AN EXPLANATION OF SYLLABLE STRUCTURE CHANGE IN KOREAN

With Special Reference to Vennemann's Preference Laws and to Phonological and Conceptual Properties*

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This research is bipartite. The first part deals with various aspects of syllable-related phenomena in Korean with reference to the framework given in Theo Vennemann 1985. Based on his eight 'universal' Preference Laws, Korean data are scrutinized and presented to underline the universality of the Laws (with some minor exceptions).

The second part was inspired by the research carried out for the first part. It suggests that a system of laws is needed as a part of the theory of universal phonology to explain the changes of syllable structures in the history of a certain language. It is argued that the number of homonyms together with contextual help has the relation of inverse proportion to the size of syllables and/or the number of phonemes and/or tones among many other possible multilateral interactions.

I

The first part of this research deals with various aspects of syllable-related phenomena in the history of the Korean language. It is conceivable that one may apply to these data some of the syllabic principles recently suggested as being universal such as the Principle of Maximal Onset and others by Selkirk (1982), the principle of autosegmental syllabification by Steriade (1982), and 'CV-phonology' by Clements and Keyser (1983) among many others. Without great difficulties, this application may be shown to be possible.

Here, however, the theoretical framework recently given by Vennemann (1985) will be adopted exclusively to prove how these 'universal' laws contribute to a more natural explanation of Korean data, and to discuss some empirical implications of the data for and against the theory. Vennemann (1985) synthesizes many works published since his pioneering study in 1972 through other articles in 1974, 1978, 1982, 1983, and Murray and Vennemann 1983. The present research will therefore only refer to that synthesis, because his 1985 work contains the most complete framework to be used as a universal basis.

For convenience, the essential parts from Vennemann 1985 will be quoted first; viz. the scale of Universal Consonantal Strength and some preference laws for syllable structure.

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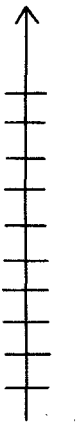
(1) 

The list of laws and their details are as follows.

(2) A. Preference laws for individual syllables
1. The Head Law
2. The Coda Law
3. The Nucleus Law
B. Preference laws for sequences of syllables
4. The Weight Law
5. The Law of Initials
6. The Law of Finals
7. The Strength Assimilation Law
8. The Contact Law

(3) The Head Law ; A syllable head is the more preferred, (a) the closer the number of speech sounds in the head is to one, (b) the greater the Consonantal Strength value of its onset is, and (c) the more sharply the Consonantal Strength of the following syllable nucleus.

(4) The Coda Law : A syllable coda is the more preferred, (a) the smaller the number of speech sounds in the coda is, (b) the lesser the Consonantal Strength of its offset is, and (c) the more sharply the Consonantal strength drops from the offset toward the Consonantal Strength of the preceding syllable nucleus.

(5) The Nucleus Law : A nucleus is the more preferred, (a) the steadier its speech sound is, and (b) the lesser the Consonantal Strength of its speech sound is.

(6) The Weight Law : In stress accent languages, an accented syllable is the more preferred the closer its syllable weight is to two moras, and an unaccented syllable is the more preferred the closer its weight is to one mora. (The optimal stressed syllable is bimoric, the optimal unstressed syllable is unimoric.)

(7) The Law of Initials: Word medial syllable heads are the more preferred the less they differ from possible word initial syllable heads of the language system.

(8) The law of Finals: Word medial syllable codas are the more preferred the less they differ from possible word final syllable codas of the language system.

(9) The Strength Assimilation Law: If Consonantal Strength is assimilated in a syllable contact, the Consonantal Strength of the stronger speech sound decreases.

(10) The Contact Law: A syllable contact A $ B is the more preferred the lesser the Consonantal Strength of the offset A is, and the greater the Consonantal Strength of the onset B is—— more precisely: the greater the characteristic difference CS(B)—CS(A) between the Consonantal Strength of B and that of A is.

It seems to me possible to state additionally that (2A) must be overridden by (2B). This overriding relationship is intuitively necessary, because one has to deal eventually with sequences of syllables after handling individual syllables.

Vennemann (in personal communication) also reckons with a set of principles telling us which of the 'laws' dominate in cases of conflict. Note that Vennemann (1974) advocated the No-Ordering Principle of 'Rules': Rules of grammer cannot be extrinsically ordered.

Note also that Vennemann (1985) already envisaged a conflict between (9) and (10) in his conclusion and wisely mentioned that "improvement on one parameter can entail deterioration on another. It is impossible to optimize a language system on all parameters at once; there cannot exist an 'optimal' language system as such, but only systems that are optimized on some parameters. The same holds true even within the narrow limits of syllable structure."

However, the actual cases in which we have to take care of relative priority in applying some of (2A) and some of (2B) are rather limited to a certain permutation: e.g. Apply (2A 1, 2, 3) to a syllable X and also (2A 1,2,3) to a syllable Y, and then apply either (2B 7) or (2B 8) to "the sequence of the coda of syllable X and the head of syllable Y, i.e. the coda by (2A 2) and the head by (2A 1)." Between (2B 7) and (2B 8), namely (9) and (10) in particular, Korean data predict an interesting fact that (10) must precede (9). See (16) for more details.

Although the contents of (2B 5) and (2B 6) presuppose (2A 1) and (2A 2), there would be no ordering problem between (2B 5) and (2B 1), and between (2A 6) and (2A 2). It is enough that one must define (2B 5) and (2B 6) without relying on (2A 1) and (2A 2), as in (7, 8) and (3, 4) in order to make them independent each other.

I will begin with a case in Korean matching part (a) of the Head Law, c.f. (3).

