The Interaction of Syllabification and Underspecification in Dutch

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The patterning of [ə] (schwa) has been used to divide Dutch affixes into two main groups or classes and a third minor group, identified as applying at different levels or as having different boundary types (see for example, Booij (1977), (1981)). The division into separate levels or boundaries has been determined (in Booij (1977, 1981)) by the differential application of phonological rules to the various affix types, within a framework that is somewhat similar to the Lexical Phonology (LP) framework of Kiparsky (1982).

The segment [ə] has usually been treated in an allophonic manner rather than as a separate phoneme since it frequently arises as the result of the reduction of unstressed vowels (see for instance Neijt and Zonneveld (1982)). In this case, [ə] indeed appears to have allophonic properties. However, there are some cases where [ə] possesses more of a phonemic character: for example, compare the two suffixes [-In] "feminine" and [-ən] "plural". The main phonetic difference between these two affixes, aside from the contrast between [ə] and [I] per se, is that [-In] receives the main stress of the word, and [-ən] does not: compare [hɛldən] 'heroine' with [hɛldən] 'heroes'. It might be claimed that [ə] is actually arising from a reduced vowel in cases such as this. That is, underlyingly in [ə]-containing affixes, there might exist a phoneme which only surfaces as a [ə] because it never attracts stress within the word. This approach is problematic in that there is no evidence based on distribution or alternations that the suffix '−ən' has an underlying representation containing a vowel other than [ə].

If in the case of the suffix [−ən], [ə] is treated as a phonemic segment in its own right, but one that is completely underspecified for all features, then it may follow that stress never falls on such [ə]-containing syllables. In this approach, there is no underlying vowel that gets reduced to schwa, but a completely underspecified timing unit that acquires all of its features by means of redundancy rules. This approach simplifies the accounts previously given for epenthesis and deletion phenomena, as well as those proposed for morphological systems. Furthermore, this approach does not exclude the true cases of vowel reduction to [ə], although the mechanism for reduction will not be discussed here.
In this paper the vowel system of Dutch will be briefly outlined within an autosegmentally based underspecification framework as outlined by Archangeli (1984). The underspecification system presented here provides the basis for subsequent discussions of schwa-deletion, syllabification and epenthesis. Next, a description of Dutch morphology will be presented along with a brief outline of Booij’s (1977, 1981) transformationally-based phonological analysis. In later sections the system of syllabification will be outlined in conjunction with a discussion of θ-deletion processes, following the framework outlined in Piggott and Singh (1985). This will be followed by application of both syllabification and underspecification to various instances of epenthesis in Dutch. The analyses presented here will then be compared to other analyses which attempt to account for similar data.

A. Underspecification Of Dutch Vowels:

The Dutch vowel system is given in chart form in (1) below:

1.  

<table>
<thead>
<tr>
<th></th>
<th>-Back</th>
<th>+Back</th>
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</thead>
<tbody>
<tr>
<td>+Rd</td>
<td></td>
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<tr>
<td>-Rd</td>
<td>y</td>
<td>u</td>
</tr>
<tr>
<td>+High</td>
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<tr>
<td>-Tense</td>
<td>I</td>
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<tr>
<td>+Tense</td>
<td>e</td>
<td>o</td>
</tr>
<tr>
<td>-High</td>
<td>oe</td>
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<tr>
<td>-Tense</td>
<td></td>
<td>θ</td>
</tr>
<tr>
<td>+Low</td>
<td>E</td>
<td>^</td>
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<tr>
<td>+Tense</td>
<td></td>
<td>a</td>
</tr>
<tr>
<td></td>
<td>A</td>
<td>A</td>
</tr>
</tbody>
</table>

In the underspecified chart in (2), I assume that [θ] is completely unmarked for all features, following Archangeli’s (1984) treatment of epenthetic vowels. Since the features of [θ] consist of [-High, -Low, -Round, -Tense, -Back], I will assume that (-) is the unmarked or default condition for all features. The details of the features are not relevant to later analyses.

2.  

<table>
<thead>
<tr>
<th></th>
<th>i</th>
<th>y</th>
<th>e</th>
<th>o</th>
<th>E</th>
<th>oe</th>
<th>a</th>
<th>^</th>
<th>A</th>
<th>O</th>
<th>θ</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>+</td>
<td>+</td>
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<td></td>
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<td>Low</td>
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<td>Back</td>
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<td>+</td>
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<td>Round</td>
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<td></td>
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<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Tense</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>
Redundancy Rules apply to this matrix, and are ordered by the Elsewhere Condition as defined by Kliparsky (1982):(F1)

Assuming Piggott and Singh's (1985) claim that a segment which is unspecifed for the feature [vocalic] must be placed in the syllabic nucleus, the representation of [Ø] may consist entirely of a completely underspecified skeletal timing unit. Due to its underspecification for [vocalic] and its subsequent incorporation into the syllabic nucleus, all other features can be filled in automatically by redundancy rules as demonstrated in (3).

3.  

\[
\begin{array}{ccc}
[-\text{tense}] & [-\text{round}] & [-\text{back}] \\
[-\text{low}] & [-\text{high}] & [\text{Ø}] \\
\text{x} & \text{x} & \text{x} & \text{x} & \text{x} & \text{x} \\
\text{N} & \text{N} & \text{N} & \text{N} & \text{N} & \text{N}
\end{array}
\]

Furthermore, in instances where the same underspecified timing unit precedes another segment that is specified [ +vocalic ], the underspecified segment must be placed into the onset of the syllable. Piggott and Singh treat glide - high vowel alternations in this manner, claiming that the alternation between glides and high vowels follows from the fact that the segments underlying both the glides [j] and [w], and the high vowels [i] and [u] respectively, are underspecified for the feature [vocalic]. If the underspecified segment appears with no adjacent [ +voc ] segment, then it can be placed in the syllabic nucleus and [i] or [u] will appear in the surface representation. This is demonstrated in (4).

4.  

\[
\begin{array}{cccccc}
\text{[+high]} & \text{[0 voc] [-voc]} & \text{[+high]} & \text{[0 voc] [-voc]} & \text{[+high]} & \text{[+ voc] [-voc]} & \text{i C} \\
\text{x} & \text{x} & \text{x} & \text{x} & \text{x} & \text{x} & \text{x} \\
\text{N} & \text{N} & \text{N} & \text{N} & \text{N} & \text{N} & \text{N}
\end{array}
\]

However, if the underspecified segment immediately precedes a [ +voc ] segment, then it must be placed into the onset of the syllable since the [ +voc ] segment will then occupy the nucleus position. The segment that is underspecified for the feature [vocalic] will then surface as a glide ([j]) or ([w]) in the onset of the syllable. The glide - high vowel alternation is demonstrated in (5); a segment such as [Ø] that is underspecified for all features will show a similar pattern.(F2)
Conversely, all consonants must be specified with either [+consonantal] or [-vocalic] so as to avoid being placed in the nucleus. (F3)

Given that [@] is represented in the underlying representation as a completely unspecified timing unit (in addition to Piggott and Singh (1985), see also ter Mors (1984), who argues for this representation for Klamath epenthesis and Archangeli (1984) who uses a similar treatment for Yawelmani), then simple insertion of a timing unit in any position ought to be realized as an epenthetic vowel. Deletion of schwa is also quite straightforward since it involves just the deletion of a timing unit under certain conditions. At this point it becomes possible to treat the deletion and epenthesis data within a framework that deals with representations rather than segmental rules in the grammar.

B. The Dutch @-Deletion Rule and Syllabification:

The deletion of stem-final [@] under specific circumstances in Dutch has led to the definition of different boundary types for affixes which can, depending upon their characteristics, block the application of certain phonological rules. Thus, Booij’s (1977, 1981) segmental rule of schwa deletion for Dutch (given in 6)) is able to apply across +°-boundaries but is blocked by #°-boundaries of affixes.

6. Schwa Deletion:

[@] --> 0 / [+syllabic]

In a complementary fashion, a devoicing rule (given below) applies to stems when #°-suffixes are added.

7. Syllable-final C Devoicing:

[-son] --> [-voice] / 0

This rule does not apply in the environment of +°-suffixes (or Class I suffixes) due to a resyllabification process that automatically applies to remove the required environment for devoicing by shifting a consonant in the coda into the onset position of the following syllable.
On this basis, Booij argues for two main Classes of affixes (Classes I and II, respectively), which correspond roughly to the ordered Levels I and II within the framework of Lexical Phonology as proposed by Kiparsky (1982). Class I (+ boundaries) affixes all seem to be vowel-initial, derivational suffixes which are able to affect the stress patterns of their stems, and whose stems are susceptible to Θ-deletion but not to the devoicing rule. These facts are demonstrated by the data below.

8.1 Class I suffixation eliciting Θ-deletion:

[-Ix] zijdig [z'Idlx] 'silky' from zijde [z'Idø] 'silk'
modig [mø:dIx] 'fashionable' * mode [mødø] 'fashion'
[-al] sinodal [slnodal] 'of the synod' * sinode [snodø] 'synod'
[-ist] machinist [mASinist] 'mechanic' * machine [mA.Sinø] 'machine'

8.2 Class I suffixation eliciting no Syllable-final devoicing:

[-Ix] 'ish'
rodig [rödIx] 'reddish' from rood /röd/ [rot] 'red'
goedig [xudIx] 'well-meaning' * goed /xud/ [xut] 'good'

[-itEit] 'ity'
absurditeit [aps'rEit'] 'absurdity' from absurd [aps'rt] 'absurd'

Class II affixes (- boundaries) are generally non-stress affecting, and fail to elicit Θ-deletion in their stems but readily elicit the devoicing rule. With one exception, the latter are all consonant-initial suffixes. These facts are illustrated by the data in (9):

9.1 Class II suffixation eliciting no Θ-deletion:

[-Axtøx]

zijdeachtig [z'IIdøAxtøx] 'silk-like' from zijde 'silk'
sinodeachtig [snodøAxtøx] 'synod-like' from sinode 'synod'

(N.B. * [z'IIdøAxtøx], [snodøAxtøx])

[-lo:s]

zijdeloos [z'IIdølo:s] 'silk-less' from zijde 'silk'
synodeloos [snodølo:s] 'synod-less' * sinode 'synod'
modeloos [mødølo:s] 'fashionless' * mode 'fashion'
9.2 Class II suffixation eliciting syllable-final devoicing:

[-AxtΩx]
rodachtig  [roːtAxtΩx]  ‘reddish’ from rood /roːd/ [roːt] ‘red’
hoedachtig [hutAxtΩx]  ‘hat-like’  from hoed /hud/ [hut] ‘hat’

[-tJΩ]
draadje [draːtjΩ]  ‘small thread’ from draad /draːd/ [draːt] ‘thread’
vraagje [vraːxjΩ]  ‘small question’  from vraag /vraːx/ [vraːx] ‘question’

Boosj places prefixes within the #-boundary or Class II group of affixes as well, largely because of their nonsusceptibility to the rule of Ω-deletion.
Consider the data provided in (10):

10. Prefixation:

geeerd  [xΩ ˈeːrt]  * [xeːrt]  ‘honoured’
geacht  [xΩ ˈAxt]  * [xAxt]  ‘paid attention to’
beademd  [bΩ ˈadəmt]  * [badəmt]  ‘to be breathed upon’
b_eofoon  [bΩ ˈoːrdeːl]  * [bo:ordeːl]  ‘to distribute’
and oordeel [oːrdeːl] ‘portion’)

In addition to the two large classes, there is a third class of inflectional
suffixes which Boosj claims must bear a # boundary (due to their ability to elicit
Ω-deletion in the stem, and the lack of application of syllable-final devoicing to
the stem-final consonant). Since this third class of suffixes has no effect on
stress patterns within the stem, it must follow Class II affixation and phonology.
Some examples are included below:

11. Inflectional suffixation:

zijden  [zEIdΩn]  ‘silks’  from zijde ‘silk’
sinoden  [sInódΩn]  ‘synods’  from sinode ‘synod’
moden  [moːdΩn]  ‘fashions’  from mode ‘fashion’
kaden  [káːdΩn]  ‘quays’  from kade ‘quay’
zaden  [zaːdΩn]  ‘seeds’  from zaad /zaːd/ [zaːt] ‘seed’
hoeden  [húdΩn]  ‘hats’  from hoed /hud/ [hut] ‘hat’
raden  [raːdΩn]  ‘to advise’  from raad /raːd/ [raːt] ‘advice’
In a theoretical framework that attempts to eliminate the '+/\#' boundary' distinction on the grounds that it is redundant once level ordering is assumed for Lexical Phonology, it would be desirable to make the differential application of @-deletion take place as a result of principles within the grammar other than the boundary distinctions. Furthermore, the use of boundaries results in problematic analyses for a number of Dutch complex words, in which the usual 'nesting' of +-boundaries inside #-boundaries does not occur. Instead, it is common to find flagrant violations of this pattern in Dutch - a pattern which was claimed to follow from the presence of #- and +-boundaries in the first place (cf. Siegel (1974) and Allen (1978)).

The evidence for the segmental rules of @-deletion and C-devoicing become problematic as well, once boundaries are eliminated from the lexical representations of affixes since these rules are dependent upon the existence of the boundaries in the first place. Once a boundary-less representation is adopted for lexical items, the phonological patterns that the segmental rules were meant to account for become subject to a different set of principles. As a result, phonological changes that were thought to follow from the application of segmental rules can be accounted for by autosegmental and syllabic representations of the lexical items in question. Thus, the evidence for the existence of the segmental rules of @-deletion and C-devoicing is severely weakened, and the only remaining evidence for level ordering within the phonological component involves the stress-assignment rules. The purpose of the remainder of this paper then, is to show that it is indeed possible to account for phonological alternations in Dutch within a purely autosegmental framework that includes the principles of underspecification (outlined in section B), and the principles of syllabification (outlined in the section below).

In adopting the framework proposed by Piggott and Singh (1985), I assume here that all syllables minimally require an onset and a rhyme that contains an obligatory nucleus. Thus, the minimal syllable in Dutch is as in (12):

12.

```
  O  \\
  R
```

Within the underspecification framework outlined in the previous section of this paper, and assuming with it an autosegmental representation for Dutch, the
∅-deletion rule (see (6)) can be recharacterized as the deletion of a timing unit that is underspecified for the feature [vocalic] whenever such a timing unit immediately precedes a syllable nucleus. In such cases the timing unit is placed in the onset. Subsequently, due to being adjacent to consonants in the onset, the underspecified timing unit becomes subject to deletion:

13. Schwa-deletion II (Onset Incorporation (OI), and Deletion (DEL)):

\[
\begin{array}{c}
\begin{array}{c}
[+C] \\
[+\alpha]\ \\
x \\
ox \\
o \\
N \\
\end{array}
\end{array}
\begin{array}{c}
\begin{array}{c}
[+C] \\
[a\alpha]\ \\
x \\
x \\
N \\
N \\
\end{array}
\end{array}
\begin{array}{c}
\begin{array}{c}
[+C] \\
[a\alpha]\ \\
x \\
x \\
N \\
O \\
\end{array}
\end{array}
\]

where N can be either [+vocalic] or [0 vocalic].

This mechanism will account for all instances of ∅-deletion involving Class I affixes. In addition it will account for the instances of ∅-deletion which arise with the inflectional suffixes that Booij required to follow Class II morphology and phonology.

The rules, as they are presently formulated, cannot deal with the data that one encounters with Class II morphology, however. Consider the instances in (9.1), which illustrate the lack of ∅-deletion before the only vowel-initial Class II suffix -achtig [Ax.təx] "-ish / -like". If [−Ax.təx] is indeed a vowel-initial suffix underlyingly, then there is no way to prevent the annexation of the preceding C into the onset of the syllable [−Ax−], and subsequent application of the processes described in (13), short of referring to a # boundary within the rule (as Booij (1977, 1981) would do) or making crucial use of the notion that a rule can ‘turn off’ after a certain level (in this case, after Level I). This last possibility raises another problem however, in that these rules would have to be able to deal with discontinuous domains - essentially they would be forced to turn back on in order to apply within the complex words which have + boundaries outside of #-boundaries.

The rules as formulated up to now would apply in similar fashion to (13), to produce the following derivations for ‘zijde + achtig’ ‘silk-like’ and ‘rood + achtig’ ‘reddish’:
14. Syllable structure assigned during first run of the stem through L-1, followed by coda devoicing and affixation at L-2.

Onset Incorporation of x and buildup of coda where necessary:

Deletion of θ, nonapplication of coda-final devoicing and specification of remaining features:

Although the notions of boundaries and Level-controlled rules have frequently been called upon in earlier analyses (creating a number of theoretical problems), the processes may be better explained if they can be accounted for by the interaction of independently motivated components of the grammar. In the cases discussed here, it becomes apparent that the processes of syllabification and well-formedness conditions on syllables control the occurrence of θ-deletion to a greater extent than previously thought.

The same problems arise in cases of prefixation, where the prefix is θ-final and the stem is vowel-initial. Once again θ-deletion does not occur in this environment, although the rule as written should be able to apply. Thus, we get the types of data given in example (10) above.

The same failure of these rules to apply arises in the case of compounds containing a θ-final first constituent, and a V-initial second constituent - the [θ] remains firmly in place.

15. Compounding:

modeartikel  [[ modθ ][ Artikθ ]]  ‘fashion article’
medeeigenaar  [[ medθ ][ EiXna:r ]]  ‘co-owner’
medeondertekenen  [[ medθ ][ Onد&teek&n]]  ‘to co-sign’
elitearbeid  [[ elitθ ][ arbEIt]]  ‘work of the elite’
At this point it becomes useful to refer to slow, careful speech phenomena. In instances involving prefixation, Class II suffixation and compounding, wherever \( \Theta \)-deletion is blocked in normal speech, a glottal stop may be inserted in between the \( \Theta \) and the following vowel. This does not take place when a Class I suffix is added to the stem (i.e., where \( \Theta \)-deletion normally applies). The existence of such glottal stops provides evidence for an empty onset position in the forms where deletion fails to apply (despite the fact that its structural description is apparently met), into which the features for [?] may be inserted in slow speech. This is in addition to the fact that resyllabification is also blocked in the processes of Level / Class II affixation and compounding (demonstrated in (15) above). This empty onset position has been proposed by other investigators (Kaye and Lowenstamm 1981; Lleber 1985; Piggott and Singh 1985) as well.

If there is indeed an obligatorily empty onset position in the forms that do not elicit \( \Theta \)-deletion, then it follows that the rule of \( \Theta \)-deletion in (13) could not apply since the empty timing unit (\( \Theta \) is not immediately adjacent to a timing unit that is specified for placement within a syllabic nucleus. That is, underspecified \( x \) is adjacent to an abstract timing unit that bears at least the specification for syllabic onset due to its having the feature \([-\text{vocalic}]\), rather than a unit resembling \('x'\). These forms contain an empty onset that is specified to be \([-\text{voc}]\) so that it must be incorporated into the onset of the syllable. Due to redundancy rule application, this unit surfaces as [?] in slow speech. If this is the correct representation for these various forms, the sample derivations below can be proposed for non-affixed, Class I suffixed, and Class II suffixed stems respectively, recalling the underspecified representations of the vowels as discussed in section A.(F4):

16. Nonaffixed Stem:  
Class I Suffixed Stem:

\[
\begin{align*}
\text{zijde} & \quad \text{[zEI}d\Theta] \quad \text{\textit{"silk}}' \\
\text{z} & \quad \text{[+Lo] [+Hi] d} \\
\text{x} & \quad \text{x} \quad \text{x} \quad \text{x} \quad \text{x} \\
\text{Syllabification: (this derivation assumes that all segments acting like consonants are underlyingly specified as \([-\text{vocalic}]\) or \([+\text{consonantal}]. \text{ As a result, these segments are not placed in the nucleus but are included in the onset and coda instead.)}
\end{align*}
\]
17.  

\[ \text{z [+Lo] [+Hi] d} \quad \text{‘silk’} \quad \text{z [+Lo] [+Hi] d} \quad \text{[+Hi] x} \quad \text{‘silk-like’} \]

\[ \text{x x x x x x} \quad \text{O N O N N C} \quad \text{x x x x x x} \quad \text{O O O N N R} \]

**Deletion** applies to the derived word, following automatic resyllabification of \([d]\) and \(x\) into the onset position of the affix syllable. Resyllabification occurs as a result of the well-formedness condition that requires all syllables to have an onset.

18. **Resyllabification**

\[ \text{z [+Lo] [+Hi] d} \quad \text{[+Hi] x} \quad \text{‘silk-like’} \]

\[ \text{x x x x x x} \quad \text{O N O N N C} \quad \text{x x x x x x} \quad \text{O O O N N R} \]

**Ø-deletion:**

\[ \text{z [+Lo] [+Hi] d} \quad \text{[+Hi] x} \quad \text{‘silk-like’} \]

\[ \text{x x x x x x} \quad \text{O N O N N C} \quad \text{x x x x x x} \quad \text{O O O N N R} \]

The redundancy rules and default rules then proceed to fill in the underspecified features, to produce the surface structures below:

19.  

\[ \text{z E I d} \quad \text{Ø} \quad \text{‘silk’} \quad \text{z E I d I} \quad \text{i} \quad \text{x} \quad \text{‘silk-like’} \]

\[ \text{x x x x x x} \quad \text{O N O N N} \quad \text{x x x x x x} \quad \text{O O O N N R} \]

20. **Class II Suffixed Stem:**

\[ \text{zijdachtig} \]

\[ \text{[[ zEIdØ ] -AxtØx ] ‘silk-like’} \]

\[ \text{z [+Lo] [+Hi] d} \quad \text{[+Cons]} \quad \text{[+Lo] x t x} \]

\[ \text{x x x x x x} \quad \text{x x x x x x} \]
21. Syllabification:

Incorporation of the underspecified segment \(x\) into the onset cannot apply in this environment. Default and redundancy rules fill in the remaining features, and the glottal stop is expressed optionally in slow and careful speech:

22. 

Similar derivations are possible for prefixed and compounded stems. In all of these instances, we encounter affixes and words that, although phonetically vowel-initial, pattern as though they contain this same abstract onset that blocks \(\Theta\)-deletion and resyllabification. Some investigators have proposed that the Class II suffixes and prefixes actually act as though they are phonological words (see for instance Bool (1985) who argues for this status for Dutch Class II suffixes and some prefixes based on their morphological ability to be conjoined). Here then, we have more evidence for giving Class II morphemes this status, from a phonological point of view. (This is in addition to the evidence for the same classification given by data concerning stress patterns in Dutch. These are discussed in Scholten (1985)).

Once we assume the rule of \(\Theta\)-deletion to be a syllable-based rule which applies as a result of the need for an onset position in the suffix, then the deletion of unmarked timing units in adjacent nuclei follows from well-formedness conditions (WFC’s) on the syllable itself. These WFC’s include a requirement for an onset and a rhyme containing a nucleus, and they must be accompanied by a number of possible repair strategies which can apply whenever the WFC’s are not met. The possible repair strategies include a process of resyllabification which applies when necessary, to acquire onsets or remove segmental sequences that violate the Sonority Hierarchy, and a process of
deletion which applies (in the cases described above, at least) when an unmarked timing unit occurs in adjacent position to a syllable nucleus without an intervening onset or coda. (F5)

C. Syllabification Patterns in Dutch.

Before proceeding any further, I will clarify the series of assumptions I will be making concerning syllable structure and syllable construction in Dutch. A review of the basic syllabic patterns and constraints will help to demonstrate how epenthesis of [E] comes about from an interaction of these processes with the mechanisms of underspecification in Dutch.

As mentioned in previous sections, the Dutch syllable must consist minimally of an onset and a rhyme containing a nucleus. Units of the timing tier which bear no specification for the feature [vocalic], or are specified as being [+vocalic] are obligatorily incorporated into the nucleus. Conversely, the nucleus must contain a segment (presumably by the time that it reaches the Surface Representation) in order to be well formed. The minimal structure is therefore:

\[
\begin{array}{c}
\ \ \ \ \ \ \ \ \ \ \\
\ \ \ \ \ \ \ \ \ \\
\ \ \ \ \ \ \ \ \\
\ \ \ \ \ \ \ \\
\ \ \ \ \ \\
\ \ \ \ \\
\ \ \ \\
\ \ X \ \ \\
\ \ X \ \ \\
\end{array}
\]

I will assume with Levin (1985), Sterlade (1982) and others, that syllables are built outwards from the nucleus. Initially, all segments that are specified [+vocalic] or underspecified for the feature [vocalic] are placed in the nucleus, following the proposal made by Piggott and Singh, and this is followed by the incorporation of consonants into the onset so that the obligatory requirements of syllable structure can be fulfilled. Finally the coda is constructed when necessary, to create the first representation of the syllable. In Dutch, the final consonant of a syllable remains extrasyllabic in order to maintain the minimal (nonbranching) syllable structure. In such cases, the resulting structure is a light syllable (this includes CV and CVC structures as a result). If the syllable structure must contain a branching rhyme despite the extrametrical consonant, then the syllable will be treated as heavy (e.g., CVV, CVVC, CVCC, CVVCC). This structure is subjected to constraints and well-formedness conditions of the grammar throughout, and it undergoes changes if these conditions are violated at any point in the subsequent derivation. The extrasyllabic segments are subject
to resyllabification processes whenever the environment permits (for example, when L-1 suffixation creates a new onset position). If the extrasyllabic segment is not incorporated into a following onset by the time that the Surface Representation is reached, it is incorporated into the preceding coda provided that no sonority violations are created in the process.

Generally, the Dutch onset and coda may consist of up to three segments, which must be classified as either [-vocalic] or [+consonantal]. The most peripheral segment of the three-consonant onset (i.e., in first position) can only be [s]. In two-consonant clusters within the onset, the peripheral consonant cannot bear the feature [+sonorant]. A similar constraint applies to codas, where a nonsonorant consonant cannot be followed by a sonorant within the same syllable. Adjacent nasal consonants are also prohibited in both the onset and the coda.

When nonpermissible sequences of segments do arise during a derivation, various repair strategies apply to create acceptable structures. These strategies include an automatic process of onset creation which adds onsets when they are not originally present, and removes * onset and coda sequences by creating more acceptable structures which contain the obligatory elements (i.e., at least the nucleus and the onset). Another repair strategy, the deletion process discussed in section B of this chapter, interacts with resyllabification. The insertion of the null onset as a last resort (also discussed briefly in section B) also interacts with resyllabification, and may actually be a consequence of resyllabification itself, rather than a separate rule. Insertion of [Ø] in the nucleus turns out to be another consequence of resyllabification following violations of the well-formedness conditions on syllables, and this process will be discussed below.

The segment [Ø] has generally been treated as a vowel that is marked for being unstressable (Booij (1981), Kooij (1978) and others), where all other vowels permit stress to be assigned to them. This constraint on [Ø] arises in both underlying and derived instances of the vowel. Thus, in the following simplex and derived words, [Ø] never attracts stress.

24. appel [Apół] 'apple' gelachen [xø + lØx + øn] 'laughed'
kabel [kabøl] 'cable' geleerd [xø + leə +t] 'learned'
bodem [bódøm] 'bottom' bereikt [bø + rɛik + t] 'reached'
bezem [bezøm] 'broom' belachelijk [bø + lØx + ølɪk] 'laughable' or 'ridiculous'
meter [mɛtør] 'meter'
kuiken [kɔykøm] 'chicken'
However, at no point (to the best of my knowledge) has any analysis attempted to account for why this should be so. Within an underspecification framework as previously outlined, and in coordination with the syllabification patterns and constraints, we may begin to get an idea of the reasons for underlying \( \Theta \)'s unstressability.

Previous analyses which have been forced to use a feature [\(-\)stressable] for [\( \Theta \)] have typically assumed that where [\( \Theta \)] occurred on the surface, there was a position for this \( \Theta \) underlyingly, in the lexical entry of words such as those in (24). Given our syllable structure constraints, and a theory of underspecification, it becomes apparent that this position need not always exist underlyingly.

Consider the simplex words in the example above. These forms could be lexically listed as follows: /apl/, /kabl/, /bodm/, /bezm/, /metr/, /kOykn/.

Initial syllabification will produce derivations and structures similar to that given below for /apl/ 'apple' (recalling the null onset for V-initial phonological words):

Since the rhyme must have a nucleus, an empty nucleus is inserted when one is unavailable from the underlying representation. Finally, the empty nucleus must be filled in the surface form. A timing unit is inserted here, and all other features get filled in by default, so that the inserted unit surfaces as the [\( \Theta \)] in [Ap\( \Theta \)]. In these examples, then, the underlying representations do not contain any vowel in the second position. This vowel arises as a result of the need for a
nucleus at all times within a syllable, the manner in which the syllable gets built, and the interaction of this system with the constraints placed upon it. It follows then that syllables that get built up in this manner would never get stress assigned to them, especially if stress assignment is only sensitive to a 'filled' or 'partially specified' nucleus. At the same time, instances involving a lexical listing of [0] (as in the stem 'zeide' [zEIdø] 'silk') can be dealt with, since these involve an unmarked timing unit as well. Hence, the same restriction involving stress assignment can apply in these cases.

The analysis of these data within a Lexical Phonology framework depends crucially on the notion that a lexical entry enters the Lexical Phonology component via the phonology rather than by the morphology. Especially at Level I, this predicts that a L-1 derived stem will undergo an initial stage of syllabification prior to affixation of a L-1 suffix, since these suffixes tend to acquire their obligatory onsets from the stem-final consonant position. Before the stem-final consonant can be annexed in forms like /Ap1 + Ix/, the stem-internal nucleus position must be created. If the nucleus position is not created before /I/ is placed into the onset of the suffix, the environment for the creation of a nucleus will be removed, producing the * surface form [Ap1lx] --> * [A.pllx] (via later rules), instead of / [A.p0lxlx] 'apple-ish'. Once the nucleus position is created however, resyllabification may apply, since the nucleus will subsequently be filled in by default rules, and the correct surface forms will be derived, as demonstrated in (26).

26. a) [+C] A p x x x x

b) Build syllable structure as in (25).

    [+C] A p l
    x x x x
    O N O N
    R
    O

    [A.p1lx] (x)

c) L-1

    Affix' n

    xn x x x x (x)

    O O O R

    D. Epenthesis in Dutch Diminutives:

The underspecification of the segment [θ], and the resulting interactions of this segment with syllable structure requirements within the Dutch grammar,
have interesting implications for rules of epenthesis. Once it is assumed that all syllables have an obligatory onset, an obligatory nucleus, that extrasyllabicity exists, and that repair strategies create the illusion of having various rules for deletion and insertion within the grammar, it follows that previous accounts of epenthetic processes in Dutch may well be revised and greatly simplified.

A problem that has arisen many times in the discussion of Dutch phonological and morphological processes concerns the conditioning environment for θ-epenthesis between a stem and an affix. Here, I will limit the discussion to the Dutch diminutive affix /-tθ/, although many of the conclusions will extend to other instances of epenthesis within the language.

The Data:

When the stem is vowel-final, the surface form of the affix is [-tθ], as shown below:

<table>
<thead>
<tr>
<th>Stem</th>
<th>Surface Form</th>
<th>Translation</th>
</tr>
</thead>
<tbody>
<tr>
<td>kade</td>
<td>[kadθ]</td>
<td>kadetje</td>
</tr>
<tr>
<td>tableau</td>
<td>[tAblo]</td>
<td>tableautje</td>
</tr>
<tr>
<td>cadeau</td>
<td>[kAdo]</td>
<td>cadeautje</td>
</tr>
<tr>
<td>koe</td>
<td>[ku]</td>
<td>koetje</td>
</tr>
</tbody>
</table>

When the stem ends in a consonant, other changes can be observed involving the diminutive. Consider the data shown below:

<table>
<thead>
<tr>
<th>Stem</th>
<th>Surface Form</th>
<th>Translation</th>
</tr>
</thead>
<tbody>
<tr>
<td>kat</td>
<td>[kAt]</td>
<td>katje</td>
</tr>
<tr>
<td>hoed</td>
<td>[hut]</td>
<td>hoedje</td>
</tr>
<tr>
<td>hut</td>
<td>[h^t]</td>
<td>hutje</td>
</tr>
<tr>
<td>pot</td>
<td>[pOt]</td>
<td>potje</td>
</tr>
<tr>
<td>poot</td>
<td>[po:t]</td>
<td>pootje</td>
</tr>
<tr>
<td>goot</td>
<td>[xo:t]</td>
<td>gootje</td>
</tr>
<tr>
<td>zak</td>
<td>[zAk]</td>
<td>zakje</td>
</tr>
<tr>
<td>zaak</td>
<td>[za:k]</td>
<td>zaakje</td>
</tr>
<tr>
<td>schrik</td>
<td>[sxrik]</td>
<td>schrikje</td>
</tr>
<tr>
<td>piep</td>
<td>[pip]</td>
<td>piepje</td>
</tr>
<tr>
<td>kerk</td>
<td>[kErk]</td>
<td>kerkje</td>
</tr>
<tr>
<td>ramp</td>
<td>[rAmp]</td>
<td>rampje</td>
</tr>
<tr>
<td>zorg</td>
<td>[zOrx]</td>
<td>zorgje</td>
</tr>
<tr>
<td>kalf</td>
<td>[kAfl]</td>
<td>kalfje</td>
</tr>
<tr>
<td>kus</td>
<td>[k^s]</td>
<td>kusje</td>
</tr>
<tr>
<td>poes</td>
<td>[pus]</td>
<td>poesje</td>
</tr>
<tr>
<td>lief</td>
<td>[li^f]</td>
<td>liefje</td>
</tr>
<tr>
<td>veeg</td>
<td>[ve:x]</td>
<td>veegje</td>
</tr>
<tr>
<td>vraag</td>
<td>[vra:x]</td>
<td>vraagje</td>
</tr>
</tbody>
</table>

'little quay' 'hat' 'hut' 'pot' 'paw' 'gutter' 'bag' 'business' 'scare' 'peep' 'little cat' 'little church' 'ramp' 'worry' 'calf' 'kiss' 'cat' 'sweetie' 'wipe' 'question'
From these forms, it can be seen that assimilation of Place and Manner occurs between the stem-final consonant and the [t] of the suffix (I am assuming an approximate underlying representation /-[-obst]j@/ (i.e., /-Tj@/) for the moment), which must be followed by some degemination process that deletes one of the adjacent, identical consonants. An example of this type of process is given in (29). The system will be expanded upon later on in the discussion.

29. \[ kA t + T j @ \]
   \[ kA, tj @ \] i.e. no geminate [t] in the final form.

   \[ p i p + T j @ \]
   \[ pi, pj @ \] i.e. assimilation of [T] to [p] has occurred, followed by degemination.

However, when the stem ends in a sonorant consonant, and contains a lax vowel in the last syllable (as in (30)), ß-Epenthesis applies between the sonorant and the following segment of the affix. Examples are given in (31).

30. \[ mA n + T j @ \]
   \[ mA, n @, tj @ \] i.e. epenthesis has occurred

31. man [mA@n] mannetj e [mA@n@tj@] 'little man'
    zon [zO@n] zonnetj e [zO@n@tj@] 'sun'
    ring [rIn] ringetj e [rIn@tj@] 'ring'
    ram [rAm] rammetj e [rAm@tj@] 'ram'
    lam [lAm] lammetj e [lAm@tj@] 'lamb'
    pil [pI@] pilletj e [pI@tj@] 'pill'
    snor [snOr] snorretj e [snO@tj@] 'moustache'

The processes of epenthesis and assimilation must therefore be ordered with respect to each other so that where epenthesis occurs, assimilation between the two consonants is actually prevented, thus causing the first segment of the suffix to arise as a [T] by default. All other features will get filled in by redundancy rules once assimilation is blocked by the prior application of epenthesis.
Epenthesis can only apply with sonorant-final stems that contain neither a branching nucleus or coda since (as the data below demonstrate) such forms do not elicit G-epenthesis even if they contain lax vowels in the nuclei, or have stem-final sonorant consonants.

32. Branching Nucleus:

<table>
<thead>
<tr>
<th>Word</th>
<th>Stressed</th>
<th>Pronunciation</th>
<th>Transcription</th>
</tr>
</thead>
<tbody>
<tr>
<td>zoon</td>
<td>[zo:n]</td>
<td>zoontje [zo:ntjø]</td>
<td>'little son'</td>
</tr>
<tr>
<td>maan</td>
<td>[ma:n]</td>
<td>maantje [ma:ntjø]</td>
<td>'moon'</td>
</tr>
<tr>
<td>zeeër</td>
<td>[zwe:r]</td>
<td>zweertje [zwe:rtjø]</td>
<td>'blistér'</td>
</tr>
<tr>
<td>schaal</td>
<td>[sxa:l]</td>
<td>schaaltje [sxa:ltjø]</td>
<td>'bowl'</td>
</tr>
<tr>
<td>raam</td>
<td>[ra:m]</td>
<td>raampje [ra:mpjø]</td>
<td>'window'</td>
</tr>
<tr>
<td>schuim</td>
<td>[sxOym]</td>
<td>schuimpje [sxOymphjø]</td>
<td>'foam' (a type of cookie)</td>
</tr>
</tbody>
</table>

Branching Coda:

<table>
<thead>
<tr>
<th>Word</th>
<th>Stressed</th>
<th>Pronunciation</th>
<th>Transcription</th>
</tr>
</thead>
<tbody>
<tr>
<td>arm</td>
<td>[Arm]</td>
<td>armpje [Armpjø]</td>
<td>'little arm'</td>
</tr>
<tr>
<td>palm</td>
<td>[pAlm]</td>
<td>palmmpje [pAmpjø]</td>
<td>'palm'</td>
</tr>
<tr>
<td>kern</td>
<td>[kErn]</td>
<td>kerntje [kErntjø]</td>
<td>'kernel'</td>
</tr>
<tr>
<td>urn</td>
<td>['rn]</td>
<td>urntje ['rntjø]</td>
<td>'urn'</td>
</tr>
</tbody>
</table>

Notice that the initial segment of the suffix assimilates in Place but not in Manner in the last set of examples. This C remains a voiceless stop in all cases. The representation of the affix itself should therefore be modified from that given in 33 a) to that in b), below:

33. a) [+obstr] [+Hi] b) [-son] [+Hi]

In this manner, assimilation of sonance is prevented. An approximation of the assimilation process is given below:

1. Spread features of Place and Manner to an adjacent underspecified consonant.

By Steriade’s (1982) Shared Feature Constraint, sequences of nonsonorant consonants will be geminated automatically. Homorganic sonorant-obstruent sequences can exist at surface structure because they are only partial geminates. These are illustrated respectively in 34 a) and b) below.
34. a) [-son] [-son]  
   [Manner]  
   [Place]  
   [-son]  
   [-son]  
   x  
   [-Voice]  

   b) [+son] [-son]  
   [Manner]  
   [Place]  
   [+son]  
   [-son]  
   x  
   [-Voice]  

2. Degeminate full nonsonorant geminates by delinking the association  
   line between the feature matrix and one of the timing units.  

35.  
   [Manner]  
   [Place]  
   [-son]  
   x  
   [-Voice]  

Since sequences of [N + N] and [V + V] can arise, we must specify that only  
nonsonorant geminates are not permitted. As a result of the application of these  
feature spreading and degemination processes on representations, derivations  
like those in (36) below result, where complete assimilation followed by  
degemination applies in 36 a) while in 36 b) only a partial geminate results, so  
that degemination cannot apply.  

36 a)  
   'piepje'  [ pipj@ ]  'little peep' from  [ pip + Tj@ ]  
   [-Cor]  
   [+Ant]  
   p i  [-son]  +  [-son] [+Hi]  
   x x  x  
   x x  x  
   [-Voice]  [-Voice]  

Complete Assimilation:  
   [-Cor]  
   [+Ant]  
   p i  [-son]  [+Hi]  
   x x  x  x  x  
   [-Voice]
Degemination:

[-Cor]
[+Ant]

p i [-son] [+Hi]
|   |

xx xx x
| |

[-Voice]

Surface Form: [ pi.pjΩ ]

36 b) armpje [ Arm. pjΩ ] 'little arm' from [ Arm + TjΩ ]

[-Cor]
[+Ant]

A r [+son] + [-son] [+Hi]
|   |   |

xx xx x
| |

[+Voice] [-Voice]

Assimilation:

[-Cor]
[+Ant]

A r [+son] [-son] [+Hi]
|   |   |

xx xx x
| |

[+Voice] [-Voice]

Degemination cannot apply (this is a partial geminate):

Surface Form: [ Arm. pjΩ ]

E. θ-Deletion as a Specific Version of a General Process

At this point, we have two types of deletion rules present within the grammar. These are the processes of θ-deletion and Degemination. Recall that θ-deletion applies whenever a segment that is underspecified for the feature [vocalic] precedes a [+vocalic] segment. In such instances [θ] is placed into the onset of the same syllable. This representation is needed to account for alternations between high vowels and glides in English, under the framework proposed by Piggott and Singh (1985), and since many other investigations have proposed that the representation of epenthetic [θ] is a completely underspecified timing unit, it follows that [θ] would also be unspecified for [vocalic], just as the high vowels are. This being the case, [θ] should follow the same syllabification patterns as high vowels do. Therefore, when [θ] is placed into the onset as a result of this process' application, it will appear next to (on the right-hand side
of any consonant which must also occupy the onset position. The resulting structure resembles that given in (37).

37. \[
\begin{array}{c}
    \text{C} \\
    \quad \uparrow \\
    \quad \text{[+voc]}
\end{array}
\]

\[
\begin{array}{cccc}
    & X & X & \\
    \lor & & & \\
    & O & N
\end{array}
\]

To this structure, $\Theta$-deletion applies to remove the unspecified timing unit from the onset. This process strongly resembles degemination since both rules operate to remove timing units from the onset position. It appears that these two deletion processes could actually be collapsed into one operation. Note that assimilation of place and manner features has up to now always taken place in a rightwards direction — that is, the [-son] segment of the affix ‘-jdbc’ assimilates to the place and manner features of the consonant that precedes it. If, in the case of $\Theta$-deletion, feature spreading to the right were to take place as well, then an instance of full gemination would result — identical to the full geminates that elicit the degemination process in the diminutive data.

We can see then, that the ‘rule’ of $\Theta$-deletion actually arises as a special example of a larger process within the language — assimilation of features and subsequent degemination of the resulting full nonsonorant geminates. These processes interact with syllabification to produce the surface representations seen in the data presented up to now. Consequently, $\Theta$-Deletion itself can no longer be used in the diagnosis of levels or boundaries of affixes since it is completely independent of such parameters, once it is incorporated into the more general case.

F. Other Analyses of Epenthesis in Diminutives:

Several attempts have been made to account for the insertion of $[\Theta]$ in some cases, and assimilation of place of articulation of the [t] in /-tj$/ to the preceding stem consonant, in other cases of affixation of the diminutive suffix. Trommelen (1982) provides a Rhyme-bound analysis which, although not involving underspecified segments, gives a fairly accurate account for these data. She argues for a rule of epenthesis that is sensitive to the rhyme structure of the preceding syllable, such that epenthesis only occurs when the preceding rhyme contains exactly one segment in both the nucleus and the coda. The analysis that I adopt here will resemble her account to some extent. However, by including the
notions of underspecification and extrasyllablcity in the analysis, some problems encountered by Trommelen can be resolved.

Earlier analyses opted for a segmental account, with rules similar to that proposed by Cohen (1958):

\[
\begin{align*}
0 & \rightarrow \Theta / V \quad C \quad \text{\#tje} \\
\text{[-tense]} \quad \text{[+son]} \\
\end{align*}
\]

This last rule has trouble accounting for the lack of \( \Theta \)-Insertion in the following examples.

39. \begin{align*}
\text{appel} & \rightarrow \text{appeltje} \quad \text{[Ap\Theta t\Theta j]} \quad \text{'little apple'} \\
\text{kabel} & \rightarrow \text{kabeltje} \quad \text{[ka:\Theta b\Theta t\Theta j]} \quad \text{'cable'} \\
\text{bezem} & \rightarrow \text{bezempje} \quad \text{[bez\Theta m\Theta p\Theta j]} \quad \text{'broom'} \\
\text{bodem} & \rightarrow \text{bodempe} \quad \text{[bod\Theta m\Theta p\Theta j]} \quad \text{'bottom'} \\
\end{align*}

\((\text{[Ap\Theta t\Theta j]}, \text{[ka:\Theta b\Theta t\Theta j]}, \text{[bez\Theta m\Theta p\Theta j]}, \text{[bod\Theta m\Theta p\Theta j]})\)

40. \begin{align*}
\text{koning} & \rightarrow \text{koningkje} \quad \text{[konIn\Theta k]} \quad \text{'little king'} \\
\text{leenin} & \rightarrow \text{leeninkje} \quad \text{[le\Theta nIn\Theta k]} \quad \text{'little chair-arm'} \\
\text{reling} & \rightarrow \text{relingkje} \quad \text{[re\Theta lIn\Theta k]} \quad \text{'little safety railing'} \\
\end{align*}

\((\text{[konIn\Theta t\Theta j]}, \text{[le\Theta nIn\Theta t\Theta j]}, \text{[re\Theta lIn\Theta t\Theta j]})\)

Here, where epenthesis should apply, assimilation of the consonants takes place instead. In Trommelen's dialect, the forms in (40) all contain a \( \Theta \) instead of an \( [I] \), and due to her treatment of \( \Theta \) within the syllable nucleus, she can predict that the forms in both (39) and (40) will not elicit epenthesis. In her analysis, \( \Theta \) gets placed into a \([+\text{sonorant}]\) position. This position floats between the nucleus and the coda, and can be associated with either the nucleus or the coda, depending upon the nature of the segment that is placed in the \([+\text{sonorant}]\) slot.

Schwa is treated as a segment that can act as a syllable nucleus only because it is placed into this \([+\text{sonorant}]\) slot, and subsequently associates with the nucleus. In the case of a \( \Theta \)-only nucleus, the nucleus has a branching structure in which the first branch is unfilled. All other vowels get placed into a \([+\text{vocalic}]\) position which occupies the first branch within the nucleus. In the case of lax vowels, only the \([+\text{vocalic}]\) position gets filled, while long (tense) vowels and diphthongs occupy both the \([+\text{vocalic}]\) and the \([+\text{sonorant}]\) positions.

In coda clusters, any sonorant consonants will be associated with the \([+\text{sonorant}]\) position, which is therefore associated in turn with the coda instead
of the nucleus. Trommelen's final rule for epenthesis predicts (correctly) that all forms containing branching rhymes (i.e. containing anything other than the nonbranching nucleus and possibly a nonbranching coda) will not elicit epenthesis even if they end in a sonorant C. Syllables containing [∅] in the nucleus thus cannot meet the structural description for the epenthesis rule, since these are by their very nature present only within branching nuclei.

It has been noted, however, that in dialects where an [I] exists in the stem-final nucleus of words like those in (40), Trommelen's analysis predicts that epenthesis should take place (see van Voorst (1983)). However, no dialect of Dutch allows epenthesis to apply within these constructions. The analysis proposed here can, however, account for these data as well, without requiring that [∅] hold a special place within the rhyme.

G. Extrasyllabicity and Underspecification:

Within the framework of this paper, the ∅-Epenthesis rule for diminutives has the form given in (41). This rule must be listed separately from the epenthesis process for forms like [A]/[N] since in those instances the epenthesis follows from other principles. Here on the other hand, a specific process must be invoked to produce the desired effects. (F6)

41. 

\[
\begin{align*}
&{^[+\text{son}] [-\text{son}]} Y \\
&0 \rightarrow x / x (x) \quad \xrightarrow{r} x / x \quad (\text{where } Y = \text{some features or is null}) \\
&\text{N} \quad \text{N} \quad \text{R} \quad \text{O}
\end{align*}
\]

Thus, as the data require, the rule is sensitive to a nonbranching rhyme. The rule is also sensitive to the presence or absence of any of the timing units within the preceding rhyme. If the nucleus branches, or if a coda must be constructed despite the presence of an extrasyllabic segment (as in the case of C-clusters), epenthesis cannot take place because the necessary environment is not met. From this rule it follows that vowel-final stems like those in (27) will never elicit epenthesis, since they contain no final extrasyllabic consonant, and the diminutive's onset will surface as [t], by default. Furthermore, the forms in (39) such as [Ap∅t] → [Ap∅tj∅] become predictable, because at the point where epenthesis applies, the nucleus is still unassociated with a segment on the skeletal tier in these stems. This is illustrated in the diagram below:
We are still forced to deal with the data in (40) however, since Trommelen and others have assumed that these forms contain an underlying vowel in the final nucleus. As such, they should elicit epenthesis, but do not. We can account for these data in another fashion; if *koening, *leuning, and *reling are listed lexically in a form resembling that of *appel /ApI/ (that is, /konə/, /10nə/, and /relə/), subsequent syllabification will create the same kind of empty nucleus, which will eventually be filled by ə. These processes produce exactly the forms spoken in Trommelen’s dialect (i.e. /konən/, /10nən/, and /relən/). It takes only a simple assimilation rule, present in the other dialects, to produce [I] before velar consonants:

\[
\begin{array}{l}
\text{43.} \\
\quad \text{[+High]} \\
\quad x \quad x \\
\quad \text{[+cons]} \\
\end{array} \quad \Rightarrow \\
\begin{array}{l}
\text{[+High]} \\
\quad x \quad x \\
\quad \text{[+cons]} \\
\end{array}
\]

This rule seems to be available within my own dialect. In Trommelen’s dialect this rule is absent, hence the distinction. Such a representation for these forms accounts simultaneously for the lack of epenthesis in these cases, and for the dialectal variation.

H. Conclusion:

From the preceding discussions, it has become apparent that the ə-Deletion and epenthetic processes in Dutch can be greatly simplified when they are discussed in terms of their interactions with other phonological processes within the Dutch grammar. ə-Deletion seems to arise as the result of constraints on syllable structure, and as the result of the characteristics of the vowel segment involved. When the vowel is completely underspecified for all features, it is susceptible to onset incorporation and subsequent degemination if the following morpheme does not contain an onset in its lexical entry. