theory (cf. Cyran 2017), that is, spontaneous voicing that occurs in sonorants is not phonologically relevant.

[15] Vowel devoicing is affected by many factors, most notably by pitch accent; low pitched (L) vowels are more susceptible to devoicing than high pitched (H) ones. Moreover, it is also affected by the speech rate and consecutive devoicing may be avoided (Fujimoto 2015). In this way, it is likely that only the first high vowel in *hiku* [LH] is devoiced.

However, as Labrune (2012: 38) admits, it is difficult to capture the exact condition of this phenomenon. That is, the devoiceability of vowels triggered by /C^0/ is susceptible to accent shifts and allows variance among speakers. Avery and Idsardi (2001: 48) proposed that this is a case of enhancement with non-contrastive GW. GW enhancement is only available as long as the language does not employ GW as a phonological dimension; the claim is true for MoJ. In addition, there is no evidence that Japanese ever used GW as a contrastive dimension. The optionality and difficulty in determining the exact condition of devoicing indicates that this process is not phonological, but phonetic.

In this way, LL as a constraint on the ban on the co-occurrence of /C^{GT}/ and vowel devoicing triggered by non-contrastive GW seem to support the supposition that MoJ is a GT language. From the diachronic point of view, however, the landscape seems to be rather complicated.

4. OVERVIEW OF YAMATO JAPANESE

4.1 Characteristics of YJ and SJ

In this section, I discuss the laryngeal specification in the YJ obstruent system to identify the nature of LL. The characteristics of YJ are listed in (12), in which the absence of voiced obstruents in the word-initial position (12b) and the absence of /p/ (12e) will be discussed. Observe the differences between (A) and (B) in (12) below.

(12) Comparison of YJ and SJ words (Labrune 2012: 16-18)

(A) Characteristics of Yamato lexemes

a. The possible syllable structure is (C)V.

b. /b, d, g, z, r/ do not occur word-initially.

c. two voiced obstruents within the same root and two /r/s in the same root are prohibited[16]

d. Morphemes are two to three morae long

e. /p/ is absent.

f. /h/ is absent in the word-internal position.

g. Gemination of voiced obstruents and gemination of /r/ are not allowed.

(B) Characteristics of Sino-Japanese lexemes

h. Coda nasals are present.

i. Geminations occur in compounds.

j. The singleton /p/ is absent.

k. Gemination of voiced obstruents does not occur.

l. Morphemes are one to two morae long.

4.2 Distribution of voiced obstruents in MoJ and YJ

The distribution of voiced obstruents need revision considering the distinction in the lexical strata. Even though /C^{GT}/ occurs in all positions in MoJ, this is (historically) only true for SJ items.

(13) MoJ obstruents in the word-initial position

	#b	#d	#g	#z
YJ	*baka* 'idiot' *bero* 'tongue' *buta* 'pig' *bokeru* 'become senile INF'	*dasu* 'to put something out' *deru* 'to get out' *doko* 'where'	*garakuta* 'rubbish'	*zurui* 'being cunning'
SJ	*basho* 'place' *bin* 'bottle'	*dango* 'dumpling' *desi* 'apprentice'	*gaka* 'painter' *goma* 'sesame seed'	*zukan* 'picture book' *zeikin* 'tax'

[16] The odd behaviour of /r/ will not be discussed in this thesis.

(14) Obstruents in the intervocalic position

	VbV	VdV	VgV	VzV
YJ	*sabi* 'rust' *kabe* 'wall'	*eda* 'branch' *hude* 'brush'	*tesage* 'handbag' *ago* 'jaw'	*aza* 'bruise' *mazu* 'firstly'
SJ	*kobu* 'seaweed' *hubo* 'parents'	*ido* 'well' *kadan* 'flower bed'	*kigou* 'symbol' *bogo* 'mother tongue'	*sizin* 'poet' *kozi* 'orphan'

In the intervocalic position, all the consonants are found except for [p], which I will turn to in section 7. However, as seen in the statistical data which Labrune (2012: 100) provides, the occurrence of the voiced obstruents in the word-initial position in YJ is rather rare as opposed to the higher frequency of those consonants in SJ words. The examples of YJ words in (13) are special cases, see (15) below for examples.

(15) The sources of the word-initial voiced obstruents in YJ (adapted from Ito & Mester 2003: 33)

a. the deletion of the word-initial high vowel

ideru 'go out' > *deru*, *idasu* 'put out' > *dasu*

iduko 'where' > *doko*

b. mimetic words

bero 'tongue' comes from an onomatopoeia *berobero* (used to describe the manner of licking)

garakuta contains *garagara*, the rattling sound added to *akuta* 'waste'

zurui 'cunning' comes from *zuruzuru*, reflecting the inconclusiveness of prolonged state

c. negative connotations

buta ‘pig’ (or it might come from the sound given off by pigs, too)

bokeru ‘become senile INF’

First, as for the deletion of the word-initial high vowels, Ito and Mester (2003: 33) argue for the weak status of high vowels that make them subject to deletion. Second, the mimetic words and negative connotations involve non-phonological factors, which is why they are omitted from our discussion. Thus, it can be concluded that YJ did not originally have voiced obstruents in the word-initial position. It is phonologically unexpected that occurrences of voiced stops are banned word-initially, the only position in which, generally, all contrasts of a language are found given the cross-linguistic observation that segments in a strong position exemplify all potential contrasts of a language (Scheer & Ségéral 2008: 140). It is more plausible to claim that YJ only had a lenis series of obstruents. In such a system, the voicing value depends on the environment. They would have been voiced in voicing friendly environments, namely in intersonorant position. The phonetic realisation of unmarked obstruents in YJ will be taken up in section 8. Therefore, an alternative account for LL is needed because LL, which regulates the co-occurrence of more than one voiced obstruent, is not compatible with the system of YJ that only had /C^0/ and no phonologically contrastive voicing.

5. EMERGENCE OF CONTRASTIVE VOICE IN THE SYSTEM

As YJ only had a lenis series of obstruents, how did the language come to have a phonological contrast of voiced vs voiceless? In other terms, how did MoJ intervocalic /C^{GT}/ come about? I will argue that GT system originates in nasality, brought about by a series of changes starting with post-nasal voicing.

5.1 Post-nasal voicing (PNV)

PNV is a phenomenon that we can observe in nasal-obstruent clusters either within a morpheme or at the morpheme boundary. After the deletion of high vowels that followed a nasal, the nasal came to be in direct contact with the following /C^0/. The obstruents that immediately follow nasals become always voiced. Ito & Mester (1995: 820) formulate a constraint as *N+voiceless obstruents in Japanese, see (16B).

(16) Post-nasal Voicing (PNV)

(A) Example of PNV within YJ-origin words that are found in MoJ (Nasukawa 2005a: 3)

a. *šom**b**ori* 'discouraged' /**š*ompori*

b. *šin**d**oi* 'tired' /**š*intoi*

c. *kaŋ**g**ae* 'thought' /***kaŋkae*

(B) Post-nasal obstruents in YJ in the intervocalic position

V[mb~b]V	**V[mp]V
V[nd~d]V	**V[nt]V
V[nz~z]V	**V[ns]V
V[ŋg~g]V	**V[ŋk]V

We can only see the outcome of PNV in monomorphemic words in (16A), PNV at morpheme boundaries in inflection juncture gives us an insight into the possible changes concerning nasals, shown in (17).

(17) PNV at the morpheme boundary in inflection juncture[17] (*-te* = inflectional suffix)

a. **kam-* + *-te* > *kamite* > MoJ *kan**d**e* 'chew'

b. **sin-* + *-te* > *sinite* > MoJ *sin**d**e* 'die'

c. **yom-* + *-te* > *yomite* > MoJ *yon**d**e* 'read'

[17] Stems can end in a consonant, but the phonetic realisation always follows the CV pattern.

The examples in (17) illustrate that PNV was preceded by high vowel deletion and coda nasals emerged as a result. These nasals are always homorganic with the following obstruents, which indicates that they lost their PoA at the point of syncopation. As YJ did not have contrastive voice, the constraint *N+voiceless obstruents did not result in phonologically relevant status of voicing in YJ. Rather, this constraint tells us that the sequence of N+ /C^0/ produced phonetically voiced obstruents.

Although the process of changes at the morpheme boundary in (17) can be etymologically justified, it is not easy to observe the same process within a morpheme. Yet, there are some MoJ words whose origin is known and which underwent the same voicing. Monomorphemic words went through a further change, however. For example, a MoJ monomorphemic word, *hude* 'brush, pencil' was originally a compound **humi+te*.

(18) syncopation, PNV, nasal deletion (Labrune 2012: 107)

**humi* 'letter' + *te* 'hand'	> *hunte	> *hunde	> *hude 'brush, pencil'
**sumi* 'ink' + *suri* 'to rub'	> *sumsuri	> *sunzuri	> *suzuri 'inkstone'

It is unknown why some words underwent a further change of nasal deletion while nasals remain in others (but see section 6.2), such as those that were created by the process of inflectional juncture. The rule of nasal deletion must have run its course prior to the formation of words like *yonde*, *kande*, shown in (17).

5.2 Nasality and voicing

Nasukawa (2005b) accounts for the relationship between nasality and voicing using the notion of headedness. He argues that nasality and voicing are realisations of the same phonological feature (source element) N. What is responsible for the difference on the surface is the phonetic

interpretation of this phonological feature. In his terms, headed N results in voicing while non-headed N results in nasality, see (19).

