Ann. Rep. Asahikawa Med. Coll.
1980, Vol. 2, 23～55

A Note on Tensification in Korean*

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INTRODUCTION

In Korean, there is a phonological change called tensification. This is a well-known phonological process that can be described as follows: Lax consonants are tensed in environments where (1) a lax obstruent is preceded by an identical lax obstruent, (2) a lax obstruent is preceded by a non-homorganic syllable-final obstruent and (3) in some cases a lax syllable initial obstruent is pronounced tense as shown by the following examle (1c). Of these three cases the first and the second are easily accounted for by the rule of tensification, which is independently motivated.[1]

(1) a. kokku [kokku] "a fancy shot" tappyən [tappyən] "an answer"
nossoi [nosswi] "brass" nakkoan [nakkwan] "signature"
b.[2] kakcang [kak′ccaŋ] "a thick floor paper"
kapkak [kap′kkak′] "a shell" macpur [mat′ppul] "opposite fires"
c. socang [soccaŋ] "petition" koka [kokka] "wage"
sɨngkyək [sɨŋkkyək′] "the elevation of status"

For tensification as in (1c), Kim [1]** and others have proposed a *t*-insertion; that is, *t* is inserted between the two elements of a compound as the forms in (1c) involve compound boundaries. Sohn [5] points out that

* The author would like to thank Mr. Barry Potter who kindly read over the author's first draft and corrected his English phrasing. Only the author, however, should be held responsible for any imperfections that may still exist in the paper.

** Numbers in brackets refer to the references as the end of the paper.

this type of tensification cannot be accounted for by making the distinction between phrasal compounds and non-phrasal ones. He proposes another tensing rule (2) in addition to an independently motivated tensing rule and a *t*-insertion rule (3) proposed by Kim [1]. Rule (2) can apply to all the words that meet the condition, whether they are compounds or not.

(2) $\left\{\begin{matrix} t \\ c \\ s \end{matrix}\right\} \longrightarrow [+\text{tense}]/1\_\_\_\_$

(3) $\emptyset \longrightarrow t/X+\_\_\_\_+Y$

Rule (3) inserts a *t* in the proper environment that is necessary for the tensification of a following obstruent. With the application of only both rule (3) and the tensing rule to the forms listed in (1c), the correct output forms cannot be derived. Sample derivation are given in (4).

(4)	/so + + caŋ/	/siŋ + + kyək/	
	so + t + caŋ	siŋ + t + kyək	Rule (3)
	sotccaŋ	siŋtkkyək	Tensing Rule
	soccaŋ	siŋkkyək	*t* Deletion Rule
	[soccaŋ]	[siŋkkyək′]	Implosion Rule

As can be seen, however, the inserted *t* must be deleted by a rule in order to get correct output phonetic forms. According to Kim's proposal, the *t* is deleted by applying a rule that simplifies the three-consonant cluster. He argues that this rule is necessary in Korean to account for the phenomenon that one of the medial-three consonants is unpronounceable to Koreans. Sohn insists that rule (2) and the correct interpretation of Korean compounds may make it possible to accommodate the tensification phenomenon, but finally he points out that the distinction between the compounds of Sino-Korean origin and pure Korean compounds plays no role in solving the problem.

This paper is devoted to a possible analysis of tensification easily found in Korean. We will begin by examining various contexts in which the tensification occurs, and attempt to work out of numerous details. I will not present any new and ad hoc proposals for solving the problem; rather I will try to

show that there are some residual problems in the explanation proposed by Kim [1] and Sohn [5], though their work has succeeded in explaining at least some aspects of tensification. Tensification may present difficult problems that resist systematic solution and generalization. In fact, the tensification we are concerned with here seems to be anything but simple. I will mention important differences among the contexts in which tensification occurs, and provide further insights into the nature of the tensification phenomenon.

1.0 The Environment of Tensification

1.1 The tensification phenomenon may appear immediately after a vowel and a voiced consonant such as/m/, /n/, /ng/and/l/. Some obstruents become tense consonants, and some do not. In most cases, we have a voiced consonant in this environment[3]. According to Kiparsky's theory[4], rules that account for this type of tensification must be characterized as opaque. We had bettr consider the tensification that appears immediately after a vowel. In this context, we have a comparatively small number of examples to be found. Thus, cosider the following forms:

(5) sipico [sibicco] "a defiant tone"
seca [secca] "small characters"
socang [socca] "petition"
micək [miccək′] "aesthetic"
kasosəng [kasossəŋ] "plasticity"
uɨkoa [wɨkkwa] "medical department"
koka [kokka] "wage"
hɨksapyəng [hɨksappyəŋ] "plague"
yanyocɨng [yanyoccɨŋ] "nocturnal incontinence"
taeku [tækku] "a couplet"
pusu [pussu] "the number of copies"
cukyək [cukkyək′] "the nominative case"
sepang [seppaŋ] "a room to let"
hucang [huccaŋ] "a market next opened"
kangtosang [kangdossaŋ] "a chair used when one evangèlizes"
makukan [magukkan] "a stable"

sepəp [seppəp′] "the taxation law"
cəkən [cəkkən] "an item"
sakuən [sakkwən] "a private right"
yəkuən [yəkkwən] "a passport"
ocəm [occəm] "a stain"
haengtokun [hæŋdokkun] "a bier bearer"
sorikyər [sorikkyəl] "sound waves"
cacupic [cajuppit′] "dark purple"
kacəngcək [kəjəŋccək′] "homely"

As can be seen, these forms have derived tense obstruents. It is at this point that some basic questions arise what is the determinant of tensification? Does tensification always occur in the forms which have a formative with a derived tense consonant as an element? The latter problem can be solved easily, though there are some difficulties in arriving at a significant generalization. For we have a number of forms that are derived without the application of the tensing rule. Notice that in this environment, i.e., after a vowel, the occurrence of tensification may depend on certain elements making up the words, and there is no form with a tensed *t* consonant, i.e., [tt]. As stated above, these examples and the following examples show that the boundary solution proposed by Kim gives us no basis to account for the observed facts, so they must be accounted for in other way. Look at the following examples:

(6) pico [pijo] "plaintive melody", saca [saja] "copying"
taecang [tæjaŋ] "a galley" yukicək [yugijək′] "organic"
kamsəng [kamsəŋ] "sensibility"
mukoa [mugwa] "military examination"
muka [muga] "uselessness" cipyəng [cibyəŋ] "a chronic desease"
ccac+ng [ccaj+ŋ] "ill humour" yuku [yugu] "synonymous phrase"
hosu [hosu] "the number of houses"
chekyək [chegyək′] "physique"
naepang [næbaŋ] "the inner room"
wasang [wasaŋ] "a bed"
sukan [sugan] "between trees"

sekəri [segəri] "a three-forked road"
chopic [chobit′] "first colors" sapəp [sabəp′] "a dead law"

The tensification phenomenon does not appear in these forms, though they are expected to undergo tensing. We must consider on what basis the variation in these forms cited in (5) and (6) can occur. To find the key to the problem, Sohn's discussion is undoubtedly useful, but unfortunately insufficient for explaining tensification after nasals and a vowel. According to Sohn, the initial consonants of the second or third elemnts, i.e., /c, s, k, and p/ should be pronounced as [cc, ss, kk and pp] respectively instead of [j, s, g and b], if words are phrasal compounds. This is the basic argument Sohn presents for the tensification phenomenon. Along this line, he argues that even in the Sino-Korean, nonphrasal compounds in which the consonant immediately before a tensed consonant is a liquid, tensification should be accomplished by applying rule (2) instead of (3). However, he does not argue against Kim's analysis; rather, he completely agrees with Kim's analysis of the words in (5). Consequently his argument is that there are two kinds of tensification in Korean, and that the phenomenon should be explained only by establishing two different, independent rules. At this point, his claim is considered to be inconsistent, since he correctly observes that there is no evidence for positing different kinds of boundaries in the cases he discussed.