In this case, "initial consonant *P* plus vowel plus other consonant" in the twelfth century changes into "*P*-initial consonant cluster" after losing the vowel by the fifteenth century: *pVt→pt*, *pVsk→psk*, etc. The resulting syllable heads were in Middle Korean (from 11th century to 16th) reduced to single (glottalized) tense sound by the end of the seventeenth century : *pt→tt*, *psk→kk*, etc. Although digraphs such as '*tt*' and '*kk*' are used here, they represent 'single' tense sounds. Examples are cited from K.-M. Lee 1972.

(11)	12c.	15c.	17c.				
	pVt	pt	tt	ptɨt	→	ttɨt	'meaning'
				ptəy	→	tte	'a raft'
				ptʌy	→	ttɛ	'dirt'
				ptɨ-	→	ttɨ-	'to float, to open'
				ptuy-	→	ttü-	'to run'
				ptəna-	→	ttəna-	'to leave'
	pVs	ps	ss	psʌr	→	ssar	'rice'
				psi	→	ssi	'seed'
				psɨ-	→	ssɨ-	'to be bitter, to use'
				psuk	→	ssuk	'mugwort'
				psɨr-	→	ssɨr-	'to wipe'
	pVc	pc	cc	pcak	→	ccak	'one of a pair'
				pcʌ-	→	cca-	'to weave, to be salty'
				pcok	→	ccok	'a piece'
	pVsk	psk	kk	pskɨr	→	kkɨr	'a chisel'
				pskur	→	kkur	'honey'
				pskəy-	→	kkwe-	'to pierce'
				pskuy-	→	kkü-	'to lend'
				pskay-	→	kkɛ-	'to break'
				pskay	→	kkɛ	'sesame'
	pVst	pst	tt	pstay	→	ttɛ	'time'
also			cc	psti-	→	cci-	'to overflow'
				pstirɨ-	→	ccirɨ-	'to prick'
also			th	pstati-	→	thəci-	'to be torn'
				pstoyo-	→	thöki-	'to snap'
cf.	pVth ('th' stands for aspirated 't'.)	pth	th	pthʌ-	→	tha-	'to play on'
				pthuy-	→	thü-	'to spring'
				pthuk	→	thuk	'with a snap'

As we have seen above, there is a tendency for the number of word-initial consonants to become one. As for '*pVst*', this may be palatalized into '*cc*' or analogized into '*th*' after changing into '*pst*'. In any case, '*cc*' and '*th*' are single sounds. too.

Although it is not an example of sound change, there is another interesting case relating to part (a) of the Head Law. That is, the inventory of the Korean alphabet provided a dummy symbol 'ㅇ' for the head position of 'naked' syllables (namely, syllables with empty heads), e.g. *ərini* 어린이 'children', *ociyə* 오징어 'a squid'. This symbol is certainly more than null, namely one.

In addition, some occurrences of 'ㅇ' may indeed be deciphered as having a sound value [ɦ], namely, voiced [h]. This [ɦ] is nothing but an alternative form with [k], e.g. *ka-ko→ka-ɦo* 'go and' and *ar-ko→ar-ɦo* 'know and' ('*ko*' changes into '*ɦo*' between *y, r, z* and a vowel). The fact that a dummy symbol and a consonant [ɦ] shared the same 'ㅇ' might be additional evidence that a syllable head with one consonant is preferred to null.

As a third case matching (3a), here is an example from MK in the sixteenth century. As a strengthening process of onset speech sounds, the epenthesis of the glide '**y**' in intervocalic position became popular, e.g. *hʌ+a→hʌya* 'do and so', *yəhiy+ə→yəhiyye* 'lose and so'.

On the other hand, just like the Pāli example *"syandana→sandana"* in Murray 1982, Korean also has had a **y**-deletion rule for head clusters reducing them to one consonant since the nineteenth century, e.g. *syəm→səm* 'island', *syo→so* 'cow'; *kyesita→kesita* 'be (honorific)', *hyesəŋ→hesəŋ* 'comet'.

However, there are some other rules in Korean against (3a) that delete the consonant in the head completely rather than reduce it to one.[1] They are the deletion of *r, z, β, h* and *ɦ* in different periods of Korean history, cf. S.-O. Lee 1977 : rule 18, 20, 25, 34, 35, 36——these rule numbers are the same as the ones given in the 1977 paper. The list of rules is here attached as an appendix to avoid the repetition of the same rules in other sections.——Nevertheless, these rules are minor rules that affect only a small number of data in most cases. To be exact, the Law of Initials (7) applies to those examples of word medial syllable heads in sequences of syllables, e.g. rule 20, 25, 34, 35, 36.

According to (3b), the greater the Consonantal Strength value of its onset is, the more preferred a syllable head is. This law can be related to the fact that in Korean the weakest Consonant on its Strength scale, i.e. the liquid, has never occurred in the syllable-initial position.

In addition, (3b) relates to the fact that there are many more entry-words starting with plosives than affricates or fricatives in the Korean dictionary. In other words, more words start with consonants of greater strength.

There is also the case that weak, unaspirated and unreleased plosives never occur in onsets of words but only in syllable-final positions in accordance with (4), the Coda Law. It means that [p˺, t˺, k˺] are not strong enough in Consonantal Strength to be onsets, in Korean as well as in other languages.

Note at the same time that there are cases against (3b) in Korean, cf. S.-O.

[1] Perhaps deletion is so different from reduction in nature that it is not fair to apply (3a) to the case of deletion from the very beginning.