(19) Headedness of N and phonetic manifestation (adapted by Nasukawa 2005b: 83)

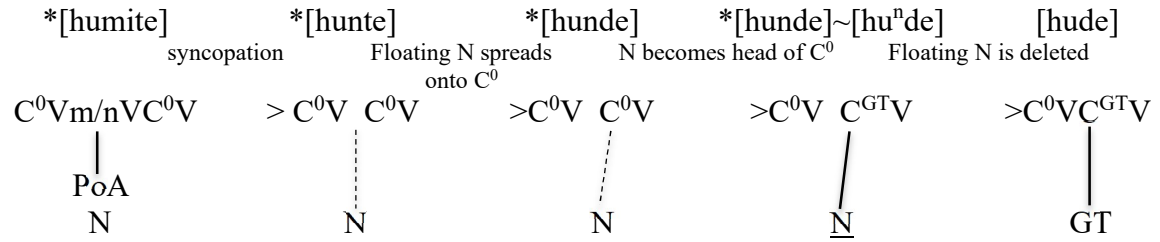
phonological feature	[N] (non-headed [N])	[N̲] (headed [N])
phonetic manifestation	Nasality	voicing
examples[18]	MoJ /ka**m**i/ ‘paper’	MoJ /ka**b**i/ ‘mold’
	/m/ | N	/b/ | N̲

Provided that the difference of nasality and voicing on the surface depends on whether N is headed or not, nasal deletion might indicate that N had already been headed in /C^0/ prior to deletion. I propose that N existed as a floating element without any skeletal slot to occupy after it had lost its segmental status at the point of syncopation. That is, YJ originally disallowed closed syllables of any type, as Labrune (2012: 16) posits, see (12).[19] This floating N spread onto the following /C^0/ and triggered PNV. Then, N was linked to the /C^0/ and became headed, turning /C^0/ into /C^{GT}/, see (20). The specification with N̲ in the obstruents is interpreted as GT in this thesis. Consequently, minimal pairs as seen in (21) emerged.

[18] The other elements involved in the example ([?] (occlusion), [U] (labiality), and [h] (obstruency)) are omitted here for the sake of simplicity.

[19] Kawagoe (2015) argues that the series of changes at the morpheme boundary in inflection juncture resulted in the emergence of three different coda segments depending on the stem final consonant: coda nasals, geminates and long vowels. This is seen in */sin- + -te/ > /siNde/ ‘die’, */tor- + -te/ > /totte/ ‘take’, */kik- + -te/ > /kiite/ ‘listen’ respectively.

(20) Emergence of C^{GT}



(broken lines show floating N)

(21) A minimal pair in MoJ

a. huda / $hud^{GT}a$/ < YJ */puN(V)t^0a/ vs

b. huta /hut^0a/ < YJ */put^0a/

To sum up, the unstability of floating N in YJ triggered PNV to begin with and ultimately changed the phonological system from a one-way to a two-way contrastive system.

6. CONSTRAINTS ON FLOATING N

6.1 Sequential voicing and OCP

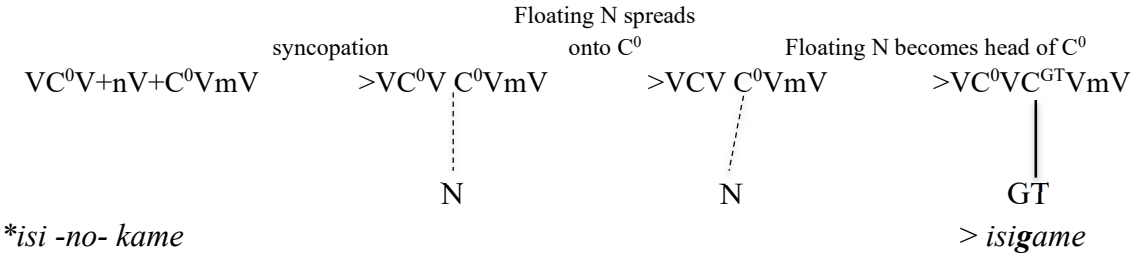
In this section, I return to sequential voicing and aim to re-analyse it with respect to floating N. In a previous study on sequential voicing, Ito & Mester (2003) claim that what blocks sequential voicing is a ban on more than one occurrence of voiced obstruents, formulated as an OCP violation. In order to avoid OCP violation, sequential voicing fails to occur when the second constituent of the compound already contains /C^{GT}/. As discussed in section 4, voicing cannot be a factor of OCP violation because there was no phonological voice in YJ. Considering that floating N was unstable without its skeletal slot to link to, it is more plausible that the failure of sequential voicing is due to the avoidance of OCP violation in terms of floating N.

