PART TWO

A COMPREHENSIVE ANALYSIS OF

THE VOWEL PHONOLOGY OF KOREAN
Chapter 5

On-glides

5.0. Introduction

In Part I, we have reviewed the various theoretical frameworks in a consistent analysis of the vowel phonology of Korean will be presented. These include feature underspecification theory, feature geometry and syllable structure. We have developed a theory of monovalent underspecification and have proposed a feature geometry that incorporates a branching Place Node along with the possibility of parameterization in the Place Node. We have also adopted McCarthy and Prince's (1986) moraic syllable structure.

In Part II, four different vowels related phenomena in Korean phonology will be dealt with. These include the location of the Korean on-glide in syllable structure, vowel harmony in both ideophones and verbal suffixation, vowel fronting, and vowel coalescence. Each topic will be discussed in separate chapters.

In this chapter, I will discuss the location of on-glides in the syllable structure and the glide formation process. A glide is represented as part of the vowel in the Korean orthographic system. And traditionally, perhaps due to the way glides are represented in Korean orthography, glides have been treated as vowels, and therefore, a sequence like /ya/ is called "diphthong" in prescriptive grammar books. With the re-emergence of the role of the
syllable in phonological description, however, many Korean phonologists have proposed different syllable structures for the description of the Korean syllable, and the status of glides with respect to syllable structure has become one of the interesting issues in Korean phonology.

B-G. Lee (1982), S-C. Ahn (1985) and Gim (1987) propose that the glide is an onset segment, while Kim-Renaud (1978), J-M. Kim (1986), H-S. Sohn (1987a, b), H-Y. Kim (1990), and Y-S. Kang (1991) argue that the glide is a nucleus segment. Sohn (1987b: 104) sums up the controversy concerning the location of the glide in the syllable by observing that a CGVC sequence can be represented in two different ways as shown in (1), which incorporates Levin's (1985) view of syllable structure:

(1) The Different Representations of a Glide

<table>
<thead>
<tr>
<th></th>
<th>a. Glide in the Onset</th>
<th>b. Glide in the Nucleus</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N''</td>
<td>N''</td>
</tr>
<tr>
<td></td>
<td>N'</td>
<td>N'</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td></td>
<td>C G V C</td>
<td>C G V C</td>
</tr>
</tbody>
</table>

In (1a), the glide is located outside of the nucleus (N), while in (1b) it is represented

I will not deal with two other logically possible representations of an on-glide as shown below:

(a) o
    N
    C G V

(b) o
    N
    C G V

J-S. Lee (1992) assumes that a glide can be represented as part of the onset consonant just like in (a), and de Hass (1988) proposes (b) for his explanation of Korean vowel coalescence.
inside of the nucleus. The structures given in (1) can be translated into McCarthy and Prince's (1986) type of moraic syllable structure as in (2)\(^2\):

\[(2) \quad \text{Moraic Representation of a Glide}\]

a. Glide in the onset  
\begin{center}
\[\begin{array}{c}
\sigma \\
\mu \\
C \quad G \quad V \quad C
\end{array}\]
\end{center}

b. Glide under a mora  
\begin{center}
\[\begin{array}{c}
\sigma \\
\mu \\
C \quad G \quad V \quad C
\end{array}\]
\end{center}

Putting aside certain differences between the representations (1) and (2), which are not directly relevant to the discussion in this chapter, I will use the syllable structures in (2) throughout this chapter. One characteristic of McCarthy and Prince's (1986) style of moraic representation is that the structure is, in some sense, impoverished. There are no intermediate constituents such as onset, nucleus or coda. I do not think any of these intermediate units have any formal status in phonological theory. However I will use these terms for the sake of convenience and in the following manner as they apply to Korean:

\[\begin{array}{c}
\sigma \\
\mu \\
C \quad G \quad V \quad C
\end{array}\]

\[\begin{array}{c}
\sigma \\
\mu \\
C \quad G \quad V \quad C
\end{array}\]

\[\begin{array}{c}
\sigma \\
\mu \\
C \quad G \quad V \quad C
\end{array}\]

\[\begin{array}{c}
\sigma \\
\mu \\
C \quad G \quad V \quad C
\end{array}\]

Since, the topic of this chapter is the structure of onset, I will not be concerned about Hyman's syllable structure.

---

\(^2\)There are other types of moraic representation of a syllable such as in Hayes (1989) or Hyman (1985) as discussed in 4.2. (See also Zec (1988).) If we adopt Hyman's (1985) mora-only representation, the controversy over the location of a glide in the syllable structure is trivialized since both the onset and nucleus elements are dominated by a mora as shown below:
(3) Description of the Terminology

Onset : Any segment (or segments) that is placed before a mora in a syllable.

Nucleus : Any segment (or segments) dominated by a mora

Coda : Any segment that follows a mora in a syllable.

The aim of this chapter is mainly to compare the structures in (2a) and (2b) against various data in Korean to see which representation is more adequate in describing Korean phonology. Previously, Sohn (1987a, b) claimed that glides should be represented as a part of the nucleus on the basis of phonotactic data and language game data. For her, (1b) or (2b) is the correct representation. I will call this approach the Nucleus Hypothesis (= NH). H-S. Sohn (1987b), Kim and Kim (1990) and H-Y. Kim (1991) present a comprehensive array of data that argue for the NH. However, in this chapter, I will make a different claim by arguing that glides should not be represented as part of the nucleus rather they should be represented as part of the onset. This Onset Hypothesis (= OH) is reflected by the representation (2a).

After the discussion on these two hypotheses, I will briefly discuss glide formation in Korean in 5.3. The focus of the discussion is on obligatory glide formation which is not accompanied by compensatory lengthening. As an extension of the discussion in 4.3.2, I will propose that exceptional glide formation can be explained by positing nonmoraic vowels in underlying representation.3

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3The discussion in 5.1 and 5.2 is based on the earlier version of Y. Lee (1992b).
5.1. The Onset Hypothesis

In this section, I will introduce the arguments from vowel clash, vowel harmony, onset simplification, (i.e. nucleus degemination), language game data, and phonotactic constraints that will be shown to support the onset hypothesis for Korean glides.

5.1.1. Hiatus Resolving

Hiatus, or vowel clash, is strongly avoided in many languages. Translating the vowel clash into syllable phonology, we may say that hiatus resolving is the process of minimizing onsetless syllables. This is well expressed by Itô's (1989:227) onset principle:

\[
(4) \text{ Onset Principle} \quad \text{Avoid} \quad \sigma \{ V
\]

The Onset Principle, though it is not obligatory in Korean, can be viewed as the basic guideline for syllabification and resyllabification. Whenever onsetless syllables are encountered in the course of phonological derivation, certain changes take place to conform to create a syllable with an onset element such as consonant insertion, glide formation or vowel deletion.