Lee 1977: rule 7, 9, 10, 11, 14, 15, 41. These rules make the Consonantal Strength value of the onset smaller. At the moment it is rather difficult to explain why these rules do not follow (3b), but we will draw a general conclusion at the end of this paper. Again, to be precise, the Law of Initials (7) matches those examples of word medial syllable heads: rule 7, 9, 10, 11, 15, 41 (but not to 14). But there are other rules, 6, 26, 30, which increase the Strength and comply with (3b).

It is difficult to find a good example in Korean to support or refute (3c), because Korean has always had only very limited kinds of initial consonant clusters, as already shown in (11).

The Law (4a) is nicely supported by the fact that the eleven consonant clusters in the coda of Present-day Korean (*ks, nc, nh, rk, rm, rp, rs, rth, rph, rh,* and *ps*) are simplified by dropping one member. For instance, when a nasal and a liquid abut in a coda, a nasal is preferred to a liquid in the simplification of consonant clusters and likewise a liquid to a plosive and also a plosive to a fricative: nasal→liquid→plosive→fricative. Note, however, that Vennemann's scale of Consonantal Strength is in a different order from the Korean case, namely, a liquid is preferred to a nasal, etc.: "liquid→nasal→fricative→plosive". Yet the number of sounds in the coda is reduced in both Vennemann's (4a) and the Korean case.

Besides the case mentioned above, there are other cases where final consonants (mostly '*r*') are completely deleted. Cf. S.-O. Lee 1977: rule 16, 21, 22, 27, 33. These rules also support (4a). On the other hand, there is a rare case in which an epenthetic *n* is inserted in the Coda to avoid a hiatus: rule 24. The rule 22 and 24 are for sequences and need to refer to the Law of Finals (8).

There are some rules which support (4b), but also a few rules which run counter to (4b) in Korean. Rules 8, 12, 15, 17, support it, while the counter cases include rules 1, 3, 5 in S.-O. Lee 1977. The rules 3, 5, 15, 17 are related to sequences which should be reconsidered with reference to the Law (8).

Nevertheless, part (b) of the Coda Law is evidently demonstrated in Modern Korean in the neutralization of the final plosives into their weak, unaspirated, and unreleased correlates in syllable-final position.

(12) nap [nap˺] 'lead'
nat [nat˺] 'grain(s)'
nak [nak˺] 'pleasure'

Interestingly, however, [t˺] in (12) represents the neutralization of not only '*t*' but also '*s*' and '*z*' in syllalble final position by the middle of the sixteenth century. This change (*s* or *z* to [t˺]) is against the preference for the lesser Consonant Strength in the offset. On the other hand, '*c*' was formerly neutral-

ized into [s˺] by the fifteenth century, and this change (*c* to [s˺]) is favorable to the preference law in (4b).

In addition, there is the phenomenon that '*r*' is realized as [l] in the syllable/word-final position. One may consider that this final [l] is the unreleased version of '*r*', but '*l*', is not weaker than '*r*' on the scale of Consonantal Strength. It means this change (*r* to [l]) might be a counterexample to the Coda Law (b). However, one can regard this change merely as a part of overall neutralization in the Korean final consonants.

To sum up, here is the list of the syllable-final consonants along the three different stages in the history of Korean language.

(13)		12 c.		15 c.		17 c.(~20 c.)
		[m]	⟶	[m]	⟶	[m]
		[n]	⟶	[n]	⟶	[n]
Modern Korean		[ŋ]	⟶	[ŋ]	⟶	[ŋ]
nar [nal] 'a day'	/r/→	[l]	⟶	[l]	⟶	[l]
iph [ip˺] 'a leaf'	(ph→)	[p˺]	⟶	[p˺]	⟶	[p˺]
nah- [nat˺]'to breed'		[h]				
nath [nat˺]'a piece'	(th→)	[t˺]	⟶	[t˺]	⟶	[t˺]
(kʌz [kaz˺] 'edge')		[z˺]	⟶	[z˺]		
nas [nat˺] 'a sickle'		[s˺]	⟶	[s˺]		
nach [nat˺] 'a face'	(ch→)	[c˺]				
nac [nat˺]'daytime'						
-nyəkh [nyək˺]	(kh→)	[k˺]	⟶	[k˺]	⟶	[k˺]
'the area of'						

One can observe that the number of final consonants is diminished by a sequence of merging neutralizations as indicated by the arrow lines. It means probably that, although the unreleased final consonants are preferred in the coda, the number of those consonants can be reduced depending on the other forces in the structure of sound system.[2]

The apparent rarity of examples for (4c) — even Vennemann (1985 : 320) presents only a single example from Sanskrit — may explain why it is not easy to find a suitable example to this part of the Coda Law in Korean.

Part (a) of the Nucleus Law (5) expresses the idea that "monophthongs are preferred to diphthongs". Monophthongization of diphthongs occurred first at the end of the eighteenth century : (ʌ*y*→) *ay*→*ɛ*, *əy*→*e*. The second monophthongization was introduced in the twentieth century: *oy*→*ö*, *uy*→*ü*. But these front rounded monophthongs are already disappearing now.

[2] Theo Vennemann believes that mere shortening of consonants in codas (which is a kind of weakening) may produce such effects as [s˺]>[t˺] and [r˺]>[l˺] on acoustic grounds.

Part (b) of the Nucleus Law implies that "most languages tolerate only vowels as nuclei." Korean is one of these languages.

As for the Weight Law, one may relate this law only to stress-accented languages. However, it seems to me that one may also make an analogous statement in relation to 'length': The optimal long syllable is bimoric; the optimal short syllable is unimoric. With this extended law, Korean can safely be used as supporting evidence.