Even though sequential voicing is understood as voicing of the initial /C^0/ in the second constituent in MoJ, my proposal is that sequential voicing was originally the linking

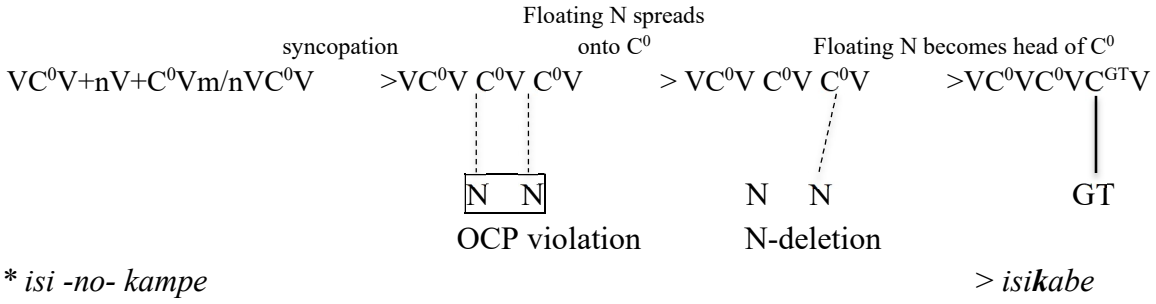
process of floating N to the initial /C^0/ of the second constituent of the compound in YJ. Suppose there was a linking morpheme *-no-*, as Ito and Mester (2003) propose (see section 3.4), sequential voicing is predicted to entail the same process as shown for the evolution of N+ /C^0/ into /C^{GT}/ in YJ. The N of the linking morpheme (after syncopation) is interpreted as voicing of the original /C^0/ giving rise to /C^{GT}/ (**aka-no-ke* > **akanke* > **akange* > *akage* 'redhead').

(22) Sequential voicing (examples from Vance 2016: 7)

a. Sequential voicing in *isigame*



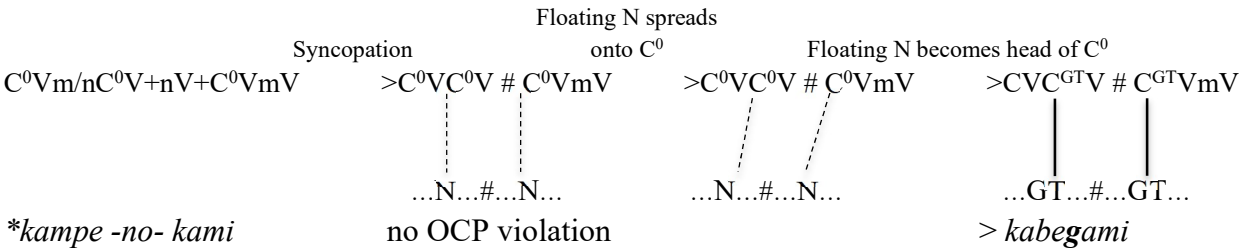
b. Failure of sequential voicing in *isikabe*



The process of sequential voicing is shown in (22). Frist, onset nasals do not block the process, shown in (22a). It, again, shows that it is floating N that causes an OCP violation. Second, (22b) illustrates that sequential voicing does not occur when the second member of the compound already contains a floating N. As a result, an OCP violation is avoided by deleting one of the floating N's. In this dissimilation process triggered by OCP, which element causing the OPC violation should be deleted is a language-specific and phenomenon-specific

matter. In the case of YJ, it is always the N that originates from the linking morpheme *-no-* that is deleted, not the N of (the second member of) the compound. Even though this shows that stem-integrity and paradigm uniformity (Steriade 2000) was more important than affix integrity, this is beyond the scope of the thesis. Let us look at (23) now which shows two voiced obstruents in MoJ.

(23) Sequential voicing in *kabegami* 'wallpaper' (cf. *kabe* 'wall', *kami* 'paper')



Comparing (22b) and (23) shows the domain of the OCP on floating N. It is the presence of floating N in the second constituent only that is the potential trigger of an OCP violation, while the presence of floating N in the first constituent does not interfere with the process. This indicates that OCP does not 'see through' the morpheme boundary. In other words, the floating N in the first constituent of the compound does not belong to the same domain as the floating N coming from the linking morpheme *-no-*. Therefore, the constraint that was present in YJ is as follows:

(24) An alternative constraint to Lyman's Law

*more than one occurrence of floating N within a YJ morpheme

(violation repaired as deletion of floating N of the linking morpheme)

6.2 The influence of Sino Japanese

The constraint in (24) sheds some light on the productivity of sequential voicing, OCP and PNV in YJ and its relation to the next period of Japanese. Sequential voicing is exclusively productive in YJ words[20] (Ito & Mester 1995, for example), which can be well accounted for in terms of linking of floating N to unmarked obstruents, a process which does not exist in SJ. This may be interpreted as follows: floating N had already been lost by the time of massive borrowing from Chinese started, that is, N had been linked to the following /C^0/, becoming $\underline{N}$, and /C^0/ with $\underline{N}$ was interpreted as /C^{GT}/, a segment with underlying 'voice'. Thus, in this GT-Japanese now N as a floating element no longer plays a role, that is, OCP went obsolete, and sequential voicing has survived until today in the guise of 'voicing' of the initial /C^0/ of the second constituents of compounds.