Observe that some words in (5) have the same lexical structures as some forms in (6). For example, *cika* [cikka], *kacəngcək* [kajəŋccək′], *tosu* [tossu] and *sepəp* [seppəp′] etc. have the same lexical structures as *muka* [muga], *yukcək* [yugijək], *taesu* [tæsu] and *pipəp* [pibəp′], respectively. Furthermore, *kacangcək* and *yukicək* have the same lexical structures as /kacəng+cək/ and /yuki+cək/, while *cika* and *muka* are analyzed as /cika/ and /muka/. Given these examples, we must find an appropriate way other than the boundary solution to explain the tensification. Here it is important to examine other examples in which tensification appears in different environments.

1.2 Next observe the foms that have derived tense obstruents as segments immediately after a continuant voiced velar consonant:

(7) nongk a [noŋkkwa] "agricultural department"

tɨngpangsəng[tɨŋpaŋssəŋ] "isotropy" tɨngsu[tɨŋssu] "a grade"
kyəngsangse[kyəŋsaŋsse] "an ordinary tax"
koanki[kwankki] "madness" kangcəm[kəŋccəm] "a strong point"
kyəhgkui[kyəŋkkwi] "epigram" tongcək[toŋccək′] "dynamic"
kansɨngpəp[kansɨŋppəp′] "a simple multiplication method"
kongkuən[koŋkkwən] "civil right" pangcang[paŋccaŋ] "hanging"
phyəngka[phyəŋkka] "appreciation" yongkən[yoŋkkən] "business"
səngkoa[səŋkkwa] "a result" kongton[koŋtton] "a windfall income"
tɨngpur[tɨŋppul] "a light" nangsəngtae[naŋsəŋttæ] "bamboo pole"
naengkuk[næŋkkuk′] "cold soup" kangka[kaŋkka] "a riverside"
nɨngco[nɨŋcco] "a mocking tone" səngkyək[səŋkkyək′] "personality"
kyəngcɨng[kyəŋccɨŋ] "slight illness"
kwanpyəng[kwanppyəŋ] "insanity"
congsori[coŋssori] "a sound of a bell"
yəngca[yəŋcca] "English printing"

Among these examples, it is easy to find the same morphemes, i.e., *-cəm*, *-kwən*, *-ka*, *-ca*, *-cang*, *-pəp* and so on, as those in (5). They also undergo tensing in the context cited above. There are other morphemes in addition that are subject to tensification. The fact that a definite number of morphemes undergo tensing in two different environments suggests that the determinant of tensification might be the strength of the environment which triggers the tensing rule rather than a morpheme itself of which the initial consonant is tensed. Also the fact that some morphemes, which undergo voicing immediately after a vowel, are pronounced tense in the context shown in (7) suggests that /ŋ/ may be stronger than a vowel as the environment that triggers tensification.

In this case, we face the same situation as in the case discussed in section 1.1. There are forms in which the initial obstruents of the elements expected to undergo tensing are derived as voiced consonants corresponding to them. The examples are given in (8):

(8) tɨngsang[tɨŋsaŋ] "a stool" kangki[kaŋgi] "sturdy spirit"
tongpyəng[toŋbyəŋ] "the same desease" kacəm[kajəm] "making with a dot"

kangsəng[kaŋsəŋ] "hardness"　kyəngcoi[kyəŋjwi] "a misdemeanour"
kakongcək[kakoŋjək′] "unreal"　kakyək[kagyək′] "family rules"
kongse[koŋse] "a tax"　cungc+ng[cuŋj+ŋ] "a serious illness"

Again it can be seen that the distinction between forms with derived tense obstruents and forms with voiced consonants derived form the same underlying segments should not be given ad hoc boundaries, since the lexical structures of the latter are the same as those of the former in some cases. For example, we must analyse *kungki* [kuŋkki] and *kangki* [kaŋgi] into /kuŋ-ki/ and /kaŋ-ki/, respectively , where the symbol "-" stands for syllable boundaries which are used for convenience.

1.3　In this section, we shall consider the tensification phenomenon that appears immediately after a nasal consonant /n/. The examples are given as follows:

(9)　incəktampo[inccək′ttambo] "presonal security"
inkyək[inkkyək′] "personality"　insu[inssu] "number of people"
hyənunc+ng[hyənuncc+ŋ] "giddiness"
cənkuən[cənkkwən] "plenipotentiary power"
+npang[+nppaŋ] "a silver smith's"　cənkən[cənkkən] "an antecedent"
insəng[inssəŋ] "tenacity"　cənca[cəncca] "a seal character"
+npanse[+npansse] "transportation tax"
phanpəp[phanppəp′] "judgement"　thanka[thankka] "price of coal"
chankan[chankkan] "kitchen"　cənkoa[cənkkwa] "result of war"
yunki[yunkki] "gloss"　yənki[yənkkwi] "a couplet"
cənkoa[cenkkwa] "a special course"　sinkyək[sinkkyək] "divinity"
cantae[canttæ] "saucer of a winecup"　thanpur[thanppul] "coal fire"
anton[antton] "a small amount of money"
phansori[phanssori] "Korean opera"　incur[inccul] "a sacred rope"
inci[incci] "a stamp"　sinpuncang[sinbunccaŋ] "a personal status book"

Note that there are some other elements which undergo tensing in addition to the tensed elements discussed in the section 1.1 and 1.2. From this observation , we can assume that each nasal consonant as the environment

has its own strength as the trigger. If this is the case, an examination of the above data suggests that the influence of the environment /n_____ on tensification may be a little stronger than that of the env./ŋ_____ and the env./V_____. It is also interesting to note that a hierarchical relationship may be established among the nasal and the vowel with regard to the influencing power on the phonological process. But we cannot discuss it here. We will turn our attention to the problem in the later section.

There are non-tensed morphemes corresponding to tensed morphemes in this case, as examplified in (10):

(10) hyənki[hyəngi] "pride" chənkyək[chəngyək'] "meanness"
inkoa[ingwa] "cause and effect" canton[candon] "change"
canpyəng[capyəŋ] "slight illness"
hyənsu[hyənsu] "present number" hoanse[hwanse] "refunding the tax"
sinsən[sinsən] "divinity" cansori[cansori] "scolding"
əncəm[wənjəm] "a round point" cənsunkan[cənsungan] "a moment"
uncang[unjaŋ] "a whole sheet of paper"
yəncur[yənjul] "connections"

Here we can recognize that the tensification phenomenon is not as straightforward as (2) and (3) seem to imply. Some forms with derived tense obstruents must be analyzed as compounds, while other forms must be analyzed as single words. Moreover, the distinction between a compound word and a single word plays no significant role in determining what kind of morphemes are subject to tensification.

Next we must examine the following examples. Here, derived tense obstruents occur immediately after a bilabial nasal consonant /m/, as shown in (11):

(11) hɨmcəm[hɨmccəm] "a defect" hamca[hamcca] "your name"
hamsuron[hamssuron] "theory of function"
chəmci[chəmcci] "a tag" chamcoi[chamccwi] "decapitation"
cimkun[cimkkun] "a porter" cəmpang[cəmppaŋ] "a store"
yəmcɨng[yəmccɨŋ] "an aversion" ɨmka[ɨmkka] "a phonetic value"

yəmse[yəmsse] "a salt tax" amki[amkki] "jealousy"
sumkɨn[sumkkɨn] "respiratory muscles"
simcək[simccək′] "mental" simcur[simccul] "muscles"
pompich[pomppit′] "spring scenery" kɨmkui[kɨmkkwi] "a taboo word"
kamkɨmcoi[kamkɨmccwi] "illegal detection"
kusimsəng sinkyəng[kusimssəŋ sinkyəŋ] "an exciter"
simtae[simttæ] "an axis"

In this case, there are many verbs, and adjectives in which the initial *t* of inflectional suffix '*-ta*' is pronounced tense in such a context as in *kam+ta* [kamtta] "to wash", *nam+ta*[namtta] "to remain", *kəm+ ta*[kəmtta] "black" and so on. However, these inflected forms are syntactically generated, so this problem will not dealt with in this paper.