The Law of Initials is generally applicable to Korean data, but there is a contrary case to this law. That is, Korean deletes word-initial '*r*' and '*n*' before '*i*' or '*y*', and changes word-initial '*r*' before sounds other than '*i*' or '*y*', into '*n*'. As a result of this language-specific initial law in Korean, the number of possible word-initial syllable heads is diminished, while the number of word medial syllable heads has not been increased. As a result there is more variety in word-medial syllable heads than in word-initial syllable heads in Korean.

The Law of Finals is likely to be quite compatible with Korean data. However, only similar (not the same) kind of data can be found in Present-day Korean. Vennemann (1985: 328-829) presented the Sanskrit case in which a final consonant is doubled before other consonant. Compare the Sanskrit forms such as "*sap.ta-*→*sap.pta-*'seven', *ak.tubhiḥ*→*ak.ktubhiḥ* 'at night', *ar.kaḥ* →*ark.kaḥ* 'sun', *ār.ta*→*ārt.ta* 'concerned" with relevant Korean examples which will be presented in (17) to illustrate the similarity to other cases of the Contact Law.

As for the Strength Assimilation Law, there are two examples in Present-day Korean favorable to this Law. Firstly, 'nasal lateralization' can be presented. Note that the lateral with lesser Consonantal Strength dominates the nasal with greater Consonantal Strength. In (14), /r/ is represented as [1] to show the phonetic representation. Note that both of the patterns presented by Vennemann (1985: 331, *l.n*→*l.l, r.n*→*r.r*; 333, *n.l*→*l.l, n.r*→*r.r.*) are evident·

(14) a. progressive nasal lateralization (1.n→1.l)
chal.na→chal.la 'a moment'
khal.nal→khal.lal 'the blade of a knife'
il.nyən→il.lyən 'a year'
b. regressive nasal lateralization (n.l→l.l)
man.li→mal.li 'ten thousand li, ca. 2,500 miles'
sin.la→sil.la 'one of the Three Kingdoms'
cən.la→cəl.la 'the province of Cənla'

There is another case favorable to this law, viz. regressive nasal assimilation. Note here that the nasal with lesser Consonantal Strength dominates the plosive with greater Consonantal Strength.

(15) a. p.m→m.m
pap.məkta→pam.məkta 'to eat food'
b. p.n→m.n
cap.nɨn→cam.nɨn 'holding'
c. t.m→n.m
mat.myəniri→man.myəniri 'the wife of one's eldest son'
d. t.n→n.n
pat.nɨn→pan.nɨn 'receiving'
e. k.m→ŋ.m
kuk.mur→kuŋ.mur 'soup'
f. k.n→n.n
mək.nɨn→məŋ.nɨn 'eating'

So far, in either progressive or regressive assimilation, the speech sound with lesser Consonantal Strength dominates. However, the opposite is observed in the so-called 'lateral nasalization' in Present-day Korean. In other words, the sound with greater Consonantal Strength, i.e. nasal, dominates. In (16), however, '*r*→*n*' is strengthened by the Contact Law and '*p*→*m*' is the assimilation. Thus, these changes are related to the Contact Law rather than the Strength Assimilation Law. This is an interesting case, in that the same data as in (16) may be applied to two laws, namely (9) and (10). However, if (9) is applied, (16) will be an exception to (9). Therefore, (10) should be applied to interpret (16) without treating it as an exception. This is a case where the relative ordering between (9) and (10) is required and (10) must precede (9) based on the data (16).[3]

(16) a. p.r→p.n→m.n
sip.ryuk→sip.nyuk→sim.nyuk 'sixteen'
b. t.r→t.n→n.n
pic.ryaŋ→pit.ryaŋ→pit.nyaŋ→pin.nyaŋ 'debt'
c. k.r→k.n→n.n
pɛk.ro→pɛk.no→pɛŋ.no 'white dew, white heron'
d. m.r→m.n
kam.ro→kam.no 'sweet dew'
e. ŋ.r→ŋ.n
koŋ.ro→koŋ.no 'merits'

There are equal numbers of pros and cons to this Strength Assimilation Law according to a check of the list of rules in S.-O. Lee 1977. Pros: rule (9, 11, 13, 26); cons: rule (1, 2, 3, 5). In this case, it is rather difficult to decide in favor

[3] Robert Murray (in personal communication) suggests that his 'ordering' between (9) and (10) is language specific. He does not think we will ever be able to predict which syllable structure improvement will take place but only certain characteristics of it, e.g. its generalization pattern.

of one side or the other.

As for (10), the Contact law, Korean knows a kind of fortition (A.B→A.BB), which is different from the gemination suggested by Vennemann (A.B→A.AB). The following Korean data are quoted from U. Hŏ 1965.

(17) a. p.p→p.pp ap. pak→ap. ppak 'pressure'
t.p→t.pp nat.pota→nat.ppota 'to despise'
k.p→k.pp kak.pyər→kak.ppyər 'special'
b. p.t→p.tt kup.tori→kup.ttori 'the base molding of a wall'
t.t → t.tt kas.turumaki → kat.turumaki → kat.tturumaki 'old-fashioned hat and coat'
k.t→k.tt nak.tam→nak.ttam 'discouragement'
c. p.s.→p.ss nap.se→nap.sse 'tax payment'
t.s→t.ss nas.sar→nat.sar→nat.ssar 'age'
k.s→k.ss nak.səŋ→nak.ssəŋ 'completion of a building'
d. p.c→p.cc nap.cakkho→nap.ccakkho 'a flat nose'
t.c→t.cc kas.caŋi→kat.caŋi→kat.ccaŋi 'a man wearing a hat, a hat maker'
k.c→k.cc nak.ci→nak.cci 'a small octopus'
e. p.k→p.kk nap.kəmi→nap.kkəmi 'a kind of spider'
t.k→t.kk tot.kuta→tot.kkuta 'to make higher'
k.k.→k.kk tok.kam→tok.kkam 'flu'

There is also a different kind of contact epenthesis from the one suggested by Vennemann (A.B→A.CB). The case is *y*-insertion between vowels to avoid a hiatus in the sixteenth century: *hʌ.a→hʌya*.