In addition, the fact MoJ allows nasals to appear not only in the onset but in the coda, too (Labrune 2012: 133) shows that Chinese words reinstated coda nasals,[21] which were now interpreted as elements with a skeletal slot. As a matter of fact, both phonetically voiced and voiceless obstruents can occur in the post-nasal position in SJ and they are contrastive, as shown in (25).

(25) Minimal pairs in SJ (Nasu 2015: 263)

a.	*kon-pan*[22] 'this time'	*kon-ban* 'tonight'
b.	*kan-tan* 'easy'	*kon-dan* 'pleasant chat'
c.	*kan-sen* 'infection'	*kan-zen* 'perfect'
d.	*kan-kei* 'relationship'	*kan-gei* 'welcome'

[20] Some YJ words do not undergo PNV as in *tanpopo* [ta**mp**opo] 'dandelion' (Nasu 2015: 262). This word is also irregular because it contains singleton /p/, which does not occur in YJ.

[21] According to Ito & Mester (2015: 291), the possible syllable structure in SJ stems was CV, CVV, CVN, CVt/k. For stems that end is /t/ or /k/ (i.e., obstruents), vowels (either /i/ or /u/) were inserted, resulting in open syllables on the surface.

[22] Singleton [p] in SJ is only found in the post-nasal position (Labrune 2012: 60).

This clearly shows that coda nasals started to exist in the system of Japanese as standalone sonorants without spreading onto the following obstruents, which shows that PNV of YJ had become obsolete by the time of SJ.

Lastly, it needs to be clarified why some YJ words (*ka**n**de*, *si**n**de*, *yo**n**de*, for example, see (17)) have preserved nasals that originate in floating N until today. One possibility is that this was a newer construction and they had not yet reached the process of nasal deletion by the time of the massive influx of Chinese. As SJ led to the establishment of coda nasals, the nasality that existed as a floating element in these YJ words might now be interpreted as a coda nasal. Another possibility is a morphological factor. It is possible that stems were resistant to change in order to maintain paradigm uniformity (Steriade 2000). For example, if *kam-* + *-te* 'chew' had completed all the sound changes including syncopation, PNV, and nasal deletion, the output would have been *kade*. In this hypothetical scenario, this form would have been (too) dissimilar to other inflectional forms in the same paradigm in which the nasal is present, such as *kama*, *kamu*, *kame*, *kamo*. Even though /d^{GT}/ in *kade* originally comes from N+/t^{0}/, nasality is no longer recoverable after the GT system emerged. Therefore, nasality is preserved to keep the *identical phonological representations* (Steriade 2000: 2).

In this way, under the influence of Chinese, the original strict syllable template of CV of YJ was loosened and placeless coda nasals were now licit making Japanese develop closed syllables of a restricted kind.

6.3. Parallels to YJ OCP on floating nasals

The OCP violation on floating N that I propose for YJ words has parallels in other languages. A similar nasal dissimilation is attested in Australian languages, for example, see (26). What triggers dissimilation in these languages is the co-occurrence of NC clusters.[23] In Timugon

[23] Levin (1985) argues that a NC cluster constitutes a complex onset and N is ambisyllabic.

Murut, for example, coda N contained in the prefixes is deleted when the base already contains an NC cluster because the co-occurrence of NC clusters is disallowed within a phonological domain (Blust 2012: 367). This illicit structure is repaired by deleting the N in the prefixes (24 e-f).

(26) Dissimilation triggered by NC clusters in Timugon Murut (Blust 2012: 367)

prefix			Base	affixed base	
a.	maN-[24]	+	buli	mam-buli	'keep'
b.	maN-	+	tutu	man-tutu	'pound'
c.	ŋaN-	+	lopo	ŋon-dopo	'fathoms'
d.	taN-	+	putaʔ	tam-putaʔ	'foam at the mouth'
e.	taN-	+	pumput	ta-pu**mp**ut, **ta**m-p**u**mput	'comes into bud'
f.	maN-	+	tumbuk	ma-tu**mb**uk, **ma**n-t**u**mbuk	'thump'
g.	ŋaN-	+	goŋgom	ŋo-go**ŋg**om, **ŋo**ŋ-go**ŋg**om	'fistfuls'

The examples in (24 a-d) show that the constraint does not affect onset nasals when these are followed by coda nasals (***ma**mbuli* is not repaired to ***a**mbuli*). Similarly, coda nasals are left unaffected by onset nasals (***ma**mbuli* is not repaired to ****m**abuli*). The constraint only affects two occurrences of coda nasals (*ta**m-p**umput* > *ta-p**ump**ut*, ***ta**m-p**ump**ut*). Whether these examples are perfect parallels for YJ is questionable: we would need to know if the nasal in question was a floating one. Even so, two occurrences of what appears to be coda-nasals are banned, similarly to what was found for YJ.

Recall that previous analyses relied on an OCP violation on the occurrence of 'voice' in two obstruents in the explanation of LL in YJ. My analysis shows that referring to 'voice' in the formulation of LL in YJ is untenable as YJ had no phonologically voiced obstruents. LL in

[24] The coda N in these prefixes is not specified for PoA; there is place assimilation to the following segments, similarly to coda nasals in YJ and MoJ.

its traditional formulation seems to be based on MoJ, a GT language. However, the origin of LL lies in YJ, a language with a single series of unmarked obstruents.

Claiming that LL is about floating nasals is more plausible: nasals existed in YJ as a phonological category. The preconsonantal ones were analysed as floating on account of their instability: i) they were linked to unmarked obstruents making these phonologically voiced in the long run and ii) they could also undergo deletion, which I analysed as the result of an OCP violation on the cooccurrence of two floating nasals in a morpheme. LL in this formulation has nothing to do with voice.

7. PASSIVE VOICING AND GW ENHANCEMENT

To extend this discussion about GW enhancement introduced in section 3.5, enhancement with non-contrastive GW is theoretically available for YJ, which did not have the phonological contrast in the system originally. At the same time, YJ could undergo passive voicing, which is GT enhancement. Although the phonetic value of obstruents is conjectural due to the absence of orthographic evidence, the series of changes that historical */p/ underwent and the dialectal differences found in MoJ could shed light on the possible phonetic interpretations of the lenis obstruents in YJ.

As shown in the MoJ consonant inventory in (3), singleton*/p/ is absent due to a historical change. Word-initial and intervocalic */p/ underwent different changes (Hamano 2000). Word-initial */p/ is found as MoJ /h/. I assume that */p/ underwent the change shown in (27).

(27) The historical change of */p/ in word-initial position (Hamano 2000: 208)

*/p/ > *[p^h] > [ϕ^h] > [h] MoJ /h/

(28) Examples for the word-initial */p/

a. *[**p**aru] > *[**p**$^{\mathbf{h}}$aru] > *[**ɸ**aru] > [**h**aru] MoJ /haru/ ‘spring’

b. *[**p**ikari] > *[**p**$^{\mathbf{h}}$ikari] > *[**ɸ**ikari] > [**h**ikari/**ç**ikari] MoJ /hikari/ ‘light’

c. *[**p**une] > *[**p**$^{\mathbf{h}}$une] > [**ɸ**une] MoJ /hune/ ‘boat’

I argue that this is the case of enhancement with non-contrastive GW (*/p/ > *[p^{h}]), similar to the case of Germanic Enhancement, where Indo-European laryngeally unspecified stops */p, t, k/ underwent GW enhancement, followed by spirantisation, ultimately resulting in /f, θ, x/, bringing in a great extension of the fricative inventory (Iverson & Salmons 2003). On the other hand, */p/ in the intervocalic position underwent lenition as shown in (29).

(29) The historical change of */p/ in the intervocalic position

*/p/ [p] > *[b] > *[β] > [w] (> ∅ _/ i, u, e, o)[25]

(30) Example of lenition of intervocalic */p/ (adapted from Labrune (2012: 77))

a. *[ka**p**a] > *[ka**b**a] > *[ka**β**a] > [ka**w**a] MoJ /kawa/ ‘river’

b. *[ʃi**p**o] > *[ʃi**b**o] > *[ʃi**β**o] > [ʃi**w**o] > [ʃio] MoJ /sio/ ‘salt’

c. *[i**p**e] > *[i**b**e] > *[i**β**e] >*[i**w**e] > [ije] > [ie] MoJ /ie/ ‘house’

This sonorisation and deletion presuppose that lenis */p^{0}/ was passively voiced and realised as *[b] to start with. The presence of passive voicing is a strong indicator of the absence of GW enhancement in the intervocalic position, which is one of the weak positions cross-linguistically (Scheer & Ségéral 2008).

[25] The historical */p/ followed by /a/ survives as /w/ in MoJ as shown in (30a).

(31) Summary of the historical changes of */p^0/

a. in the strong position (word-initially): */p^0/ *[p] (enhanced with non-contrastive GW) > *[p^h] (loss of stopness) > *[ϕ^h] (debuccalisation) > *[h]

b. in the weak position (intervocalically)[26]: */p^0/ *[p] (enhanced with non-contrastive GT) > *[b] (spirantisaiton) > *[β] (sonorisation) > [w] (> ∅ _/ i, u, e, o)

However, the evidence to show the presence and absence of GW enhancement is limited to the labial series. Whether a similar change happened to the other obstruents /t^0/, /k^0/ and /s^0/ as well is yet to be determined. The changes that involve debuccalisaton in the word-initial position and sonorisation in the intervocalic position are tangible enough to show the presence/absence of GW enhancement for */p/. However, not all the possible inputs (*[t^h], *[k^h], *[s^h]) have to follow the same pattern. If GW enhancement on the word-initial /t^0, k^0, s^0/ had triggered the same series of changes as those for */p/, all these phonemes would have merged into /h/ in this position, which is not the case.[27] This change would have substantially reduced the number of oppositions in the initial positions, and have resulted in a change that would have gone not only against maximal dispersion, but also sufficient phonetic distance for the place of articulation (as argued by Cyran 2017, for the laryngeal oppositions). This is left for further research.