Again, non-tensed forms corresponding to the tensed forms in (11) are found in this case, as examplified in (12):

(12) chəmcoi[chəmjwi] "commit a crime again"
impang[imbaŋ] "cloth peddler's meeting room"
yəmki[yəmgi] "beauty" kɨmca[kɨmja] "a golden letter"
nampich[nambit′] "indigo" amsu[amsu] "trickery"
yəmpyəng[yəmbyəŋ] "infection"

The words relevant to the tensification phenomenon in this context are comparatively few in Korean. Under this condition, there may be some difficulty in determining the strength of /m/ as an environment, compared with that of /n/ or /ŋ/.

1.4 Finally we must cite the most typical case of tensification that Sohn [5] has exclusively studied. This is the tensification that appears immediately after a liquid /l/. This case differs from other cases in the effect of the environment on three kinds of obstruents, /t/, /s/ and /c/, when the obstruents are preceded by /l/. Therefore it is convenient to cite the forms with coronal obstruents in (13), and other relevant forms in (14).

(13) kartɨng[kalttɨŋ] "complication" karsaek[kalssæk′] "brown"
karcin[kalccin] "exhaustion" tartək[talttək′] "cardinal virtues"

torson[tolsson] "fluent" torcin[torccin] "rush"
sirsəng[silssəŋ] "insanity" sirsu[silssu] "a real number"
sircək[silccək′] "reality" sirco[silcco] "disharmony"
sirtək[silttək′] "losing one's reputation"
cərtang[cəltta] "exactness" cərto[cəltto] "theft"

(14) kərkui[kəlkkwi] "an excellent verse" karki[kalkki] "a heroic temper"
kyərkyək[kyəlkkyək′] "disqualification"
torkyər[tolkkyəl] "grain" tɨrparam [tɨlpparam] "field wind"
murkənpi[mulkkənbi] "cost of supplies"
murpyəng[mulppyəŋ] "water-bottle" sarpich[salppit′] "fresh color"
sərkoa[səlkkwa] "establishing a course"
surpəp[sulppəp′] "wizardry" sirpap[silppap′] "a seam"
sirkwən[silkkwən] "a real power" sirka[silkka] "intrinsic value"

As (14) indicates, morphemes such as {kyək}, {pəp}, {kwən}, etc., are pronounced tense after a liquid /l/ as well as after a vowel or nasal obstruent. On the other hand, morpheme-initial /t/, /s/ and /c/ are tensed after /l/ with a few exceptions. In this situation, we need to find the answers to a few questions: What kind of morphemes are exceptional? How do they behave? What lexical structures do the forms with exceptional elements have? To answer the first question, we must cite the following examples:

(15) sirtɨk[sildok′] "actual acquirement" hartang[haldaŋ] "apportionment"
hoarcək[hwaljək′] "a coyote" sərcaeng[səljæŋ] "quarrel"
circa[cilcca] "a hostage" sirson[silson] "working with bare hand"
pyərsu[pyəlsu] "special luck" pyərsori[pyəlsori] "unexpected words"
horsəng[holsəŋ] "unisexual " sirsahoi[silsahϕ] "real world"

Sohn [5] says that he could not find any words which have *lt*, *lc*, or *ls* sequences in which the second consonant undergoes voicing and the only permissable sequences are a liquid /l/ plus the tense consonant. As (15) indicates, his observation can cover only a part of the tensification phenomenon. This does not mean that his proposal should be rejected entirely. However,

it is not necessary to modify his rule (2). Before we fully discuss the tensification, some seemingly controversial forms need to be examined briefly. Such investigation will enable us to understand the true nature of the phenomenon of tensification.

Consider the following foms:

(16) a./hor+sori/[holsori] but /[hor+sori]+əurrim/[horssoriəurllim]
/murkən/[mulgən] but /murkən+pi/[mulkkənbi]
/ttar#casik/[ttaljasik′] but /sirca/[silcca]
/yər+cənki/[yəljəngi] but /parcən+koan/[palccəngwan]
b./mur#param/[mulpparam] but /sir#param/[silbaram]
/sim#pich/[simppit′] but /nam#pich/[nambit′]
c./korsang/[kolssaŋ] /korsang+hak/[kolssaŋhak′]
/parsa/[palssa] /parsa+yak/[palssayak′]
/sirsang/[silssaŋ] /sirsang#muru/[silssaŋ muru]
/cərtae/[cəlttæ] /cərtae+ca/[cəlttæja]
d./karco/[kalcco] but /irjo/[iljo]
/chircək/[chilccək′] but /sar#cək/ [sal jok′], /hwarcək/[hwaljak′]
/kyərkyək/[kyəlkkək′] but /korkyək/[kolgyək′]
/sirtɨk/[silttɨk′] but /sirtɨk/[sildɨk′]
/sirca/[silcca] but /sərca/[səlja]

The examples in (16a) suggest that boundaries may play a crucial role in tensing obstruents regardless of any other morphological conditions. However, other examples (16b-d) show that this is not the case. The first two pairs of forms lead us to think that forms that can be regarded as single words will not have derived tense consonants, but any proposal based on this thought must be rejected, since the forms, *sirca*, *hoarcək*, etc., do not undergo tensing though they are regarded as single words. The existence of the forms cited in (16b) shows that the boundary is not regarded as the determinant of tensification, since there are two tense and non-tense variants after the boundary. Morever, the tensification in the forms listed in (16c) is independent of the existence of the boundaries. It appears that we cannot analyze the forms with derived tense consonants in (16d) as compounds, and the corresponding

non-tensed forms in (16d) as single words. At the present stage, all we can do to find a possible way to explain this complicated morphophonological phenomenon is to show that there are certain semantic reguralitles among words, suffixes and base forms of which the initial consonants are tensed.

2.0 Semantic Reguralities in Formatives

2.1 We have seen that the determinant of tensification is a suffix, a base form or a word itself which undergoes tensing, and that the tensification depends on the strength of the environment. In this section, we will discuss whether there is a semantic regurality in each tensed formative and what regurality takes part in tensification. In 2.1, we will deal with the case of base foms by which the words question are formed.

We will accept the version of the lexicalist hypothesis[5] here. Under this version, inflected forms are syntactically generated, while derived forms are the result of the application of rules of the lexicon. When we work under this hypothesis, we notice that there are two different theories of boundary assignment in words. Under the theory in which both the word boundary # and the formative boundary + are assigned in the lexicon for explaining certain phonological facts, it is necessary for us to formulate readjustment rules that convert # to + in ad hoc fashion in order to make the distinction between the application and the vacuous application of certain rules to segments in question. Under the other theory in which only the formative boundary is assigned in the lexicon, we must mark segments with lexical features that undergo certain phonological changes.

In the present paper, it is not our purpose to decide which theory is the best. We will proceed with our discussion, using both + and #, since in the case of tensification the boundaries have no important function, as we have already shown. Our analysis of tensification will indicate that there is no need for boundary distinctions in Korean morphology.

Putting aside this argument, let us turn our attention once more, to our present discussion. Consider the following forms:

(17) a. −(+)cəm "a point"

[onccəm] "a hot point"　[wənjəm]/*[wənccəm]"a round point"
[chənjəŋccəm] "the zenith"　[kajəm] "marking with a dot"
[kaŋccəm] "a strong point"　[chənjəm] "a distant place in the
[kwaŋccəm] "a facula"　heaven"

b. −(+)kuən "a right or power"

[koŋkkwən] "civil right"　[kyəŋgwən] "a great principle and a
[sinkkwən] "a divine right"　political expediency"
[cənkkwən] "plenipotentiary power"
[kɨmkkwən] "power of money"

c. −(+)kuən "a ticket or a bond"

[kɨmkkwən] "a gold note"　[cəngwən] "giving a bond in pledge"
[yəkkwən] "a passport"　[cɨŋkkwən] "a document"

d. −(+)kən "a matter"

[ankkən] "agenda"　[cənkkən] "an antecedent"
[ilkkən] "an affair"　[mulgən] "a thing"

e. ′(+)pyəng "desease"

[wippyəŋ] "a stomach trouble"　[cilbyəŋ] "a desease"
[tohØppyəŋ] "urban disease"　[kanbyəŋ] "nursing"
[swippyəŋ] "senile infirmity"　[toŋbyəŋ] "same desease"
[kwanppyəŋ] "insanity"　[kolbyəŋ] "a deep-seated desease"
[hɨk′ssappyəŋ] "plague"　[canbyəŋ] "slight illness"

(− syllable boundary, + morpheme boundary)

In the first colum of (17a), the meaning of the element −(+)*cəm* is 'a point in some object,' while in the second column of (17a), it indicates a point itself in *wənc*ə*m*, that is, 'a round point contrasted with a check mark' in this case. In *kacəm* it semantically serves as instrumental case and is not regarded as the base form, and in *chənc*ə*m* [chənjəm], it indicates somewhat 'an obscure place' but 'a certain point.'

One might object that in the last case it indicates 'a point' and there is no reason for distinguishing it from others cited in the left column of (17a), but this is insufficient, since whether the initial consonant *c* is tensed or not depends on [the fixedness of the point]. We also have another phonetic form

[chənccəm] for *chəncəm*. The difference in the degree of the fixedness is shown in the following forms:

(18) sicəm[siccəm] "a visual point" [cijəm] "a spot"

micəm { [miccəm] / [mijəm] } "a point of beauty" [cijəm] "a fulcrum"

The phonetic form of *micəm* is [miccəm] in one dictionary [2], and in the other dictionary [4] it is [mijəm]. The existence of the variants is due to the difference in the degree of the fixedness. In this case, whether the element undergoes tensing or not can be predicted correctly by the semantic feature "the higher degree of the fixedness and a point in some object."

Next, note that there is only one non-tensed form in the right column of (17b-d) in each case. These forms are regarded as exceptions to the tensification of the elements. The form, [kyəŋgwən], is characterized an an abbreviated word, and in the form [cəngwən], the element, -kuən, serves as the objective case semantically, but not syntactically, since the form is considered to be a single word. The case of the form, *murkən*, is most controversial in that we have a form, *murkən* + *pi* [mulkkən + bi]. One might argue that this can be easily explained, if the element -*kən* is assumed to have its own meaning and the form, *murkən*, is analysed as a single word. Needless to say, it is most significant that the element preserves its original meaning and serves as a principal part of the word, and such elements alone undergo tensing, as shown by the discuussion of (17a).

Here another form, *inkən* + *pi* [inkkən + bi] "personal expendure," suggests that the crucial factor in tensification is the preservation of the principal meaning of a word. The -*kən* in *murkən* + *pi* has the status that is quite different in *murkən* semantically in that a former preserves its meaning. In *inhən* + *pi* and *murkən* + *pi*, it is important to observe that *inkən-* and *murkən-* serve as affixes, and for this very reason the meaning of -*kən* is preserved in them. The absence of the word *inkən* proves thet *murkən* and *murkən-* have quite a different staus in morphology.

The case of the forms listed in (17e) seems to be easily accounted for, since the meaning of the element -*pyəng* in the left column is less abstract

than that in the right column. The words cited in the left column express the names of deseases, while the words in the right column describe 'sickness' (or 'illness'), that is, in more of a general sense. In other words, it is more a specific meaning that is described by the element *-pyəg* in the left column. This is parallel to the case of (17a). This fact indicates that [-ppyəŋ] is distinguished from [-byəŋ] from morphophonological viewpoints and is different in the semantic feature. In this case, the semantic difference can be described by the degree of abstractness in the meaning of *-pyəng*. The low degree of abstrectness in the meaning plays a more decisive role in tensification. In *kanpyəng*, the element *-pyəng* means 'a patient' and serves as the objective case from a semantic viewpoint. This fact, as we have already seen, boes not offer the appropriate condition for tensification.

We have shown that a reasonable hypothesis regarding the conditioning of the tensification phenomenon should be based on some semantic conditions; the initial consonant of an element undergoes tensing, the element has a semantic feature that triggers the tensing rule and is element-specific, (ii) the element does not semantically serve as the oblique case and (iii) it is not part of an abbreviated word derived from the structure such as [a word plus a word]. Of these conditions, condition (i) is the most important and powerful. As we shall see in detail, conditions (ii) and (iii) might have some exception.

Next, we must take up the question of how these conditions work in predicting the occurrence of tensification, and what modifications are needed for getting a more significant generalization. For this purpose, we need to examine as many forms as possible, but we must limit ourselves to some typical examples of this kind. Consider the following forms:

(19) a. −(+)kyək

[cukkyək′] "the nominative case"	[sagyək′] "boatmen"
[səŋkkyək′] "personality"	[chəngyək′] "meanness"
[inkkyək′] "character"	[sigyək′] "a form of verse"
[sinkkyək′] "divinity"	[kagyək′] "family rules"
[pyəlkkyək′] "an extra status"	[kolgyək′] "physique"

b. −(+)ki

[kuŋkki] "a meagre appearence"	[sangi] "mountain air"

[kwankki] "madness"
[sijaŋkki] "hunger"
[sumkki] "breathing"
[ilgi] "weather"
[kaŋgi] "sturdy sprit"
[kyəŋgi] "business prosperity"

c. −(+)su

[inssu] "number of people"
[hamssu] "a function"
[kanssu] "floor space"
[tɨŋssu] "a grade"
[hyənsu] "present number"
[wənsu] "original number"
[sisu] "number of bits"
[sinsu] "one's star"

d. −(+)ca

[ɨncca] "a letter written in silver paint"
[chəlcca] "spelling"
[cəncca] "a quad(rat)"
[succa] "a figure"
[saja] "copying"
[thaja] "typing"
[sinja] "a new character"
[taeja] "a big letter"

e. −(+)pəp

[seppəp′] "the taxation law"
[phanppəp′] "judgement"
[cunppəp′] "law abiding"
[kəmppəp′] "art of fencing"
[mubəp′] "illegality"
[pibəp′] "unlawfulness"
[sabəp′] "a dead law"
[manbəp′] "all kinds of laws"

f. −(+)se

[insse] "a poll tax" or[inse]
[ɨnban+sse] "transportation tax"
[incci+sse] "stamp duty"
[suse] "tax collection"
[hwanse] "refunding the tax"
[cənse] "a farm tax"

g. −(+)pang

[cənppaŋ] "a shop"
[anppaŋ] "an inner room"
[kɨmɨn+ppaŋ] "a goldsmith's shop"
[munkkan+ppaŋ]"a room by the gate"
[kolbaŋ] "a closet"
[suchaŋ+baŋ]"an attendant's room"
[naebaŋ] "the inner room"
[subaŋ] "keeping a bridal room for the first night"

h. −(+)sang

[kaŋssaŋ] "a table for reading the documents"
[cunssaŋ] "a stone-stand in front of a tomb"
[kwaŋsaŋ] "a comfortable bed"
[naesaŋ] "a cold bed"
[tɨŋsaŋ] "a stool"

[sasən+ssaŋ] "a long-table for persons"

i . +(#)pram

[tɨl#pparam] "field winds"
[kaɨl#pparam] "autumn winds"
[mul#pparam] "breeze coming over the water"
[sil#baram] "breeze"
[chan#baram] "the setting in of the chill winds of autumn"
[kaŋswi#baram] "the east winds which blow in early autumn"

j . +(#)sori

[mal#ssori] "a voice"
[phan#ssori] "Korean opera"
[sin#ssori] "shoes sound"
[mun#ssorri] "a sound at the door"
[hol#sori] "a vowel"
[pyəl#sori] "unexpected words"
[can#sori] "scolding"
[swi#sori] "a metalic sound"

(Boundaries are used for convenience.)

The base *-kyək* in (19a) has some different but related meanings such as 'status', 'rank', 'a rule', 'a grammatical case' and so on. The tensed forms in the left column in (19a) indicate that the forms are subject to the tensing rule if they describe the status or rank of some thing and if they express a grammatical case. If it is the grammatical case, it can be regarded as a certain status of the form expressing the grammatical relationship to other words in the sentence. 'A rank' means 'station or a position in a hierarchy.' Now we can assume that semantic feature 'status' is justified for *-kyək*, since the forms in the right column do not have this feature; the *-kyək* in *sakyək* does not preserve any basic meaning, and it needs no accounting for, and the base in *chənkyək* expresses 'a style' rather than 'status', and each *-kyək* in *sikyək*, *kakyək* and *korkyək* describes 'a rule and quality', 'a rule' and 'a frame,' respectively. Thus the feature [status] can be used to correctly predict the appearence of tensification in this case.

On the other hand, there are two apparent counterexamples to this assumption. One of them is the form *səngkyək* [səŋkkyək′] "establishing formality." This form violates the condition (i) as well as (ii), since the element *-kyək* seems to function in the semantically oblique case. However, there is

a variant [səŋgyək′] to this form that is cited in the dictionary [4]. In addition, a form *kukyək* [kugyək′] "formality" does not undergo tensing as condition (i) of *-kyək* predicts. The other is *sirkyək* [sirkkyək] disqualification. In this case, this form becomes a true counterexample, if the base-*kyək* is considered to have a meaning 'a rule.' But the form *sirkyək* expresses 'the state of being deprived of the conditions necessary for a purpose or of a power.' This situation is similar to that of *kyərkyək* [kyəlkkyək′]. Notice that in these forms the tensing phenomenon occurs immediately after a liquid. The apparent exceptions in these forms may be explained by incorporating the hierarchy among the segments functioning as a context of the alternation into our theory.

In (19b), the forms in the left column indicate that the meaning of the base *-ki* 'a feeling of' or 'spirits' triggers the tensing rule. In other words, the semantic feature 'a feeling' can be established as a tentative condition in this case. However, there are some other form to be accounted for. The bace in *kungki* and *sumki* expresses 'a sign of.' By the meaning "signs", it is suggested that the meaning 'something external that signifies something spiritual' serves as the determinant of tensification. However, the semantic feature "a sign' needs no incorporating into our theory, since it can be related to the feature [a feeling]. If this solution can be accomplished, our system will arrive at a significant simplification over semantic features as the determinants of tensification. From another viewpoint, the 'sign' in this case can be interpreted as a stimulus by which a feeling is raised to someone. Now the 'sign' might be replaced by the semantic feature 'a feeling by.' As the result of this analysis, the tensification in the element *-ki* can be explained by the semantic feature 'a feeling of or by' in more simple way. Here, note that each *-ki* in *hyənki* [hyəngi] 'dizziness' and *simki* [simgi] 'mood or sensation' is marked as [— a feeing of or by].

Next the case of (19c) poses difficult problems for us. There are many technical terms of mathematics that we must deal with, and they seem to behave in a irregular way for tensification. First of all, the element *-su* in *insu* [in-*ssu*] means 'the number of' and the base with this meaning undergoes tensing without exception, as shown by the form; *taesu* [tæssu] "the number of generation," *tongmyəng* + *su* [toŋmyəŋssu] "same number of persons", *casu*

[cassu] "the number of letter, "and so on. In the case of *munsu* [munssu] "a size of shoes," *kansu* [kanssu], *tɨngsu* [tɨŋssu] and *sɨngsu* [sɨŋssu] "the multiplier," the element *-su* can be accounted for by assuming the feature 'quantity' for both *-su*. The feature 'quantity' can inclusively describe the meanings of *-su*.

Let's turn our attention to the terms used in mathematics. Close investigation of dictionaries reveals that whether the terms undergo tensing or not seems to depend on the speaker's intention, since some dictionaries cite the tensed form for *hamsu* "a function," and others cite the non-tensed form. The fact that such terms are Korean equivalents for the Western words makes this situation more complicated.

Another difficult problem with regard to the base *-su* occurs when its meaning is luck.' It is considered that the base *-su* with this meaning doesn't undergo tensing, since there are some non-tensing form as in *caesu* [cæsu] "luck," *taesu* [tæsu] "a good luck," *kasu* [kasu] "fortune of family," myəngsu [myəŋsu] "destiny" and so on. On the other hand, the base *-su* is tensed in *hwingsu* [hwiŋssu] "a chance hit," and *soncae+su* [soncæssu] "the doom to lose one's possessions." Any reasonable semantic feature cannot predict that the latter forms are subject to the tensing rule. Therefore the best way to deal with this case is to mark forms with the element *-su* which undergo tensing with a rule feature [+ tensing rule].

Now we shall consider the forms listed in (19d). The base shared by all the forms is *-ca* with the meaning 'a letter.' The first and the second forms in the right column cannot undergo tensing, since the element *-ca* serves as the oblique case semantically and almost loses its basic meaning. What difference is there between the meaning of the element in the left column and that of the same element cited in the right column? The element *-ca*'s in both cases shares the meaning 'a letter or a character,' but in the latter case it is used in the generic sense. This means that in the former case it expresses 'a letter' itself; in other words, it conveys a more specific meaning of 'a letter.' For example, *-ca* in [sinja] can be any kind of letter or character, since the information given by this word is that a letter is new. On the other hand, it is by *-ca* in [hancca] "a Chinese character" that a specific kind of letter is meant. One might object that *-ca* in [chəlcca] cannot be considered as having

a specific sense of 'a letter,' but this can be accounted for by the fact that in /s, c, t/ of the base in question the distinction between [+ specific] and [− specific] that triggers the tensing rule is neutralized if /s, c, t/, appear after a liquid, as discussed in section 3. In addition, the initial consonant of *-ca* is tensed if it expresses the meaning 'a name,' as in *myəngca* [myəŋcca] "a name." In a broad sense, someone's name can be regarded as a sequence of specific letters. This observation seems to be supported when a character expressing a word is used. If this is the case, the tensification in this case can be predicted by incorporating a semantic feature 'the specific use of a letter' into our theory.

The distinction between the specific and generic meaning in the sense of base functions as a tensification-determining feature in the case of (19e), again. The base common to all the forms in the left column describes an individual law or method which can be applied to a case or exercise. The tensification phenomenon does not occur in the initial consonant of the base if the element *-pəp* means 'a law' in its generic sense. The following additional examples provide strong support for our claim proposed here :

(20) hopəp [hobəp′] "defence of faith"
chopəp [chobəp′] "a stringent law"
capəp [cabəp′] "an adopted law"
pəmpəp [pəmbəp′] "violation of the law"

The forms listed in (19g) and (19h) seem to be accounted for by positing the similar distinction to the above case. Now we investigate these two cases in a little more detail. In (19g), we can insist that the base form *-pang* undergoes tensing if it expresses the meaning 'a shop,' and if *-pang* means 'a room' used for a special purpose! Moreover there is an implication that *-pang* in the left column describes a little larger room than in the right column, in my judgement. In this case, it is interesting to observe that the form *anpang* has the derived form [anppaŋ], but the form *naepang* cannot have the output form *[næppaŋ]. This distinction may also be accounted for by assuming a hierarchical relationship among the segments functioning as the environment of tensification. The last form in the right column of (19g) can be accounted for

by the condition proposed in this section, since the element *-pang* in this case is semantically analyzed as the oblique case and does not serve as the principal element of the form.

In the case of (19h), a property which distinguishes the forms in the left column from the words in the right column is the difference in the meaning of the element *-sang*. This *-sang* chiefly means 'a table,' 'a stand' or 'a bed.' Our investigation of the forms in (19h) reveals that the base *-sang* is not tensed if it means 'a bed.' It is also interesting to find that there are tensed or non-tensed variants when the base *-sang* means 'a stand.' Two relevant examples such as *kaesang* [kæsaŋ] "a thrashing stand" and *kyəngsang* [kyəŋsaŋ] "a stand for sutras" can be added to (19h). The element *-sang* in the former form seems to lose its original meaning 'a stand' or to have a figurative meaning alone. However, the latter form can be considered to meet the same condition as [cunssaŋ] does from a morphological point of view, though their environments are different from a phonological viewpoint ; the initial consonant of the base *-sang* is immediately preceded by ŋ in *kyəngsang*, while it is preceded by *n* in *cunsang*. A close observation of the forms in (19h) leads us to conclude that the determinant of tensification in this case can be attributed to the meaning of the base, that is, 'a small table-like stand for putting something on or a table.'

The forms cited in (19i) and (19j) are compounds in which original Korean words *param* of which the meaning is 'a wind' and *sori* which means 'a sound' are their principal elements, respectively. Now we shall consider the case of *param* listed in (19i). The tensed form of *-param* can occur when the meaning is 'a wind.' Note that as [chanbaram] is underlyingly represented as [[cha+~~n~~] + [param]], it can be considered to have a lexical structure as [Adjective Modifier + [Noun]]. Putting it in another way, the compound expresses a property of wind, that is, its meaning 'a chill wind' is regarded as describing a wind in a comparatively generic sense. As compared with the first form listed in each column of (19i), here again it can be claimed that the element *-param* can undergo tensing if a compound describes a particular kind of wind, but not if it means a property of wind. Other relevant examples that support our assumption are : *kangparam* [kaŋpparam] "a breeze from the river" and *kangparam* [kaŋbaram] "a dry wind,"

On the other hand, it is interesting to find that *kangsoiparam* [kaŋswibaram] "east wind in early autumn" does not undergo tensing, though the tensing rule is expected to apply to this form because this form expresses a paticular kind of wind. Another contrast is shown by a pair of examples such as *nuparam* [nunpparam] "a wind and snow" and *piparam* [pibaram] "a wind and rain :" These forms suggest that in the case of a compound like this, a phonological hierarchy among the segments functioning as the environments of tensification play a crucial role, as can be seen in 3.0.

Next a rough inspection of (19j) reveals that the tensification phenomenon occurs in the initial consonant of the base *-sori* if it describes 'a sound' itself. The last form in the right column *soisori* [swisori] becomes a true counter example to our assumption, and the second form in the left column *phansori* [phanssori] imposes difficulties needing explanation. The problem in this case seems to be more difficult than it looks. More forms must be cited in order to find a persuasive semantic feature which determines the occurrence of tensification. The relevant forms are exemplified as follows :

(20) a. mar # sori [malssori] "a voice"
sangyə # sori [saŋyəssori] "the cry of bier bearer"
kyəng # sori [kyəŋssori] "the sound of Buddhist chanting"
b. sin+sori [sinssori] "the echo of footsteps"
mun # sori [munssori] "a sound at the door"
kurrim # sori [kullimssori] "a trilled sound"
c. phan # sori [phanssori] "the song of drama"
sang+sori [saŋssori] "a vulgar song"

(21) a. saeng+sori [sæŋsori] "nonsense or an unreasonable talk"
pyər+sori [pyəlsori] "unexpected words"
sin+sori [sinsori] "the clever parry of a question"
kun+sori [kunsori] "a silly talk"
b. kin+sori [kinsori] "a long-drawn voice"
c. sae # sori [sæsori] "twittering"
swissori [swissori] "a metallic sound" or swisori [swisori]
pissori [pissori] "the sound of rainfall"

The same forms as in (19j) are cited for convenience. It is 'a sound' that is meant by the element *sori* (20a, b), and the *sori* in (20c) describes 'a sound of a song '. On the other hand, the element *sori* means 'a speech' or 'a word' in (21a). Thus the tensification that occurs in these forms can be accounted for by positing a semantic feature [a sound] that triggers tensing rule. The problem is that *malsori* undergoes tensing, while *kinsori* does not. There are two explanations for this situation. One is that the sibilant of *sori* becomes a tense consonant if a compound does not have a lexical structure $[[\ldots]_{\text{adjective}}+[\text{sori}]_{\text{noun}}]_{\text{N}}$. The other solution is that the segment *s* of *sori* does not undergoes tensing if the element *sori* means 'a voice.' If the latter explanation is correct, the occurrence of tensification in *malsori* can be attributed to the fact that *sori* appears immediately after a liquid and the semantic distinction between [a voice] which does not trigger tensification and [a sound] which triggers tensification is neutralized in this environment. The same phenomenon occurs in other cases, too. These two solution do not contradict each other, since from the viewpoint of the specificity in meaning the element *sori* has less specific meaning in the structure $[[\ldots]_{\text{Adj}}+[\text{sori}]_{\text{N}}]_{\text{N}}$. The former solution is regarded as more limited and can be incorporated into our theory as one of the conditions of the application of the tensing rule.

Next the first form listed in (21c) may indicate that immediately after a vowel the sibilant of *sori* does not become a tense consonant, though the constituent *sori* of a compound has the semantic feature [a sound], which is the determinant of tensification. This is the reason why each of the second and the third forms in (21c) has a sibilant between the first and the second element of the compound. However, this analysis is wrong, as we will show below. According to our theory, we can correctly predict that the second and the third forms undergo tensing, since the element *sori* in these forms has the semantic feature 'a sound' that triggers the tensing rule. On the other hand, the tensing rule does not apply to the first form in (21c), since 'twittering' or 'charping' that is meant by the element *sori* is analyzed as having a semantic feature 'avoice,' but not 'a sound.'

If our assumption is correct, the analysis that a sibilant *s* is inserted between a vowel and *sori*, which is adopted in dictionaries cannot capture a significant generalization and this analysis regards tensification as an excep-

tional and unpredictable phonological phenomenon. Therefore such an analysis is considered to be wrong, and the occurrence of the phenomenon cannot be predicted correctly with it. This also proves that boundary solution in which the sibilant insertion between doundaries must be assumed is not sufficient to explain the tensification phenomenon, in that this phonological process is regarded as totally exceptional and unpredictable under the boundary solution. However, the tensification discussed above can be accounted for by morpheme-specific semantic features by which the application of the tensing rule is determined. The compound *soissori* and *pissori* have such lexical representations as $[[soi]_N [sori]_N]_N$ and $[[pi]_N[sori]_N]_N$ respectively.

Finally we must discuss a most difficult case cited in (19f). All these forms share the element *se* meaning 'tax.' For convenience, the forms in question can be seen in (22) again:

(22) a. kose [kosse] "a tax on a storehouse" or [kose]
pokoanse [pogwansse] "an extra tax"
cangse [caŋsse] "a market tax"
congryangse [coŋryaŋsse] "a specific duty"
caesanse [cæsansse] "property levy tax"

b. cise [cise] "a land tax"
pukase [pugase] "an additional tax"
sənse [sənse] "a tax on ship"
nucinse [nucinse] "a progressive tax"
sangse [saŋse] "business tax"

c. koanse [kwanse] "customs duties"
cuse [cuse] "a liquor tax"
tanse [tanse] "the single tax"
muse [muse] "duty free"
ponse [ponse] "a principal tax"
cungse [cuŋse] "a heavy tax"
kamse [kamse] "a tax reduction"

The examination of the forms in (19f) and (22) reveals that the tensingg rule is not applied to these forms if the element *se* has the more general

meaning 'taxation.' However, at first glance there appears to be no other semantic feature. The forms in (22b, c) suggest that tensification does not occur if 'a tax on something' and 'a tax' itself is meant by the element *se*. Under this assumption, we can predict that *cuse*, *sənse*, *cise*, *ponse*, *pukase* and *tanse* do not undergo tensing. If this is the case, we must account for the fact that *kose* and *inse* or *intuse* undergo tensing, since they apparently describe 'a tax on somthing.' This is reason why we have a varient pronunciation of each of these forms.

An inspection of *kose* reveals that *kose* means 'a rental fee of a storehouse' and that such meaning implies the transfer of the right to use a storehouse. So we can say in this case that a tax is levied for the right of use. If our theory is correct, the tensification occurring in the forms *caesanse* and *cangse* can be correctly predicted, since they expresses 'a tax on something transferred.' Secondly we must turn our attention to the form *inse* which has a varient form pronounced as [inse]. *Inse* describes 'a tax on the number of persons.' In other words, the tensing rule is applied to the base *se* if 'a tax on quantity of something' is expressed by the base. Therefore the determinant of tensification in this case might be a informal semantic feature [a tax on transfer or quantity]. Even though this feature explains tensification in the forms in (22a), there seems to be some difficulty in predicting the non-occurrence of the phenomenon in the forms as *koanse*, *nuicinse* and *pukase*. In the case of the form *nuicinse*, it can be claimed that the base *-se* describes 'a tax' in its general sense, since we can replace 'a tax' by 'taxation' in its English equivalent. With regarding to the form *pukase*, its meaning cannot be considered 'a tax on quantity.' On trying to explain the form *koanse*, we can notice that there is no reasonable explanation outside of an exceptional rule feature. Otherwise ad hoc requirements will be necessary to accomodating this form.

2.2 In this section we will consider two kinds of suffixes which undergo tensing. These suffixes are *-səng* and *-cək*. The latter *-cək* is appended to a noun to make it express a sense of its state corresponding to a suffix *-ic*, *-ical* or *-like* in English. The former *-səng* has a sense of quality and corresponds to *-ty* or *-ness* in English, but *-səng* is attached to a noun to add to

it an abstract sense of quality. These forms undergo tensing in some cases, but not in other cases, as shown by the following examples:

(23)

[sahφ-jək′] "social"	[miccək′] "aesthetic"
[kagoŋ-jək′] "unreal"	[saccək′] "personal"
[yugi-jək] "organic"	[koŋccək′] "public"
[yaŋjək′] "quantative" or[-ccək]	[kajəŋ-ccək′] "homely"
[cinjək′] "true"	[kɨnsian-ccek′] "short-sighted" or
[phyojək′] "a target"	[-jək′]
[samu-jək′] "businesslike"	[sudoŋ-ccək′] "passive" or[-jək′]
[succək′] "numerical"	[toŋccek′] "dynamic"

The tensing rule cannot apply to the suffix *-cək* when it has the meaning, 'a target.' However, there seems to be no remarkable difference among the forms in (23). In other words, there is no semantic feature working as the determinant of tensification that can be determined from the forms cited in the right column of (23). In spite of this, it is obvious that there are superficial differences between the forms in the left column and those in the right column. One is the difference in the lexical structure, and another is the difference in the enviroment. The elements *su-*, *mi-*, *sa-* in *sucək*, *micək*, *sacək* respectively might be analyzed as bound nouns that cannot occur by themselves. Under this analysis, forms of this kind do not have morpheme boundaries when they occur before the suffix *-cək*. But this analysis is inadequate in that these forms are formed without base forms and we cannot find any word or compound having no base form.

A closer inspection of relevant data reveals that the suffix *-cək* of each form in the left column cannot be replaced by the suffix *-səng* having the meaning of 'quality or characteristic.' On the other hand, the *-cək* in the left column can be replaced by *-səng*, and its derived form is grammatical, and of course, different in meaning. For example, *yuki-səng* but **kacəng-səng*, *cin-səng* but **mi-səng*. This means that there is a semantic feature shared by the forms in the column that triggers tensing rule. The semantic feature is considered to be 'state' that cannot be expressed by the suffix *-səng*. Under our assumption, *samu-cək* [samu-jək′] is exceptional, since form the base we can-

not derive the form **samu-səng* [samu-səŋ]. However, the *-cək* in this form has the sence of 'characteristic' but not 'state,' and this feature prevents it form undergoing tensing. With the semantic feature, the following forms which have nontensed varients of the suffix *-cək*:

(24) kyəngcecək [kyəŋjejək′] "economical"
tongyangcək [toŋyaŋjək′] "Oriental"
irsicək [ilsijək′] "momentary"
citocək [cidojək′] "leading"

The observation of these examples might lead us to claim that it is possible to regard the element *-cək* as a bound form but not as a suffix which occurs in forms being tensed. But this analysis must be rejected, since the *-cək* as a bound noun does not have the sense of 'state' but of 'evident' or 'genuine.'

Next the suffix *-səng* must be considered. Relevant examples are listed as follows:

(25) kaniŋ+səng[kaniŋssəŋ] "possibility" cusəng[cusəŋ] "a drinking habit"
inkan+səng[inganssəŋ]"human nature" horsəng[holsəŋ] "unisexual"
coiim+səng[cɸimssəŋ] "impatience" uənsəng[wənsəŋ] "nature"
insəng[inssəŋ] "tenacity" sinsəng[sinsəŋ] "divinity"
kongsəng[koŋssəŋ] "porosity" kangsəng[kaŋsəŋ] "hardness"
tɨəpang+səng[twəbaŋssəŋ]"isotropy" susəng[susəŋ] "quality of water"
sakyo+səng[sakyossəŋ] "sociality" isəng[isəŋ] "reason"

From the viewpoint of the grammatical function of the morpheme, the element *-səng* can indicate three different morphemes that have the same underlying representation. One is the bound noun *-səng* that has the meanings 'nature', 'anger', 'disposition', etc.. The second is the suffix *-səng* that has almost the same meaning as that of *-səng* functioning as the bound form. The third is a true noun *-səng* having the same meanings as the two stated above. This distinction is adopted in the dictionary [3]. As shown by the form *yangsəng* [yaŋsəŋ] 'two sexes' and *horsəng* in the right column in (25),

the element -*səng* that has the meaning 'sex' cannot undergo tensing . The forms in the right column suggest that there is a feature 'mentality' in common and this semantic feature is the determinant of tensification in this case, but this suggestion must face true counterexamples such as the first three examples in the left colum of(25). The morpheme {-*səng*} undergoes tensingg almost without exception when it is appended to a noun to make an adjectival noun, and the word formation by this suffix is most productive in English .On the other hand, it is impossible for us to represent the forms in the right column as [Noun+ Suffix]. Rather they must be represented as [Noun+Noun]. However, we will not discuss whether the element -*səng* in this lexical structure should be treated as a bound noun or not, since the distinction between a bound noun and a true noun is obscure in spite of Bloomfield's difinition[6] and there is no property that distinguish a bound noun -*səng* from a true noun sing in this case.

Thus we can claim that the suffix -*səng* alone undergoes tensing. One might think that our solution must depend on the distinction between boundaries , but such an objection is not the point. As we have already discussed, just as the morphemes have semantic features that trigger the tensing rule, the suffix -*səng* is classified in a certain morpheme class to which the tensing rule can be applied. This solution is justified by the fact that morphemes or suffixes, have the same phonological representation, must be dealt with as different class formatives if their behaviours are different from a semantic or syntactic point of view.

2.3 In this section, we will discuss some other interesting cases briefly. Firstly the element -*coi* that has the meaning 'a crime' will be considered. Examples are as follows :

(26) a, kisu+coi [kisuccϕ] "a consummated crime"
chamcoi [chamccϕ] "decapitation"
kamkɨm+coi [kamkɨmccϕ] "a crime against freedom"
suroi+coi [surϕccϕ] "a crime against prohibition of accepting a bribe"

b. kocoi [kojϕ] "confession"
tongcoi [toŋjϕ] "the same crime"

uəncoi [wənjϕ] "Original Sin"
sucoi [sujϕ] "a cardinal crime"

It is clear that the base *-coi* in (26b) has a general meaning of 'a crime,' while in (26a) it has the meaning 'punishment' or 'an offense against public law in a practical sense.' The base *-coi* undergoing tensing is related to prosecution in its meaning. In this case, it can be claimed that this semantic feature plays a crucial role in determining the occurrence of tensification.

Next we will discuss the phenomenon of tensification that appears in the base *-kan* 'a room' or 'a space.' Consider the following forms :

(27) sura+kan [surakkan] "a royal kitchen"
chankan [chankkan] "kitchen"
sesu+kan [sesukkan] "a wash stand"
maku+kan [magukkan] "a stable"
cəsun+kan [cənsungan] "a moment"
sukan [sugan] "a few rooms" "between the trees"
tankan [tangan] "a single room"
puca+kan [pujagan] "the relationship of father and son"

The forms cited in (27) indicate that the base *-kan* undergoes tensing if it has the meaning 'a room,' and its initial consonant is not tensed if the element *-kan* has any other meaning than 'a room.' However, the forms *tankan* and *sukan* in the right column suggest that the occurrence of tensification cannot be predicted correctly, since these two forms cannot undergo tensing, though they have the meaning 'room.' A closer examination of these examples reveals that the determinant of the tensification is a semantic feature 'room for specific use' which triggers tensing rule.

Finally we can cite some elements with their semantic features which works as the determinants of tensification as follows :

	"example"	"feature"
(28) a.	-co ; as in n̈ngco [n̈ncco] "a mocking tone"	[abstract sense of tone]

b. —kun; as in haengto+kun [hæŋdokkun] [person that does]
"a bier bearer"

c. —tae; as in nangsəng+tae [naŋsəŋttæ] [thing like a rod]
"a bamboo pole"

d. —pur; as in thanpur [thanppul] "coal fire" [fire]

e. —cur; as in ɨncur [ɨnccul] "a silver vein" [thing like a string]

and so on.

Almost all elements and words relevant to the tensification phenomenon should be examined and analyzed for the purpose of our discussion. But it is not necessary to cite most of the elements in question, since our present purpose is to discuss whether the phenomenon of tensification can be predicted or not, and what its determinant is, if this is the case.

3.0 Hierarchy among the Segments

As we have already said in section 2, it seems that there is a hierarchy among the segments which cause tensification. It is very clear that a liquid /l/ is the strongest of the other three consonants and vowels in this sense. So our discussion should be concentrated on establishing such a hierarchy among the three consonant and vowels. The relevant date are as follows :

(29) a. kukyək [kugyək′] "formality"
sirkyək [silkkyək′] "disqualification"
səngkyək [səŋgyək′] or [səŋkkək′] "establishing formality"

b. samucək [samujək′] "businesslike"
yangcək [yaŋjək′] or [yaŋccək′] "puantative"
sutongcek [sudoŋccək′] or [sudoŋjək′] "passive"

c. cunsang [cunssaŋ] "a stone-stand in front of a tomb"
kyəngsang [kyəŋsaŋ] "a stand for sutras"

d. piparam [pibaram] "a wind and rain"
nunparam [nunpparam] "a wind and snow"

e. anpang [anppaŋ] "an inner room"
naepang [næban] "an inner room"

It is obvious that there is some difference in the strength of each consonant/n, ŋ/and of the vowels as the tensification determining factor. Though no form with the tensification determining consonant /m/ is cited in (29), it can be claimed that the consonants /n, ŋ, m/ are stronger determinants of tensification than vowels.

Moreover, a hierarchical distinction between /n/ and /ŋ/ can be found the forms in (29). The elements after the consonant /ŋ/ in (29b, c, e) have varients ; the element with the tensed initial consonant,and the element with the voiced initial consonant. On the other hand, there are no forms having variants in the case of the environment/n/. This fact indicates that /n/ is stronger than /ŋ/ as the determinant of the tensification phenomenon. Our assumption can be supported by the following examples :

(30) songcən [soŋjən] "electric supply"
soncən~~t~~ing [sonccənd~~i~~ŋ] "a flashlight"
sucən [sujən] "the generation of electricity by water power"

The differences in the strength of the tensification environment between /n/ and /m/ or between /ŋ/ and /m/ should be discussed at this point. However, there are not many relevant data enough to be able to solve the problem completely. There is a pair of examples, ~~i~~nca [~~i~~ncca] "a silvery letter" but k~~i~~mca [k~~i~~mja] 'a golden letter,' that are relevant to this case. This pair of examples makes it possible to insist that /n/is stronger than /m/as a tensification determining condition. As for the distinction between /m/ and /ŋ/, nothing can be said because of the lack of evidence.

Now it is clear that there is the following phonological hierachy with respect to the tensing rule :

(31) Vowels $< \begin{matrix} /m/ \\ /ŋ/ \end{matrix} < /n/ < /l/$

This hierarchical relationship may have something to do with the articulatory point of each sound. Further evidence for assuming some relationship to articu-

lation may be given by the fact that /s, t, c/ are tensed almost without exception if the consonants appear immediately after a liquid /r/.

On the basis of the hierarchy, all the morphemes that undergo tensing under some situations illustrated above can be classified into three or possibly four classes. Class 1 morphemes can undergo tensing even though they occur immediately after vowels, and Class I morphemes, of course, undergo tensing in other situations. Class II morphemes undergo tensing after /m/ or /ŋ/. The initial consonants of Class III morphemes are tensed after /n/. Morphemes that belong to Class IV have consonants /t, s, c/ as their initial consonants except for the morphemes belonging to Class I-III. With this classification, the tensification phenomenon in Korean can be accounted for without reliance on boundary solution.

3.0 Conclusion

It has been argued in this paper that tensification should be accounted for without reliance on ad hoc boundary solution, and that morpheme-specific semantic features are neccessary to account for the occurrence of tensification. It has also argued that there is a hierarchical arrengements among the segments functioning as the trigger of the tensification phenomenon. This assumption was shown to have some interesting consequences : morphemes relevant to tensification can be arrenged in four classes, and the assumption of semantic feature for each morpheme as the determinant of tensification makes clear the semantic-oriented nature of tensification ; whether morphemes undergo tensing or not have nothing to do with the types of compounds. Rather morpheme-specific semantic features and the case in the lexical structure, which is determined semantically, play a crucial part in determining the application of the tensing rule to morphemes.

NOTES

1. Within the framework of Korean phonology proposed in my unpublished M. A. thesis, a Phonological Study of Korean (1970), Tensing Rule has to be incorporated into the theory for explaning the tensification phenomenon appearing in underlying word-initial consonant custers.
2. It is not so clear whether a lax obstruent preceded by a non-homorganic syllable-final obstruent is always pronounced tense in this case, since some dictionary gives to a word belonging to this class a phonetic sign indicating that the lax obstruent should be pronounced tense.-For example, chaekpang' [——ppaŋ].

3. A consonant appearing in this environment is generally regarded as voiced. This analysis might be justified from a phonological viewpoint. However, it seems to me that the nature of consonants in Korean should be reanalyzed from the viewpoint of the tenseness, the degree of aperture proposed by Kim Chin-Wu in his article, Two phonological note: A-sharp and B-flat, in *Contributions to Generative Phonology*, ed. by Michael, K. Brame, or by the phonological hierarchy among them.
4. For this discussion, see Kiparsky, P. (1973) Phonological representations, in *Three dimentions in Linguistic Theory*, ed. by 0. Fujimura.
5. For this discussion, see Chomsky, N. (1970) Remarks on nominalization, in *Readings in English transformational grammar*, ed. by Jacobs, R. and P. S. Rosenbaum, and Strauss, S. L. (1979) Against Boundary Distinctions in English Morphology, in *Linguistic Analysis*, vol 5. No. 4.
6. See Bloomfield, L. (1948) *Language*. New York. Holt.

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