With this in mind, let's consider vowel clashes in Korean. In Korean, when two heterosyllabic vowels are adjacent on the melodic tier, one of the following changes takes place to resolve the vowel clash:
(5) Resolving Hiatus in Korean

a. Glide Formation:

(Make the first vowel into a glide if it is less sonorous than the second.)

\[ \text{cbiu} - \cdot \rightarrow \text{cbiw} \cdot \] (to clean)

\[ \text{mo} - \cdot \rightarrow \text{mwa} \] (to gather)

b. Vowel Coalescence

\[ \text{thante} \rightarrow \text{thente} \] (perhaps)

\[ \text{kai}l \rightarrow \text{ka}:l \] (Fall)

c. Glide Insertion

\[ \text{Minsu} - \cdot \rightarrow \text{minsuya} \] (Oh, Minsu)

\[ \text{phæ} - \cdot \rightarrow \text{phæy} \cdot \] (to come to ears)

It is seen from the data that the outcome of glide formation and glide insertion do not violate the Onset Principle; they can be understood as a result of (4) in that there is no onsetless syllable. Such an explanation is possible only when we take the glide to be an onset segment in Korean. Notice that if glides are nucleus segments, the changes are left unexplained, since, then, glide formation or glide insertion would not help to resolve the vowel clashes. Consider the schematized glide formation under the Nucleus Hypothesis as given in (6):

(6) Glide Formation in NH

\[
\begin{align*}
\sigma & \quad \mu & \quad \mu & \quad \text{GF} & \quad \sigma & \quad \mu & \quad \mu \\
\text{cbi} & \quad \text{i} & \quad \text{u} & \quad \cdot & \quad \rightarrow & \quad \text{cbi} & \quad \text{i} & \quad \text{w} & \quad \cdot
\end{align*}
\]
The output of glide formation in (6) creates another onsetless syllable\(^4\). The NH cannot explain why glide formation would take place in Korean. Further the glide insertion in (5c) is left unexplained. The OH has a simple explanation that glides are inserted to get rid of onsetless syllables in surface representations. Seen from this point, glide insertion makes the output less marked in terms of their syllable structure. The NH has no explanation for glide insertion. Notice that glide insertion has no motivation under the NH and thus cannot point to the generalization that glides are inserted only between two vowels. The output of glide insertion, as is the case in glide formation is another onsetless syllable. These changes are viewed as very natural given the Onset Principle in (4).

### 5.1.2. Vowel Harmony

Vowel harmony in Korean will be extensively dealt with in Chapter 6. In this subsection, I will concentrate on the relevant vowel harmony phenomena related to the issue of the location of Korean on-glides in syllable structure. I also hope that the discussion in this subsection will serve as an introduction to Chapter 6.

In Korean, the light vowels, /æ/, /a/ or /o/ alternate with the dark vowels /e/, /ɔ/ or /u/ in ideophonic expressions and in the verbal morphology. High vowels /i/, /ɨ/ and possibly /u/ alternate with the light vowels in the initial syllable of ideophonic words but they remain unchanged in the non-initial syllable as exemplified in (7):

\(^4\)Following the discussion in 4.3.2, I assume that some of the vowels are represented without moras in the underlying representation. (See 5.3 and 8.3 for further discussion on nonmoraic vowels.)
It is generally agreed (see Sohn (1987b), and Y-S. Kim (1988)) that the forms with dark vowels are thought to be the base and the light forms are derived from the dark forms by the following processes:

(8) Light Form Derivation

a. Introducing a harmony feature as a part of a morphological process and linking the harmony feature to the first vowel.

b. Spreading of the harmony feature to the subsequent syllables, skipping high vowels.

Deferring the relevant discussion to Chapter 6, I will assume that the harmony feature is [RTR] in Korean. The target of the linking is the moraic or nucleus segment. Now if a glide is part of the onset, the prediction is that the glide will not be the target of harmony feature linking or spreading. But if a glide is treated as a vowel, in other words, if it is in the nucleus, we might expect that these glides will participate in the vowel harmony in the linking process in (8a).

5 H-S. Sohn (1986, 1987b) and McCarthy (1983) say that the harmony feature is [+low], while Y-S Kim (1984, 1988) and J-W. Kim (1988) claim that the harmony feature is [+RTR] (or [+DVR]). The controversy does not concern us here. Vowel harmony will be dealt with in Chapter 6.

6By virtue of being underlying high vowels, glides will not participate in the harmony spreading in (8b), regardless of their location in the syllable.
Now, observe the following dark and light vowel ideophones:

(9) Dark and Light Ideophone Alternation

<table>
<thead>
<tr>
<th>Dark ideophone</th>
<th>Light ideophone</th>
<th>Gloss</th>
</tr>
</thead>
<tbody>
<tr>
<td>kh(w)u</td>
<td>kh(w)u</td>
<td>banging</td>
</tr>
<tr>
<td>wiŋ wiŋ</td>
<td>wæŋ wæŋ</td>
<td>buzzing</td>
</tr>
<tr>
<td>wucicik</td>
<td>wacicik</td>
<td>cracking</td>
</tr>
<tr>
<td>syŋ syŋ</td>
<td>syŋ syŋ</td>
<td>whizzing</td>
</tr>
<tr>
<td>(y)ilkucta</td>
<td>yalkucta</td>
<td>queer</td>
</tr>
<tr>
<td>hwi hwi</td>
<td>hwæ hwæ</td>
<td>round about</td>
</tr>
<tr>
<td>kʰwi kʰwi</td>
<td>kʰwa kʰwa</td>
<td>foul smelling</td>
</tr>
</tbody>
</table>

In all of the above examples, glides are not affected by the harmony process. This is quite straightforward given the Onset Hypothesis. We may define that the linking target is a moraic segment, and since glides are part of the onset, they are not the target of the [RTR] linking. Here is the sample derivation with the last word of (9):

(10) Sample Derivation with "foul smelling"

The harmonic feature [RTR] is linked to the first moraic segment. Seen from this
viewpoint, glides do not participate in the harmony process, simply because they are not moraic. Under the NH, the derivation would be like (11):

(11) Wrong Derivation Predicted by NH

\[
\begin{array}{c}
\text{k}^h \quad \text{u} \quad \text{i} \\
\text{[rnd]} \quad \text{[front]} \\
\text{[RTR]}
\end{array}
\longrightarrow
\begin{array}{c}
\text{k}^h \quad \text{o} \quad \text{i} \\
\text{[rnd]} \quad \text{[front]} \\
\text{[RTR]}
\end{array}
\]

(= * k^h oi)

We see here that the NH makes the wrong prediction that glides will also participate in the harmony process since they are part of the nucleus and there is no way to distinguish a vowel from a glide either by structural description or by feature combination.

Perhaps under the NH, it would be possible to redefine the target of the harmony feature linking. I would not venture into this possibility. In any case, it is neither the first vowel nor the first nucleus segment or the first moraic segment. It may not be an easy task to define the target of the harmony feature linking under NH without introducing the head of a mora.