[26] Some (Hamano 1999, Labrune 2012, Takayama 2015) see this differently; they argue for the change in the intervocalic position as follows: [p] > [ϕ] > [w] (>∅). Without GW enhancement, however, the spirantisation of [p] to [ϕ] is not plausible.

[27] According to Labrune (2012: 69), some speakers in the western area of Japan merge /s/ and /h/ before /i/. into [h]. It is attested from since the beginning of 18C. The process of debuccalisation might be another piece of evidence for GW enhancement: /s^0/ > [s^{GW}] > [h].

8. PHONETIC MANIFESTATIONS OF LENIS OBSTRUENTS IN YJ

8.1 Pre-nasality in Tohoku Japanese

In this section, I will turn to MoJ and take a closer look at the two versions of MoJ and how they maintain the two-way contrastive obstruent system phonetically. There are dialects that are spoken in Tohoku, northern Japan, which have a different phonological contrast in the intervocalic position from that of Tokyo Japanese (Yamane-Tanaka 2003; Miyashita et al. 2016). Yamane-Tanaka (2003) calls this 'synchronic chain shift'. Yamane-Tanaka argues that pre-nasalisation is the remnant of the old system that employed pre-nasality as the distinctive feature instead of voicing. Labrune (2012: 107) supports the claim by saying that 'voiced' obstruents were realised with pre-nasalisation by giving the transcription kept by European missionaries between 14–16C. For example, *Na**g**asaki* (a place name) is found spelt as *Na**ng**asaqui*. Moreover, this nasality is orthographically shown in a more regular manner before *g* and *d* than before *b*. In this thesis, I will argue that this dialectal difference originates in the different phonetic interpretations of /C^0/ in YJ and the tendency to retain phonological contrast. As shown in (32), in the intervocalic position, voiceless obstruents and voiced obstruents in Tokyo Japanese correspond to voiced obstruents and pre-nasalised voiced obstruents in Tohoku dialects respectively.

(32) A minimal pair across varieties of MoJ (Yamane-Tanaka 1995: 140)

	'flag'	'skin'
Tokyo Japanese	[ha**t**a]	[ha**d**a]
Tohoku Japanese	[ha**d**a]	[ha^{n}**d**a]

YJ only had lenis obstruents as argued in section 7, so /C^0/ may have been passively voiced in the intervocalic position. Passive voicing as GT enhancement can only occur in systems which do not have GT as a contrastive dimension, which was the case in YJ. In Tokyo Japanese, MoJ

/C^0/ in the two-way contrastive system which originates in YJ /C^0/ is phonetically voiceless as shown in (32). Yet, the intervocalic lenis obstruents of YJ could have undergone passive voicing and survived as obstruents marked for GT in MoJ through the reinterpretation of passive voicing ([C^{GT}]) as phonologically marked for GT (/C^{GT}/). In this hypothetical scenario, however, there would have been a merger in the intervocalic position of the obstruents that originate in /C^0/ and N+/C^0/ in YJ, producing ***hada* for both *hata* and *hada*. However, the phonological contrast remains intact, which indicates that /C^0/ in all positions was interpreted as [C^{GW}] in Tokyo Japanese.

8.2 Enhancement and sufficient discriminability

From the point of view of Laryngeal Relativism (Cyran 2014, 2017; Scheer 2015), the phonetic discriminability of underlyingly marked and unmarked obstruents is maintained in one way or another, and how this surface contrast is achieved is language-specific. In case of Japanese, the data show that the intervocalic position has not been a neutralising one[28] ever since the emergence of GT in the system. Phonetic discriminability is achieved by the means of the presence vs absence of voicing in Tokyo Japanese, while it is the presence vs absence of coda nasality in Tohoku Japanese.[29] How both dialects have never lost the laryngeal contrast on the surface is aligned with the development of N+/C^0/ into /C^{GT}/. In Tokyo Japanese, GW enhancement on YJ /C^0/ was needed at least at the point of nasal deletion caused by the floating N linking to the following consonant and the ensuing process of phonologisation of the GT dimension. Enhancement with GW contributed to the voicelessness of /C^0/ to keep it sufficiently distant from /C^{GT}/ phonetically.

[28] This is unlike Danish, in which the laryngeal difference is only realised on the surface in the word-initial position (Starčević 2024: 266).

[29] Having said that, how speakers manage phonetic discriminability involves various cues, which is discussed in section 9.

(33) The development of contrast of YJ and the dialectal difference in the intervocalic position

	Tokyo Japanese	Tohoku Japanese
YJ	/V$\underline{C}^0$V/ vs /V$\underline{C_{nasal}}\underline{VC}^0$V/	
syncopation	[t^{GW}]/[t^{GT}] vs [nt^{GT}][30]	[t^{GW}]/[t^{GT}] vs [nt^{GT}]
pre-nasalisation, later interpretation of N as $\underline{N}$ (= GT) phonologically	[t^{GW}]/[t^{GT}] vs [^{n}d]	[t^{GW}]/[t^{GT}] vs [^{n}d]
loss of pre-nasalisation	[t^{GW}] vs [d] (with concomitant loss of [t^{GT}] to prevent loss of contrast)	n.a. (loss of [t^{GW}] at some point)
MoJ	[t^{GW}] vs [d]	[d]/?[t^{GT}] vs [^{n}d]/?[nt^{GT}][31]

(33) shows that the two versions of Japanese started out identically and how they resulted in difference phonetic outputs. In Tokyo Japanese, GW enhancement must already have been present at the point of loss of pre-nasalisation or even earlier to stop intervocalic /t^0/ from undergoing passive voicing. What is certain is that both versions of Japanese had to make a choice whether to have GW enhancement or to keep pre-nasality. It is unnecessary to keep both voicelessness on /C^0/ with GW enhancement ([t^h]) and pre-nasality on /C^{GT}/ ([^{n}d]) because one of them will contribute to sufficient phonetic distance between /C^0/ and /C^{GT}/. In Tohoku Japanese, on the other hand, the absence (or loss) of GW enhancement hindered the deletion of pre-nasalisation to prevent the loss of contrast (*hada*, *handa* > **hada*).

9. **LARYNGEAL DIMENSIONS OF MODERN JAPANESE**

As a consequence of my claim that voicing is irrelevant to LL, the only reason to believe that MoJ is a 'true' voicing language may be discarded. MoJ does retain contrast both in the word-

[30] I interpret enhancement with GT as the consequence of the post-nasal position (if it had been enhancement with GW, such post-nasal obstruents are predicted to have survived voiceless).

[31] At this stage the difference between [t^{GT}] and [d] in Tohoku Japanese is left open.

initial position and the intervocalic position in all dialects. However, Gao & Arai's (2019) acoustic measurements targeting speakers of Tokyo Japanese show that speakers use multiple cues to maintain laryngeal contrast. First, the VOT pattern is different from what we expect in 'true' voicing languages. /C^{GT}/ in the word-initial position is frequently realised as voiceless, while /C^{GT}/ in the intervocalic position is usually (but not always) pre-voiced. Moreover, /C^{0}/ in the word-initial position is frequently realised with weak aspiration. This pattern coincides with the passive voicing pattern that is typically seen in aspirating languages such as English. They claim that the distinction in VOT is not robust enough to keep sufficient discriminability. Therefore, other cues including *f0* and the closure duration are used. For instance, *f0* is higher after /C^{0}/ than after /C^{GT}/, and the closure duration of /C^{GT}/ in the intervocalic position is much shorter and it is sometimes realised without release. Moreover, the experimental research carried out by Huang et al. (2023) illustrates that the duration of the preceding vowel is also one of the cues in both Tokyo and Tohoku Japanese. The length of the vowel followed by /C^{0}/ is slightly shorter than that before /C^{GT}/.

(34) Potential phonetic/acoustic cues to keep sufficient discriminability

a. VOT

b. tone

c. duration of the closure

d. duration of the preceding vowel

To sum up, voice is not the only component of GT: multiple cues, listed in (34), are employed on the surface to maintain the underlying contrast. The diachronic analysis in this thesis shows that Japanese has developed from a one-way contrastive system into a two-way contrastive GT system. However, this dimension is best viewed as an underlying marking without any pre-set

phonological material. Furthermore, from the synchronic point of view, what is certain is that MoJ has a two-way contrastive system, but a further claim cannot be made given that phonological phenomena such as RVA or cross-word sandhi phenomena cannot be tested due to the strict syllable (CV) structure of MoJ.

10. CONCLUSION

Lyman's Law cannot support the claim that Japanese is a voicing language because Lyman's Law turns out to be not a constraint on voicing, but on the distribution of floating N. If markedness refers to the complexity of a segment, I claim that GT was the active laryngeal dimension based on the diachronic analysis that concludes that /C^{GT}/ emerged from the contact of /C^{0}/ with a preceding floating N. From the synchronic point of view, however, whether MoJ still employs the same GT system cannot be decided in the absence of RVA and cross-word sandhi phenomena. Lastly, GT turns out to be a symbolic marker for a laryngeal opposition, which does not bear intrinsic phonological material along the lines of 'voiced' or/vs 'aspirated'. Speakers achieve laryngeal contrast by using multiple cues, voicing being just one of them. How Avery & Idsardi's laryngeal dimensions of GW/GT can be reconciled with substance-free phonology is left for further research.

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