So far, we have seen that the Korean data are for the most part compatible with Vennemann's Preference Laws, although there were some cases which were only similar to but not identical to his, and even some seemingly apparent counterexamples. However, to solve these seemingly exceptional cases, the conclusion in Vennemann 1985 can be applied. He concluded that "When syllable structure is altered without any resulting syllable structure improvement, or even with a deterioration of syllable structure, the change is not syllable structure change in the technical sense but change motivated by some other factor and only incidentally affects syllable structure." Therefore, we must find the reason why a certain case does not comply with the Preference Laws, whenever a seeming exception is encountered. In this paper, some of the exceptions are still unexplained and I hope these will be solved in the near future.

In addition, it is interesting to note that Vennemann's framework is focused on the environment of phonological rules especially in terms of the positions in a syllable or a sequence of syllables. On the other hand, the framework by C.-W. Kim (1972, 1973), i.e. the conspiracy in phonology, is focused on the changing

part (A→B) of the rules rather than the environment of rules (/__ $), cf. A→B/__$.

In any case, as already mentioned in S.-O. Lee 1977, it is also crucial to consider the relative importance and frequency of rules at issue, in other words, a sort of 'functional load' of each rule in the language. Almost a decade ago, I suggested that it would be desirable to pursue the study of 'functional load' of rules as well as phonemes, but I myself have not been able to take care of this problem simply because of indolence. Through a systematic method, this task must be challenged soon.

APPENDIX

The numbers of the rules are the same as the ones given in S.-O. Lee 1977.

(1) 15 c. β→p/__C e.g. toβa—topko 'help and'

(2) 15 c. β→p/{h, k, t}__ kisk + βi- →kisk + pɨ- →kispɨ- 'be happy'
mit + βi- →mit + pɨ 'be reliable'

(3) 15 c. h→t/__+n nyəh+nʌn→nyət.nʌn(→nyənnʌn) 'put into'

Some irrelevant rules are not listed here.

(5) 16 c. s→t/__{C, #} is + nʌni→itnʌni (→innʌni) 'tie, so'

(6) 17 c. x→kh/#__ xyə→khyə 'pull'

(7) Old K. t→r/V__V *patər→parʌr 'sea'

(8) 12 c. t→r/__# *kat→kar 'thirst(y)'

(9) 14 c. b→β/{y, r}__V taybat→tayβat 'bamboo field'

(10) 15 c. β→w/{V, y, r, z}__V syəβɨr→səwur→səur 'capital city'
*koba→koβa→kowa 'be pretty and'

(11) 15 c. k→h/{y, r, z}__V *mulkai→*[mulgai]→[molfiay] 'sand'
ar + ko→ar + fio 'know and'

(12) 15 c. c→s/__ # koc→[kos˥] 'flower'

(13) 16 c. fi→l/l__ [ol] + [fia]→[olla] 'mount and'

(14) 17 c. [t, th]→[c, ch]/__{i, y} tisay→cisay 'tile'

(15) 18 c. l→r/V V nolfiay→nolay→noray 'sing'

(16) Pres. K. $C \rightarrow \phi / r\_\begin{Bmatrix} C \\ \# \end{Bmatrix}$ — kors→kor + kwa [kolgwa] 'direction and'

(17) Pres. K. $\begin{Bmatrix} c \\ ch \\ th \end{Bmatrix} \rightarrow s / \_ + V$ — cəc + -r→[cəsɨl] 'milk' (acc.)
path + -r→[pasɨl] 'field' (acc.)

(18) Old K. $r \rightarrow \phi / \#\_\begin{Bmatrix} i \\ y \end{Bmatrix}$ — ⟨till Pres. Korean⟩
ryaŋsim→yaŋsim 'conscience'

(20) Mid K. $r \rightarrow \phi / V\_V$ — *narih→nayh 'stream'

(21) Mid K. $r \rightarrow \phi / \_\#$ — *hyer→hyə 'tongue'

(22) 15 c. $r \rightarrow \phi / \_$ [+ cor] — *kyəzɨrsari→kyəzɨsari 'mistletoe'

(24) 16 c. $\phi \rightarrow ŋ / V\_V$ — syo-aci→syoŋaci 'calf'

(25) 16 c. $z \rightarrow \phi / \left\{ \begin{matrix} \_\begin{Bmatrix} i \\ y \end{Bmatrix} \\ V\_V \end{matrix} \right\}$ — sʌzi→sʌi 'between'
kəzhuy→kəzuy→kəuy 'intestinal worm'

(26) 16 c. $z \rightarrow c / \begin{Bmatrix} m \\ n \end{Bmatrix}\_V$ — *namzin→namcin 'man'
(monso→)momzo→momco 'in person'

(27) 17 c. $r \rightarrow \phi / \_ph$ — arph→aph 'front'

(30) 18 c. $c \rightarrow k / \_\begin{Bmatrix} i \\ y \end{Bmatrix}$ — timchʌy→cimchʌy→kimchʌy 'pickled cabbage'

(32) 19 c. $y \rightarrow \phi / \left\{ \begin{matrix} \begin{Bmatrix} s \\ c \\ h \end{Bmatrix}\_ \\ \_e \end{matrix} \right\}$ — syəm→səm 'island'
syo→so 'cow'
kyesita→kesita 'be' (honorific)
hyesəŋ→hesəŋ 'comet'

(33) Old K. $*\gamma \rightarrow \phi / \_\begin{Bmatrix} c \\ \# \end{Bmatrix}$ — *namɔγ→namo 'tree' ([namg] before vowel-initial suffix)

(34) 15 c. $\beta \rightarrow \phi / \begin{bmatrix} V \\ +back \end{bmatrix}\_i$ — suβi→sui 'easily'
saβi→sai 'shrimp'

(35) 15 c. $h \rightarrow \phi / \begin{Bmatrix} z\_V \\ l\_V \end{Bmatrix}$ — kʌzhay→kʌzay 'scissors'
= (15)
18 c.