On the other hand, the OH can provide quite simple and consistent explanation to the vowel harmony data. The target is the moraic segment of the first syllable. With the OH, it is shown here that the vowel harmony process is very sensitive to the structural information of segments within a syllable. Therefore the OH can provide a much more consistent and general analysis for the vowel harmony data, and such is not available for the NH.
5.1.3 Onset Simplification

A glide and vowel sequence is often fused into one segment in Korean, which Sohn (1987a, b) refers to as nucleus degemination. This phenomenon is witnessed in colloquial standard Korean as well as in the Kyungsang (=KS) dialect. Consider the following examples:

(12) Examples of Nucleus Degemination

<table>
<thead>
<tr>
<th>p'yam ~ p'æm</th>
<th>(cheek)</th>
</tr>
</thead>
<tbody>
<tr>
<td>kyə ~ ke</td>
<td>(chaff)</td>
</tr>
<tr>
<td>pinyŏ ~ pine</td>
<td>(a stick hair pin)</td>
</tr>
<tr>
<td>myŏnili ~ menili</td>
<td>(a daughter-in-law)</td>
</tr>
<tr>
<td>pyŏlak ~ pelak</td>
<td>(thunder)</td>
</tr>
</tbody>
</table>

H-S. Sohn (1987a, b), refuting C-W. Kim's (1968) metathesis analysis claims that the process can be viewed as merging two nucleus segments into one as schematically shown in (13):

(13) Nucleus Degemination

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7In the KS dialect the nucleus degemination is obligatory, while both forms co-exist in Standard Korean.
One interesting observation we can make here is that the output of the nucleus degemination is a short vowel, unlike the case of coalescence in which two nucleus segments get together to make one long vowel. Thus Sohn formulates a double delinking rule for the nucleus degemination that involves the deletion of features as well as the deletion of an x-slot. However I argue that the process is actually an onset simplification process, which is schematically shown in (14):

(14) Onset Simplification

Though both the Nucleus Degemination analysis and Onset Simplification analysis can successfully account for all the variation in (12), these two analyses make very different predictions about the triggering factor of the phonological change. The Nucleus Degemination says that the presence of the two different elements under a nucleus triggers the process, while the Onset Simplification argues that the preceding consonant is the trigger. There is no example of a Korean word where a word initial GV sequence undergoes the Nucleus Degemination. This is more dramatically shown in the KS dialect where the Onset Simplification is obligatory as shown in (15):

(15) More Examples on Nucleus Degemination

a. kyeca ~ keca (mustard)
yəca *eca (woman)

b. kyəul ~ keul (winter)

Examples from the KS dialect clearly support the Onset Simplification analysis by showing that in spite of the obligatory nature of the Nucleus Degemination process in the KS dialect, the word initial GV syllable does not undergo the process and that the optional degemination is not applicable to GV syllables in the Standard dialect. My proposal for the KS dialect is that there is a syllable onset constraint that there must be just one onset consonant in the KS dialect, which I will call the Single Onset Consonant Constraint (=SOCC). The Onset Simplification, then, can be viewed as a process of making syllables less marked; it is obligatory in the KS dialect and optional in the Standard dialect.

On the other hand, the NH will have to make a certain ad hoc provision that the nucleus degemination is not applicable to onsetless syllables or that glides are syllabified into the onset when it is not preceded by any other consonant in the same syllable and they are syllabified into the nucleus when they follow a consonant within a syllable. No such provision is needed under the Onset Hypothesis to account for the failure of nucleus degemination in glide-initial words. Given these comparisons, we see that the OH is much superior to the NH in explaining the interaction between glides and consonants.

5.1.4. Language Game

In this subsection, we will consider language games in Korean and will discuss how these data are related to the location of glides in syllable geometry. In Korean, there is an interesting language game that duplicates each syllable with some operations on the duplicated
syllables. Following Gim (1987), I will call this CV insertion language game "Popuri" language. First observe the following data:

(16) Popuri Language Forms

<table>
<thead>
<tr>
<th>Word</th>
<th>Original Form</th>
<th>Reduplicated Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>satali</td>
<td>sa-pa-ta-pa-li-pi, sa-ka-ta-ka-li-ki</td>
<td></td>
</tr>
<tr>
<td>camsil</td>
<td>ca-pam-si-pil, ca-kam-si-kil</td>
<td></td>
</tr>
<tr>
<td>salam</td>
<td>sa-pa-la-pam, sa-ka-la-kam</td>
<td></td>
</tr>
</tbody>
</table>

Roughly speaking, the Popuri language forms are derived from lexical words by adding CV at the end of each vowel segment. I will follow McCarthy and Prince's (1986) syllable reduplication analysis: a core syllable is reduplicated after each syllable with coda consonant being extrametrical and the phonemic overwriting process will delink onset elements of the reduplicated syllable and link certain specified consonants such as /p/, /k/ or /s/.

Here is the sample derivation of the language game form of the last word of (16):

(17) Exemplary Derivation of Popuri Form with "man"

(Reduplicated syllables are represented in bold face.)

\[\text{Please refer to Marantz (1982) for a different analysis in the CV framework.}\]
Now, suppose the input of the Popuri language has a glide. We can see that the OH and the NH make different predictions in this case. The OH predicts that the glide will not appear in the reduplicated syllable, since the glide will be delinked, or erased, in the phonemic overwriting process. Onset delinking will delink any onset segment including glides. On the other hand, the NH will predict that the glide will appear in the reduplicated syllable, since glides are not subject to the onset delinking process by virtue of the fact that they are part of the nucleus.

Observe the language game forms of word that contain glides in (18) (See also Gim (1987), Y-S. Kang (1991), J-S. Lee (1992), Y. Lee (1992a)):

(18)  Additional Popuri Language Forms
hakkyo (school) → ha-pak-kyo-po *ha-pak-kyo-pyo
yŏŋkam (grandpa) → yŏ-ŋ-ka-pam *yŏ-ŋ-ka-pam
kwŏnthŭ (boxing) → kwŏ-ŋ-nt-ŭ-pu *kwŏ-ŋ-nt-ŭ-pu
hyŏŋkwŏnjĭ (florescent lamp) → hyŏ-ŋ-kwa-ŋ-tĭ-pĭ
* hyŏ-ŋ-kwa-ŋ-tŭn-tĭ-pĭ

It is clear from the data in (18) that the phonemic overwriting process overwrites not only consonantal onset segments but also glides, if there is any in the reduplicated syllable. I take this as relatively strong evidence that glides are part of onset in the Korean language.

One problem that arises is Kim and Kim's (1990) data (also reflected in H-S. Sohn (1987b), H-Y. Kim (1991)) of the same language game. They claimed that Popuri language forms support the Nucleus Hypothesis. In their data, the acceptable and unacceptable forms are reversed. Consider some of their data:
Different Output of Popuri Language Forms.

\begin{align*}
yaku \text{ (baseball)} & \rightarrow \ y\text{-}p\text{y}-k\text{-}k\text{-}p\text{u} & \text{\textasciitilde}y\text{-}p\text{a}-k\text{-}k\text{-}p\text{u} \\
\text{kw\text{	extae}nse (power)} & \rightarrow \ k\text{w}\text{\textae}-p\text{\textae}-n\text{-}s\text{-}p\text{-}e & \text{\textasciitilde}k\text{w}\text{\textae}-p\text{\textae}-n\text{-}s\text{-}p\text{-}e \\
c\text{w\textasciitilde}a\text{\textae}k \text{ (seat)} & \rightarrow \ c\text{w}a-p\text{\textae}-s\text{-}a\text{-}p\text{-}k & \text{\textasciitilde}c\text{w}a-p\text{\textae}-s\text{-}a\text{-}p\text{-}k
\end{align*}

If these data are correct, it would weaken the argument in this subsection. I do not have any explanation for how to incorporate Kim and Kim's data to the present theory. However, I think I can make a couple of observations for the language game data in (19).