(36) 15 c. $h \rightarrow \phi / V\_V$ — maktahi→maktay 'stick'

(38) 16 c. $\phi \rightarrow y / V\_V$ — hʌ + a→hʌya 'do and so'

(41) 18 c. $\begin{bmatrix} k \\ kh \end{bmatrix} \rightarrow \begin{bmatrix} c \\ ch \end{bmatrix} / \#\_\begin{Bmatrix} i \\ y \end{Bmatrix}$ — kirɨm→cirɨm 'oil'
khi→chi 'winnow'

II

The second part of this research was inspired and materialized in the process of the first part.

It seems to me that we need a system of laws (in addition to Vennemann's Preference Laws) in order to satisfactorily explain the changes of syllable structures in the history of certain languages. These laws must be general enough to cover many languages, but it is premature here to make a universal claim because I will not consider many languages in the present study. I hope, however, other linguists may find compatible evidence for my claim in other languages.

The skeleton of my claim is very simple and naïve but then the same claim has never explicitly been made before.[4] To present the idea, we need a set of nomenclature. For this purpose, I will quote some terminology from Vennemann 1985.

(1)

c : conceptual properties, viz. the syntactic, semantic, and pragmatic properties.

p : phonological properties

1) FO : foundation properties (FO assigns each word a finite sequence of syllables.)

2) PR : prosodic properties (PR assigns each word its tonal, accentual, harmonic, and other properties.)

With these specified functions of terms, I will outline my idea as follows. $\wedge$ indicates increase in numbers or strength, and $\vee$ decrease. Capital letters (A, B, C,...) stand for different languages.

(2)		languages	A	B	C	D	E
c semantic	1.	help of context	$\vee$	$\vee$	$\vee$	$\vee$	$\wedge$
	2.	number of homonyms	$\vee$	$\vee$	$\vee$	$\vee$	$\wedge$
p FO	3.	size of a word, i.e. mono/poly-syllabic (syllables per word)	$\wedge$	$\wedge$	$\wedge$	$\wedge$	$\vee$
	4.	size of a syllable (phonemes per syl.)	$\wedge$	$\wedge$	$\wedge$	$\vee$	$\vee$
	5.	number of phonemes in each position (initial, final, etc.)	$\wedge$	$\wedge$	$\vee$	$\vee$	$\vee$
PR	6.	number of tones[5]	$\wedge$	$\vee$	$\vee$	$\vee$	$\vee$

[4] Altmann (1978) already suggested a line quite similar to mine, but I did not know the precedence of his works when I first conceived this idea.

[5] In treating Indo-European languages, stress accents rather than tones may be considered. Of course, these six items in (2) do not represent any fixed set, but may be readjusted

In (2), column B, C, and D include the following combinations, although only a representative of each set is shown above.

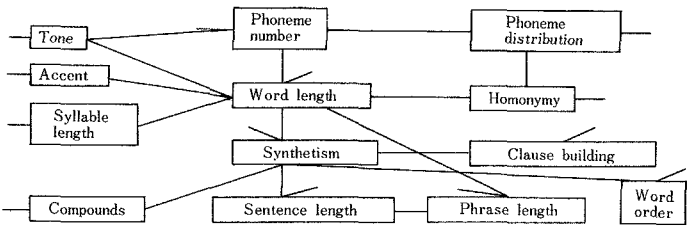
(3)	B	C	D
3.	∧ ∧ ∨	∧ ∨ ∨ ∧ ∨ ∧	∨ ∨ ∨
4.	∧ ∨ ∧	∨ ∨ ∧ ∨ ∧ ∧	∧ ∨ ∨
5.	∨ ∧ ∧	∨ ∧ ∧ ∧ ∨ ∨	∨ ∧ ∨
6.	∧ ∧ ∧	∧ ∧ ∨ ∨ ∧ ∨	∨ ∨ ∧

To explain the outline presented in (2), the following informal statement of 'universal' tendencies is needed.[6] Note that these are rather 'diachronic' tendencies than synchronic phenomena, although some tendencies are attested to be availed of synchronic data. In fact, data files in a few established archives aiming at collections of synchronic slices in the history of languages are not sufficient for my purpose. Note also that these are not exhaustive statements, but many other tendencies can possibly be put forwards and subject to testing by available data.

(4) a. i) When there are more homonyms in a language, the help of context increases and vice versa. Thus, the number of homonyms is proportional to the increasing role of context to disambiguate the meaning of homonyms. Likewise, four more relationships between 'help of context' and other items, namely (2.1) vs. (2.3), (2.4), (2.5) and (2.6), respectively, are also conceivable as in the case of the language

and refined. Professor Vennemann, for instance, insisted that (2.2) had better not stand side by side with (2.3, 2.4, 2.5) and (2.6). I think the degree of easiness in borrowing is a possible factor to consider here, because it affects syllable structures very much. I also reconsider that 'number of phonemes' may be individually itemized depending on their positions such as initial, medial and final.

Altmann (1978) also suggested other factors such as 'clause building, compounds, sentence length, phrase length, and word order' as in the following diagram.



⟨Some connections between language phenomena⟩

[6] Altmann (in personal communication) commented on the way of statement of tendencies and advised not to use vague expressions such as "may have a tendency", "is not always necessary", "differ greatly", etc.

Altmann (1978) advocated that we set up clear concepts and quantify them through measurements. I think that this is the next task for me to enter upon, but for the moment I will use some vague expressions to describe 'tendencies' because they are rather hypothetical at this stage.

E shown in (2). ii) When the word type of a language is monosyllabic, it tends to need more help of context and vice versa. iii) When the structure of a syllable is simple by containing fewer phonemes, there is a tendency to rely more on the help of context and vice versa. iv) When there are fewer phonemes in a language, it is likely that the help of context is more necessary and vice versa. v) When a (tone) language has fewer tonal distinctions, it may need more help of context and vice versa.

b. i) When the word type of a language is monosyllabic, it tends to have more homonyms and vice versa. ii) When the structure of syllables is simple by containing fewer phonemes, there is a tendency to have more homonyms, and vice versa. iii) When there are fewer phonemes in a language, it is likely that there occur more homonyms, and vice versa. iv) When a (tone) language has fewer tonal distinctions, it may have more homonyms, and vice versa.

c. i) When the syllable structure is complex, in other words, when there are many more phonemes per syllable, the language tends to be changed into the monosyllabic stage. ii) When there are more phonemes in a language, it tends to have more monosyllabic words. In particular, it is seemingly easy for either nucleus or coda structure to be filled with vowels and glides or consonant clusters, respectively, in the monosyllabic language. iii) When a language has many monosyllabic words, the language may have a tendency to be tonal.

d. i) The number of phonemes is proportional to the complexity of syllables. In other words, when there are more phonemes in a language, it tends to have more phonemes per syllable. ii) When the syllable structure is complex, the language tends to be atonal. ii') On the contrary, when the syllable structure is comparatively simple, the language tends to utilize more suprasegmental distinctions, i.e. tones, sometimes pitch accents, stress accents, and length.

e. The more phonemes a language has, the fewer tones it is likely to have and the fewer phonemes a language has, the more tones it tends to have.

f. From 'a' to 'e' shown above, there are at most only 15 possibilities of interaction between two items. However, if three items such as (2. 2), (2.3), (2.4) are considered at one time, then the possible combinations of interaction increase drastically. Thus, I will not enumerate all the trilateral (and consequently multilateral) relationships, because they are easy to predict.

g. i) When a language has many monosyllabic words with a simple syllable structure, there is a tendency that this language becomes tonal to avoid homonymity. ii) On the other hand, when there are

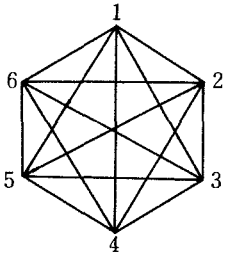
fewer phonemes in an atonal monosyllabic language, it has more homonyms.

h. i) When a language has many polysyllabic words with a complex syllable structure, then it is not always necessary that this language should utilize suprasegmental distinctions to avoid homonymity. ii) Likewise, it seems that a language with many polysyllablic words and with a simple syllable structure does not need suprasegmentals either.

Note that in (4) the tendencies from (a) to (e) are related between two items in (2), e.g. (2.1) and (2.2) for (4ai), (2.2) and (2.3) for (4bi), etc. This is a local (or partial) interaction in bilateral relationship between only two items in (2). However, in reality more than two items are often considered at the same time. The mutilateral interaction of (4gi) among (2.2), (2.3), (2.4) and (2.6) is an actual example. Just another example is that of (4gii) among (2.2), (2.3), (2.5) and (2.6). Of course, many other multilateral combinations are possible, but not shown here because they are self-evident, as in (2) and (3).

Therefore, the following illustration can be presented. It shows that above the six items in (2) are not in a one dimensional scale but in a multilateral relationship.

(5)



1=help of context
2=number of homonyms
3=mono/poly-syllabic
4=size of a syllable
5=number of phonemes
6=number of tones

In general, Standard Modern Korean is likely to illustrate (4di). But when the Northeastern and Southeastern dialects of Modern and Middle Korean are considered, it seems that (4hi), in fact, the stronger version of (4hi), i.e.(4dii) has applied to these dialects and Middle Korean. Namely, when a language has many polysyllabic words with a complex syllable structure, this language may first utilize tones or pitch-accents but later tend to be atonal like (4dii) through historical innovation.

Most present dialects of Japanese illustrate (4dii'): there are many Japanese dialects which have pitch-accent systems. However, other minor accentless dialects illustrate (4hii).

The proportion of borrowed words in a certain language is also a great factor in choosing one of the universal tendencies in (4). For instance, more than half of the vocabulary of Korean came from Chinese. These Sino-Korean

words have a special loan phonology. Thus, (4gii) may apply in this case, because monosyllabic Sino-Korean radicals in Modern Korean do not have tones and in addition have a rather limited number of phonemes, especially in syllable final position.

It might be a general tendency that a language which allows many loan words such as Korean and English shows more homonyms than a language with comparatively few loan words such as German and French.

Modern Mandarin Chinese, however, illustrates (4gi), while Cantonese with five to nine distinctive tones and various final consonants (like Sino-Korean words) illustrates (4ci). Therefore, these two dialects differ greatly from each other.[7]

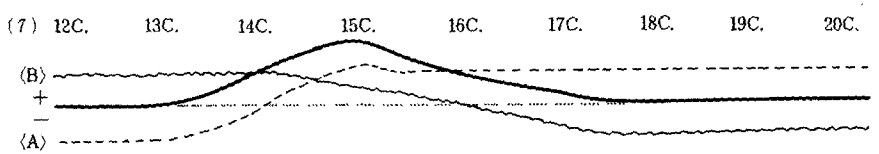
It is suggested that Chinese tonal evolution is generally as follows (S.-O. Lee 1978):

(6)	7th century	10 c.	16 c.
	4 tones in Early	more than	back to 4 tones
	Mandarin Chinese	4 tones	in Mandarin

It is well-known that all syllable-final plosives and fricatives in Mandarin Chinese were lost via [ʔ] and [h], respectively, with tonogenesis as part of the process. Since the sixteenth century, however, Mandarin has kept only four tones without recovering lost consonants. On the other hand, both Cantonese and Sino-Korean did not lose all syllable-final obstruents, as they are far from the innovative focal point, Northern China around Peking. This history proves that there is a great interactive relationship between the number of syllable-final consonants and the number of tones.

In the history of the Korean language, there may have existed a relationship between ⟨A⟩ the variety of syllable-initial consonants and ⟨B⟩ the number of tones as in (7). The lower space of the mid line indicates fewer initial consonants and lack of tone, and the upper space shows more initial consonants and existence of tone. The dotted line is ⟨A⟩ and the curvy line is ⟨B⟩. The sum of ⟨A⟩ and ⟨B⟩ is the solid line.

(7)



Around the fifteenth century, the sum of ⟨A⟩ and ⟨B⟩ became too high to keep the balance and perhaps induced the counteraction of losing a tonal system by the seventeenth century. (7) shows a nice example of (4e) which defines the

[7] The term 'language' is probably better to indicate very different dialects in China such as Mandarin and Cantonese. The number of tones present in Cantonese varies according to [illegible] 1985.

inverse proportion between segmental phonemes and tones.[8]

In closing, I would once again like to express my hope that more supporting evidence will be produced by linguists interested in this topic and specializing in other types of languages.

REFERENCES

Altmann, G. (1978) 'Towards a Theory of Language,' in G. Altmann, ed., *Glottometrika 1, Quantitative Linguistics* Vol. 1, Studienverlag Dr. N. Brockmeyer, Bochum, 1-25.

Clements, G. N. and S. J. Keyser (1983) *CV Phonology : A Generative Theory of the Syllable,* Linguistic Inquiry Monograph 9, MIT Press, Cambridge.

Hŏ, Ung (1965) *Kugŏ ŭmunhak* (Korean Phonology). Chŏngŭm-sa, Seoul.

Killingley, S. Y. (1985) *A New Look at Cantonese Tones : Five or Six?* Grevatt and Grevatt, Newcastle-upon-Tyne.

Kim, Chin-Wu (1972) 'Centrifugality in Korean Phonology,' (in Japanese) *Han* 1. 10, 89-97. Also as a part of his (1972) 'Two Phonological Notes : A-sharp and B-flat,' in M.K. Brame, ed., *Contributions to Generative Phonology,* Univ. of Texas Press, Austin, 155-170.

_____ (1973) 'Gravity in Korean Phonology,' *Language Research* 9.2, 274-81.

Lee, Ki-Moon (1972) *Kugŏ ŭmunsa yŏn'gu* (A Study of Korean Historical Phonology), Han'guk munhwa yŏn'guso, Seoul National Univ., Seoul.

Lee, Sang-Oak (1977) 'Conspiracy in Korean Phonology Revisited : As applied to Historical Data,' *Studies in the Linguistic Sciences* 7.2, 1-23.

_____ (1978) *Middle Korean Tonology,* Doctoral dissertation, Univ. of Illinois, Urbana. Also published in a corrected version (1979) by Hanshin Publishing Co., Seoul.

Murray, R. W. (1982) 'Consonant Developments in Pali,' *Folia Linguistica Historica* 3, 163-184.

_____ and T. Vennemann (1982) 'Sound Change and Syllable Structure [: Problem] in Germanic Phonology,' *Language* 59, 514-528.

Ruhlen, M. (1975) *A Guide to the Languages of the World,* Language Universals Project, Stanford University.

Selkirk, E. O. (1982) 'The Syllable,' in H. v. d. Hulst and N. Smith, eds., *The Structure of Phonological Representations* (Part II), Foris Publications, Dordrecht, 337-383.

[8] In a follow-up paper, I will soon report the result from pilot tests of my hypotheses such as (4d) and (4e) based on data shown in Ruhlen (1975).

Steriade, D. (1982) *Greek Prosodies and the Nature of Syllabification,* Doctoral dissertation, MIT.

Vennemann, T. (1972) 'On the Theory of Syllabic Phonology,' *Linguistische Berichte* 18, 1-18.

_____ (1974) 'Words and Syllables in Natural Generative Grammer,' in A. Bruck et al., eds., *Papers from the Parasession on Natural Phonology,* Chicago Linguistic Society, Chicago, 346-374.

_____ (1978) 'Universal Syllabic Phonology,' *Theoretical Linguistics* 5, 175-215.

_____ (1982) 'Zur Silbenstruktur der deutschen Standardsprache,' in T. Vennemann, ed., *Silben, Segmente, Akzente,* Max Niemeyer, Tübingen, 261-305.

_____ (1983) 'Causality in Language Change : Theories of Linguistic Preferences as a Basis for Linguistic Explanations,' *Folia Linguistica Historica* 4, 5-26.

_____ (1985) 'Preference Laws for Syllable Structure and the Explanation of Sound Change, with Special Reference to German, Germanic, Italian, and Latin,' MS., Univ. of Munich.

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