The CV insertion language game has been widely used for some age group among Koreans. Many of them used to play this language game from their preschool days throughout their elementary school days and even after. I have surveyed many Korean speakers who know this language game, and almost all of their language game forms show that glides do not appear in the reduplicated syllables. Therefore I have reasonable doubt about the source of the data in (19).

If the data in (19) came from the speakers not accustomed to this language game, then I will venture to make the second observation which is related to Korean orthography. Most Korean native speakers, as was mentioned in the introduction, were taught that glides are vowels and a glide plus vowel sequence is a diphthong. Further, Korean glides are represented either as part of a vowel or as a separate vowel in Korean orthography. The round glide has the same shape as the vowel /o/ or /u/;\footnote{To be more specific, I will have to say that the round glide has two different forms in the Korean orthography. \([w]\) is represented in the orthographic form of /o/, when it is followed by /a/ or /e/, otherwise it is represented in the orthographic form of /u/.} And the front glide [y] is represented by adding one short bar, either horizontal or vertical, to the vowel. Here are some examples of orthographic representation of glides:
If a Korean subject who does not know this language game is asked to insert a consonant-vowel sequence after each vowel, then chances are that the person, being unable to give the instant output of the language game form, may stick to the graphic forms of Korean letters and will literally draw out the language game outputs with conscious effort. And in the course of doing this, they will simply copy the vowel shape onto the reduplicated syllable. The result is the inadvertent transfer of the entire vowel shape, including glides, hence the appearance of glides in the resultant Popuri language output.\(^{10}\) The point is that, in this type of experiment, what the subjects are doing is the manipulation of the written symbols. They are not dealing with the linguistic units of pronunciation. Seen from this viewpoint, given the orthographic representation of glides, it is quite understandable that some who do not know the language game will produce (19).

\(^{10}\) I would offer a similar account to the vowel switching language game introduced by Sohn (1987b). Sohn argues that glides are nucleus elements with the following language game output:

\[
\begin{align*}
\text{kaly} & \rightarrow \text{ky}al\text{a} *\text{kaly} \\
\text{h}e\text{y}ol & \rightarrow \text{lya}o *\text{ho}yel \\
\text{sun}o & \rightarrow \text{sy}o *\text{so}n
\end{align*}
\]

As Sohn admits, the vowel switching game is not a natural language game. I have found that this is a very difficult game for me and for many other Korean speakers as well. Given the difficulty of the game and the orthographic forms of glides, I would say that what the subjects are operating on in such a language game is written symbols and not speech segments. The language game data, from this point of view, can be treated as an artifact from the orthographic forms.
One piece of supporting evidence for the observation made here is the language game data that I collected from preschool children. Informally, I made group contact with seven Korean speaking children, ages between four and seven living in Bloomington, Indiana, who did not yet have full control of Korean orthography. I gave them the exemplary derivations with control words that did not contain glides. When they became comfortable with the language game, I asked them to produce the language game forms for the words with glides. The targets words, words with glides, were interspersed among other control words that did not have glides.\textsuperscript{11}

There were individual differences in their performance. Three of them were quite good at this language game, while others, especially the youngest one, seemed to have difficulty in producing the language game outputs.\textsuperscript{12} The interesting result is that the language game forms produced by the three good performers do not have glides in the reduplicated syllable in such target words as /hakkyo/ (school), /y\textsuperscript{ca}/ (girl), /sakwa/ (apple) and /wanj/ (king). I take this result as strong evidence that glides are not copied onto the reduplicated syllable, and so they are not part of the nucleus.

To sum up, if we take out the possible interference of the orthographic forms from the language game discussed in this subsection, and/or if we collect data from those who are quite accustomed to Popuri language, we can safely say that the data given in (18) truly reflect the

\textsuperscript{11}The control and target words are as follows:

<table>
<thead>
<tr>
<th>Control words</th>
<th>Target words</th>
</tr>
</thead>
<tbody>
<tr>
<td>salam (man)</td>
<td>hakkyo (school)</td>
</tr>
<tr>
<td>kunin (soldier)</td>
<td>sakwa (apple)</td>
</tr>
<tr>
<td>i\textsuperscript{\texttt{k}}i (ink)</td>
<td>y\textsuperscript{\texttt{ca}} (woman)</td>
</tr>
<tr>
<td>ac\textsuperscript{\texttt{h}}im (morning)</td>
<td>w\textsuperscript{\texttt{an}}j (king)</td>
</tr>
<tr>
<td>kamca (potato)</td>
<td>k\textsuperscript{\texttt{æ}}mi (ant)</td>
</tr>
</tbody>
</table>

\textsuperscript{12}The typical type of mistake was to insert -pa- after every vowel.
syllable structure of Korean. The careful analysis of the language game, therefore, actually supports the Onset Hypothesis.

### 5.1.5. Phonotactic Constraints

Sohn (1987a,b) claims that there is no phonotactic constraint, or co-occurrence restriction, that holds between consonants and glides. She said that the lack of phonotactic constraints between a consonant and the following glide provides an argument *ex silentio* against the Onset Hypothesis. Further, she argues that any consonant can be followed by any "diphthong" (the diphthong here means a glide-vowel sequence). However it should be pointed out that there are underlying constraints that hold between consonants and glides in Korean. Given in (21) are the impossible sequences:

\[(21) \text{ Phonotactic Constraints between Consonants and Glides}\]

a. labial consonant - round glide (*[labial] [labial])
   
   *pw, *mw (/pu/ and /mu/ are wellformed sequences.)

b. alveolar consonant - palatal glide (*[coronal] [coronal])
   
   *sy, *cʰy (/si/ and /cʰi/ are well formed sequences.)

We might also say that there is a very strong constraint in a Korean onset cluster under the Onset Hypothesis: the second member of a consonant cluster should be a glide.

H-S. Sohn (1987a, b) focuses on introducing some phonotactic constraints that hold between glides and vowels (in her term, between two nucleus segments). Her observation can be summarized as in (22):
(22) Phonotactic constraints between glides and vowels

a.  *[+high, -round] [+high, -round]  (*yi, *yi)

b.  * [+round] [+round]  (*wu, *wo)

Now we have the argument from both sides. There are phonotactic constraints between consonants and glides as well as between glides and the following vowels. However, the phonotactic constraints given in (21) and (22) are very different from each other. In the examples given in (21), the constraint disallowing pw, sy while permitting pu, si clearly shows that the glides are different from vowels. Since [w] and [u] as well as [y] and [i] are both supposed to share the same features the difference should be incorporated by its location. I argue that the phonotactic constraints in (21) are the real evidence for the subsyllabic structure of a syllable.

Turning to (22), we find that we have [yi] sequence at least in the ideophone in order to explain the ilkucta ~ yalkucta alternation as shown in (9). If we exclude yi from the constraints in (22), we see that all the three remaining impossible combinations (yi, wu, and wo) are the sequence of phonetically very similar segments. The occurrence of such sequences (especially yi and wu) is rare cross-linguistically. Ohala and Kawasaki (1984: 122) claim that the combination of these two similar sounds fails acoustically to create "minimal difference" or "minimal modulation" and that is why the sequence is universally rare. Therefore the constraint in (22) can be explained by the universal tendency of avoidance of non-optimal sounds. Further we find that not only wu or yi, but also the heterosyllabic uu or ii are rarely found in Korean. I take these observations as relatively strong evidence for the Onset Hypothesis.
5.2. Re-examining Data Supporting the Nucleus Hypothesis

In this section, we will examine some other data that are supposed to support the NH. We will discuss coda cluster simplification, the l/r alternation, and reduplication data from ideophones. We will show either that these do not constitute a strong argument against the OH or that the data can be reanalyzed under the OH without any additional complication or exception.

5.2.1. Cluster Simplification

In Korean, only one obstruent is allowed in the onset and one in the coda. Kim and Kim (1990) used cluster simplification to argue for the Nucleus Hypothesis. Let's first briefly review their arguments. Observe the following data from Kim and Kim (1990):

(23) Cluster Simplification
a. kaps "price" kaps - i (Nom), but kap-man "price only"
b. noks "spirit" noks - i (Nom), but nak-to "the soul also"
c. ilk- "to read" ilk - ãla (Imp), but ik-ca "let's read"
d.colm- "young" colm - in (adj), but col-ciman "though young"

(24) Lack of Cluster Simplification
a. ol-pyo "this year's crop"
b. kak-pyo "each vote"
c. sil-kwa "fruit"
d. col-myo "exquisiteness"
According to Kim and Kim's (1990) analysis of (23), one of the first two consonants disappears when they are immediately followed by a third consonant. In (23a) and (23b), the second consonant is deleted, while in (23c) and (23d), the first consonant is deleted. In (23a), when /ps/ is followed by a vowel, a nominative marker in this example, both consonants appear. However if another consonant, /m/, follows, all of a sudden /s/ disappears. Now the crucial data are given in (24). Here the segment that follows the two consecutive consonants is a glide. If glides are vowels, then we won't get cluster simplification, just like in the second column of (23). However, if glides are consonants, then we are supposed to find the same cluster simplification process as in (23). The data (24) show that if the third segment is a glide, no consonants are deleted. Kim and Kim interpret this to mean that glides are not consonants, which in turn mean that glides are not onset elements.

There is one thing we have to note here. I think the analysis given above presupposes that consonant cluster simplification is a rule that refers to the sequence of consonants. If so, the analysis clearly reflects the demerits of a rule approach to consonant cluster simplification. Also notice that the rule approach cannot say anything about when two consonants are placed at the end of a word. The analysis would say that cluster simplification takes place when two consonants are followed by the third consonant or by a word boundary. In other words, the environment of cluster simplification is " _____ {C, #}". Kahn (1976) convincingly showed that whenever " _____ {C, #}" serves as the environment of a rule application, that rule can be reanalyzed in reference to the syllable structure.

Cluster simplification is not a separate rule but a natural result of the syllabification process. Consider the syllable structure proposed by the OH and the NH in (25):
The NH can explain the data neatly with the structure in (25b). According to the NH, only a single consonant is allowed both in the onset and in the coda in Korean. Therefore if there are three consonants in a row, all of them cannot be incorporated into a syllable, and unincorporated consonants are doomed to be erased by the Stray Erasure Convention as in It™ (1986). Since glides are not counted as consonants, the two consonants that precede the glide will be syllabified: the first one will be syllabified as a coda of a syllable and the second consonant will be syllabified as an onset of the next syllable. And if there are two consonants at the end of a word, one of them will be erased since Korean syllable structure allows no more than one element in the coda.

Notice, however, the OH can also equally handle the data. There is a constraint that a second member of an onset is a glide. When three consonants come together, one of them cannot be syllabified, given the syllable structure in (25a). But if the third one is a glide, then the syllable template allows a consonant-glide cluster in the onset and therefore all three can be syllabified, unless, of course, such a sequence is located at the beginning of a word.

As such, both the OH and the NH can explain the cluster simplification. That the NH can explain the data given in (23) and (24) does not mean only the NH can provide a correct account. Therefore the argument against the OH on the basis of cluster simplification is not strong enough.
A final remark on the onset consonant cluster is in order: in the literature, there is a generally accepted assumption that clusters are allowed neither in onset nor in coda in Korean (cf. Kim-Renaud (1978), H-S. Sohn (1987b) and J-W. Choe (1986)). This assumption is generated under the traditional notion that glides are nucleus elements. Under the view that a glide is part of the onset, a glide could be preceded by another consonant in a syllable as the syllable structure (25a) shows. Further, by allowing this type of consonant cluster in the onset, it does not mean that any two consonants can come together in an onset. The second member of the onset cluster should be a glide. This can be easily formalized by positing a Syllable Structure Constraint that disallows the sequence of two consonantal root nodes pre-moraically within a syllable.

5.2.2. \l/r Alternation

In Korean, the \l/r contrast is not phonemic. These two sounds are in mutually exclusive environments. Traditionally, it is thought that [l] is the underlying segment and this sound becomes [r] when it is placed in between two vowels. Kim and Kim (1990) reanalyzed the \l/r alternation in Korean and suggest that the liquid is realized as [l] in the syllable coda position and as [r] when it is placed in the onset position of a syllable. Observe the data from Kim and Kim (1990):

(26) \l/r Alternation in Korean

a. kil (street) kil-to (street also), cf. kil-e [kire] (the street (Loc.))
   tal (moon) tal-pi\u0101 (moon-light), cf. tal-i [tari] (the moon (Nom.))
   pul (fire) pulk'oe\u0101 (flame) cf. pul-il [puril] (fire (Acc.))
b. il-yo-il [iryoil], *[ilyoil] (Sunday)

sŏl-yok [sŏryok], *[sŏlyok] (vindication)

kil-wŏl [krwŏl], *[klwŏl] (writing)

mil-wŏl [mirwŏl], *[milwŏl] (honeymoon)

Kim and Kim (1990) say that the data in (26) argue for the NH. Onsetless syllables are highly marked universally, and glides are syllabified into a nucleus. Therefore whenever the glide is preceded by a consonant, that consonant should be syllabified in the onset position. Their analysis is very simple and consistent. I will not argue that their analysis is wrong in this subsection.

However, I claim that the data in (26) are not incompatible with the OH. It must be made definitely clear that both the Onset Hypothesis and the Nucleus Hypothesis will take the liquid and make it as a part of the onset as the following structure shows:

(27) The Representation "Sunday"

a. OH Approach

| | | | | |
|---|---|---|
| 1 | 1 | 1 |

b. NH Approach

| | | | | |
|---|---|---|
| 1 | 1 | 1 |

As shown in (27), both approaches observe the Maximal Syllable Onset Principle. An additional observation comes from Kyungsang dialect variation. In the KS dialect, the words in (26b) are pronounced with the [l] sound instead of [r] unlike the prediction made by the NH. In other words, KS dialect speakers' pronunciation corresponds to the asterisk-marked pronunciation of the words in (26b).
Under the OH, we can see that the explanation is straightforward. Given the Single Onset Consonant Constraint in the KS dialect (cf. discussions in 5.1.3.), the liquid sound will be syllabified as a coda consonant as shown in the following example:

(28) The Syllable Structure of "Sunday" in the KS Dialect

```
  σ  σ  σ
 / \ / \ / \ μ μ μ
  i  i  o  i  l
```

We can see that the liquid segment in question cannot become an onset element of the second syllable in (28) because of the Single Onset Consonant Constraint (SOCC) that holds in the KS dialect. The SOCC forces the liquid to be syllabified as a coda of the first syllable as shown in (28). Therefore it is fully predictable that liquid segments which come before glides will be realized as [l] in the KS dialect. Of course, it is correctly predicted that the KS dialect pronunciation of liquids in the words in (26a) are exactly like the standard dialect.

On the other hand, the NH may not successfully handle the KS dialect, without the assumption that glides are onset segments in the KS dialect but a nucleus segment in the Standard dialect (cf H-Y. Kim (1991: 12-13)) or that the KS dialect allows and actually prefers onsetless syllables. Neither of the alternatives can be incorporated in the present framework. The second alternative cannot be taken since it goes against Itô's (1989) and Steriade's (1988) claim that the unmarked setting of the onset parameter is the obligatory onset. The overall phonology of the KS dialect and Korean phonology in general for this matter actually argues against the internal onsetless syllable structure.

One other piece of evidence supporting the Onset Hypothesis comes from J-S. Lee's
(1992) observation regarding the l/r alternation in the Standard dialect. She argues that onset incorporation across the word boundary is optional in Korean. Consider the following examples:

(29) Optional l/r Alternation (data from J-S. Lee (1992: 42))

mul (water) + oli (duck) \(\rightarrow\) \([\text{mulori}]\) or \([\text{murori}]\)
sikol (country) + ai (kid) \(\rightarrow\) \([\text{sikolai}]\) or \([\text{sikorai}]\)

J-S. Lee (1992) observes that \([r]\) appears in normal speech and \([l]\) appears in slow and careful speech. The \([r]\) forms, however, do not show up if the second member of the compound is glide initial as shown in (30):

(30) Lack of Alternation

hæmul (see food) + yoli (dish) \(\rightarrow\) \([\text{hæmulyori}], *[\text{hæmuryori}]\)
sikol (country) + yəca (woman) \(\rightarrow\) \([\text{sikolyəca}], *[\text{sikoryəca}]\)

If vowel initial syllables and glide initial syllables are both nucleus initial, the NH cannot deal with the data given in (30) since the NH would predict that vowel initial and glide initial syllables should behave the same way. However, with the Onset Hypothesis, we can argue that the process in (29) is to provide an onset to the vowel initial syllable of the second member of the compound. Consequently the process is not applicable to (30) since the second member of the compound already has an onset.

It has been clearly shown that the OH and not the NH can handle all the relevant data on the l/r alternation. This strongly suggests the correctness of the OH.
5.2.3 Reduplication and Onset Deletion

In Korean, there are many interesting reduplicative ideophones. Consider the following examples:

(31) Reduplicated Ideophones

- hintil - hintil (swaying)
- mallae - mallae (flabby)
- chullae - chullae (overflowing)
- pintu - pintu (loafing)

The first and the second parts of the ideophones which are separated by hyphens in the examples are exactly identical to each other. Further, there are some ideophones that seem to show other processes in addition to reduplication. Observe the following data:

(32) Ideophones with an Additional Process

- aki - caki (sweet)
- osun-tosun (friendly)
- ulkite-pulkite (colorful)
- alluk-talluk (stained)
- als'on - tals'on (ambiguous)

Looking at the data, we can see that some other process than simple reduplication occurs here. What is interesting to note is that the first part of the words in (32) is vowel initial, while the second part is consonant initial. As a matter of fact, the first part is exactly
the same as the second part except that there is no consonant in the initial position. One way of analyzing these data is to say that the second part is the base form. And these base forms undergo the process of prefixal full reduplication with the onset of the reduplicated forms being lost, presumably by an ideophone specific rule of onset deletion. I would not try to formalize the process here. All we have to note here is that there is $\emptyset$~C contrast between the first and the second halves of the ideophones.\(^{13}\)

Now suppose that there is an ideophone that contains an initial consonant-glide cluster along with the type of reduplication in (32). Kim and Kim (1990) assume that if the glides are treated as an onset, it will not appear in the ideophone initial position, and if they are truly nucleus segments, they will not be deleted. Kim and Kim (1990) present the following additional data:

\begin{equation}
\begin{array}{ll}
\text{Additional Reduplicated Ideophones} \\
\text{yam - nyam} & \text{(tasty)} \\
\text{y大力k - l大力k} & \text{(vivid)} \\
\text{yon - nyon} & \text{(teasing)} \\
\end{array}
\end{equation}

Apparently, the glides in the examples in (33) do not seem to be deleted in the word-initial position. These data, therefore, may be used to argue for the Nucleus Hypothesis, if they belong to the ideophones in (32). But we have to take into consideration some restricted distribution of the type in (33) along with other phonological processes that can be found in Korean. We have to pay attention to the fact that all the ideophone examples in (33) have front glides [y] in the stem. There is no single example of this type that has a round glide in it. Further, the ideophone stems of this type all begin either with a coronal nasal or with a

\(^{13}\)Please refer to J-S. Lee (1992: 126-128) for detailed discussion.
liquid. We cannot find any example of this type that begins with any other consonant. Since these gaps are so systematic, we will have to reconsider the analysis of the ideophones in (33). What I claim here is that the ideophones in (33) do not belong to the category of ideophones in (32). Rather, they belong to the ideophones in (31).

This claim is supported by other phonological processes that can be found in Korean. In the Korean language, all liquids are alveolar sounds, and those liquids are changed into the homorganic nasal, [n], on the surface level, when they are placed in word initial position as exemplified in (34):

(34) l/n Alternation in Word Initial Position

<table>
<thead>
<tr>
<th></th>
<th>(pleasure)</th>
<th>(paradise)</th>
</tr>
</thead>
<tbody>
<tr>
<td>khwae</td>
<td>lak</td>
<td>nak - won</td>
</tr>
<tr>
<td>kin</td>
<td>lo</td>
<td>no - toje</td>
</tr>
<tr>
<td>mi</td>
<td>lae</td>
<td>nae - il</td>
</tr>
<tr>
<td>man</td>
<td>lu</td>
<td>nu - kak</td>
</tr>
</tbody>
</table>

Another relevant phonological process that we have to note here is the alveolar nasal deletion phenomena in Korean. When [n] is placed in word initial position and is followed by a front vowel or a front glide, they do not appear in the surface forms. The relevant examples are given in (33):

(35) Alveolar Nasal Deletion in Korean.

<table>
<thead>
<tr>
<th></th>
<th>(nun)</th>
<th>(woman)</th>
</tr>
</thead>
<tbody>
<tr>
<td>su</td>
<td>nyo</td>
<td>yo - ca</td>
</tr>
<tr>
<td>pan</td>
<td>nyo</td>
<td>yo - to</td>
</tr>
<tr>
<td>sip</td>
<td>nyan</td>
<td>yon - mal</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>(ten years)</th>
<th>(urethra)</th>
<th>(year end)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Now, if the liquid is placed in the word initial position and is followed by a front vowel or a front glide, that liquid will become an alveolar nasal by the process shown in (34) and that nasal will be delinked by the process which is responsible for the alternation in (35). Therefore a liquid sound or an alveolar nasal will not appear in word-initial position before a front glide in the surface representation of any Korean word.

With these observations, let's reconsider the data given in (35). All the examples in (35) have either liquids or nasals, and they are followed by front glides. We do not have a single ideophone of this type, which has a consonant other than a liquid or an alveolar nasal. Given such restrictions, we may say that the deletion of liquids or alveolar nasals may not be the result of the ideophone specific onset deletion process. The examples in (33), therefore, can be reanalyzed, as full reduplication like those in (31), but they additionally undergo liquid to nasal change along with nasal deletion in word initial position.

As such, if we take into consideration other phonological processes in Korean, the examples of ideophones in (39) can be explained naturally within the Onset Hypothesis. These examples thus do not exclusively support the Nucleus Hypothesis.

5.3. Glide Formation

Having discussed the location of Korean on-glides in the syllable structure in the previous sections, I will briefly discuss the glide formation process in Korean. Glide formation takes place when two moraic vowels get together in the process of morphological derivation. Thus as discussed in 5.1.1, it can be viewed as a process of eliminating vowel clash. Glide formation involves delinking a moraic segment, if it is a possible candidate for becoming a glide, i.e. a high vowel or a round vowel, and as a result, the mora which dominated the glide is
left unfilled, then the following vowel segment spreads to the empty mora to make a well-formed syllable as schematically shown in (36):

\[(36) \quad \text{Glide Formation}\]

\[\begin{array}{c}
\sigma & \sigma \\
\mu & \mu \\
\{i\} & \{o\} \\
C & V
\end{array} \quad \rightarrow \quad \begin{array}{c}
\sigma & \sigma \\
\mu & \mu \\
\{i\} & \{o\} \\
C & V
\end{array} \quad \rightarrow \quad \begin{array}{c}
\sigma \\
\mu & \mu \\
\{i\} & \{o\} \\
C & V
\end{array}\]

It should be noted that the vowel should not be less sonorous than the preceding high or round vowel in order to trigger glide formation. For example, the word /moi/ (feed) may not become [mwi] since the preceding vowel /o/ is more sonorous than the following vowel. Further it is interesting that the front vowel /e/ never undergoes glide formation though it may be followed by a more sonorous segment such as /æ/ or /a/.

The glide formation given in (36) shows that vowel length can only be stated in terms of the moraic tier. All and only long vowels are associated to two moras. This seems to represent another advantage over Levin's (1985) style of syllable representation as adopted by H-S. Sohn in Korean. We can make an interesting observation from Sohn's proposal. She argues that long vowels are represented as a vowel linked to two x slots in the surface representation as shown in (37):

\[(37) \quad \text{Sohn's Representation of Glides and Long Vowels}\]

\[
\begin{array}{c}
\text{a. Glide and Vowel} \\
N \\
x \quad x
\end{array} \quad \begin{array}{c}
\text{b. Long Vowel} \\
N \\
x \quad x
\end{array}\]
Putting (37a) and (37b) together, we come to a conclusion that a glide-long vowel sequence, often derived by the application of glide formation in Korean as in B-G. Lee (1979a), or in E. Han (1990) has to be represented as in (38):

(38) Glide-Long Vowel Sequence

One problematic aspect of the structure in (38) is that Sohn's syllabification algorithm does not allow three x-slots under a nucleus. Thus the representational inadequacy found in the representation of a glide and long vowel sequence as in (38) seems to argue against the NH.

Turning back to glide formation, we find that glide formation is optional for some verbs while it is obligatory for others in infinitive formation. Consider the following data from E. Han (1990):

(39) Glide Formation

a. Optional

\begin{align*}
\text{po} + A & \quad \text{poA} \quad \text{pwA:} \quad \text{(to see)} \\
\text{ki} + A & \quad \text{kiA} \quad \text{kyA:} \quad \text{(to crawl)} \\
\text{k'\text{u} + A} & \quad \text{k'\text{uA}} \quad \text{k'wA:} \quad \text{(to dream)}
\end{align*}

b. Obligatory

\begin{align*}
\text{o} + A & \quad *\text{oA} \quad \text{wA} \quad \text{(to come)} \\
\text{keu} + A & \quad *\text{keuA} \quad \text{kewA} \quad \text{(to vomit)} \\
\text{moi} + A & \quad *\text{moiA} \quad \text{moyA} \quad \text{(to gather)}
\end{align*}
Before getting into the analysis of the data given in (39), I will simplify the data by eliminating some of the peripheral problems in the analysis. First the segment represented by /A/ is realized as [a] after /o/ or /a/, and as [ə] elsewhere. The alternation will be discussed in Chapter 6. Second, we see that there are alternations in the vowel length in the data. I will follow B-G. Lee (1979a), Kim-Renaud (1982) and others in assuming that vowel length is contrastive only in word initial syllables.

Consider the data in (39). The basic question that Han (1990) raises is why glide formation is obligatory in (39b) and why such obligatory glide formation is not followed by compensatory lengthening. The key examples are the first words in (39a) and (39b), since in these cases both words are monosyllabic and thus we cannot resort to non-initial vowel shortening. E. Han (1989) argues that syllabification is postponed until after the suffixation for the words in (39b) but syllabification takes place very early for the words in (39a). The derivations of the first words in (39a) and (39b) are given in (40):

(40) Early vs. Late Syllabification

\[ \begin{align*}
\text{a. Early Syllabification ([pwa:])} & \\
\end{align*} \]
b. Late Syllabification ([wa])

As shown here, E. Han (1990) claims that syllabification takes place very early for the words in (39a), while the late syllabification is applied to the words in (39b). In (40b), the morpheme "o" (to come) is syllabified only after the suffixation of infinitive forms and the syllabification process takes /o/ as the onset. And since the morpheme "o" does not have a mora there is no compensatory lengthening.

Thus Han's (1990) distinction between early and late syllabification can explain both the obligatory nature of the glide formation and the lack of compensatory lengthening in the words of (39b). There are two interrelated problems in E. Han's (1990) explanation. Firstly given the fact that the syllabification process is predictable from the underlying representation, we might say that the process is mechanical which is applied across the board. Under such a framework, it is very difficult to accept that words or word groups differ from each other in the same language with respect to the level of syllabification. Secondly, even though we accept the assumption, we are faced with another problem, how to incorporate information on the level of syllabification in the underlying representation.

These problems can be obviated by taking Hayes' (1989) proposal that the underlying representation carries information on the mora. To be more specific, I argue that not all the vowel segments are underlyingly moraic. We have already seen that there is a high vowel and glide contrast on the surface level and suggest that glides are represented without an underlying mora. Following this line of argumentation, I suggest that the words in (39b) contain nonmoraic vowels in the underlying representation. This does not mean that we cannot predict whether a vowel is moraic or not. Surely the non-moraic vowels are limited to high vowels.
and round vowels. Thus it is assumed that the stem final vowels are moraless in the underlying representation. Consider the following derivation of the second word in (39b):

(41) Sample Syllabification

\[
\begin{array}{c}
\mu \\
\kappa e u + A
\end{array}
\rightarrow
\begin{array}{c}
\sigma \\
\kappa e u + A
\end{array}
\]

As shown in (41), the stem final vowel /u/ is nonmoraic in the underlying representation. Thus the syllabification process takes this moraless vowel as the onset of the second syllable. Here glide formation is a part of the syllabification process and the derivation is quite different from that in (36) in that glide formation in (36) is a process that applies after syllabification. This explains why glide formation witnessed in the words given in (39b) is obligatory and why there is no lengthening effect. Now compare the derivation of the first words in (39a) and (39b):

(42) Moraic vs. Nonmoraic Vowels

a.

\[
\begin{array}{c}
\mu \\
p o + A
\end{array}
\rightarrow
\begin{array}{c}
\sigma \\
p o + A
\end{array}
\]

There seems to be a certain corelation between the moraic status of a vowel and its co-occurrence restriction with respect to the preceding glides. We find that only four vowels /i, i, u, o/ can be nonmoraic in the underlying representation. Notice that these are the four vowels which cannot come after a glide as described in 5.1.5. To be more specific /i, i/ do not appear after [y] and /u, o, i/ do not appear after [w].
The vowel /o/ in "po" (to see) is associated to a mora in the underlying representation, while the same vowel in "o" (to come) is underlyingly nonmoraic. Therefore in (42a), the vowel can appear as a head of a syllable. However in (42b), since the stem vowel is nonmoraic, it can only appear as a glide.

As seen in (42), we do not have to resort to early and late syllabification to explain the obligatory nature of glide formation and the lack of compensatory lengthening. With the moraic representation in the underlying structure, the automatic process of syllabification can effectively explain the glide formation for (39a) and (39b). Such underlying contrast is not possible in any other framework such as CV or X tier analysis. The obligatory glide formation effect in the examples given in (39b) is exceptional and the best way to capture the exceptionality of these vowels is not to posit some specific derivational rules such as late syllabification, but to represent the peculiarity of these words underlyingly without resorting to diacritic features. I take this a strong support for the representation based approach of phonological explanation and for the moraic syllable structure in Korean.\(^{15}\)

\(^{15}\)The non-moraic status of high vowels will be discussed again in 8.3.
5.4. Conclusion

In this chapter, I have discussed two different hypotheses on the location of the prevocalic glide in Korean syllable structure: the Onset Hypothesis and the Nucleus Hypothesis. The Onset Hypothesis claims that glides should be represented as onset segments in the syllable structure, while the Nucleus Hypothesis argues that glides should be represented as part of the nucleus. In this chapter, we discussed two different sets of data and argued for the Onset Hypothesis. The first set of data consisted of four phonological phenomena that render relatively strong support for the Onset Hypothesis. The second set of data were those that have been used to support the Nucleus Hypothesis and it was shown that they can either be reanalyzed within the Onset Hypothesis or that they may not actually support the Nucleus Hypothesis.

The first set of data includes vowel clash resolving, vowel harmony in ideophones, onset simplification, language games and phonotactic constraints in Korean. First we observed that the onsetless syllables are eliminated by glide formation or glide insertion. If the glides are nucleus segments, then the hiatus resolving should be interpreted anew since inserting a glide or making a vowel into a glide does not help to get rid of the onsetless syllables. But if the glide is a consonant then glide formation or glide insertion gets rid of the onsetless syllable.

In the vowel harmony processes, glides are ignored. They do not participate in harmony feature linking. Vowel harmony involves the phonological change of vowels. The corollary of this observation is that if a segment does not participate in the vowel harmony, then the segment may not be a vowel. In Korean, all vowels in the initial syllables are the targets of harmony feature linking. Therefore if glides are treated as vowels, they should behave just
like other high vowels. But the data presented in this chapter clearly show that glides are not the targets of harmony feature linking. As such vowel harmony in Korean actually goes against the Nucleus Hypothesis and supports the Onset Hypothesis.

The Single Onset Consonant Constraint with respect to the KS dialect was motivated in this chapter, and we saw that the constraint can successfully explain the difference between glide initial syllables and consonant initial syllables with respect to the onset simplification. The Onset Hypothesis can successfully explain the obligatory nature of the onset simplification in the KS dialect as well as the lack of so called nucleus degemination in glide initial syllables in both the KS dialect and the Standard dialect.

The CV insertion language game provides another type of supporting evidence for the OH. There apparently is some uncertainty about the data of this language game. The data presented in this chapter and those introduced by Kim and Kim (1990) are not compatible with each other. However, if we carefully analyze the characteristics of the language game and the orthographic representation of the Korean alphabet, we can see that the discrepancy of the presented data may no longer be problematic. The data from Koreans who used to play the language game and from Korean children who do not know the Korean orthography show that glides do not appear in the reduplicated syllables, thus rendering full support to the OH.

Finally we saw that the phonotactic constraints provide support for the OH. There are constraints that hold between a consonant and a glide as well as between a glide and a vowel. But it has been argued that the two constraints are different in nature. The explanation of the constraints between a glide and the following vowel is universal based on acoustic factors, while the co-occurrence restrictions between a consonant and a glide are genuine subsyllabic constraints.
In addition, the data usually quoted in the literature to support the Nucleus Hypothesis were re-examined. Consonant cluster simplification does not support the Nucleus Hypothesis. This phonological phenomenon can be perfectly reanalyzable with the Onset Hypothesis. That glides are onset segments does not mean that there cannot be any other consonant before glides within a syllable. The syllable template given in this chapter allows for a consonant plus glide cluster in the onset.

Further, the l/r alternation in the KS dialect in connection with the Standard dialect was discussed. In morpheme internal position, the liquid sound is realized as [r] in between two vowels, but it is realized as [l] when it is placed between a vowel. An interesting observation here is that liquids are necessarily realized as [l] in the KS dialect when they come between a vowel and a glide, and that they remain as [l] before a glide across a word boundary. This simply means that the glides are syllabified into onset and that in the KS dialect the onset is restricted to one member. These data are better handled with the OH. Further the failure of the optional onset incorporation across the word boundary for glide initial morphemes in the standard dialect clearly reflects that glides are different from vowels in their behavior with respect to the l/r alternation.

Finally, an ideophone specific onset delinking phenomenon was considered. Some ideophones that contain glides apparently do not go through an onset deletion process. This was taken by Kim and Kim (1990) as crucial evidence that glides are not part of the onset. However in this chapter, it was shown that such a conclusion was due to the misanalysis of the given data. Taking other relevant phonological processes in Korean into account, we concluded that those ideophones do not go through the onset deletion process, but that the deletion is due to the nasal deletion rule that is also witnessed outside of ideophones.

The discussion in this chapter clearly shows that the Onset Hypothesis is much better motivated than the Nucleus Hypothesis. In spite of the traditional view influenced by the
orthographic representation that glides are part of the nucleus, the Nucleus Hypothesis is not supported by the facts of Korean phonology.

Finally, it was also shown that the exceptional behavior of high vowels and round vowels with respect to glide formation can be best explained not by rules but by their representations. High vowels and round vowels may come into the underlying representation without associated moras. In these cases, since they are not moraic, they can appear only as glides and they cannot trigger compensatory lengthening because a lengthened vowel should necessarily have two moras.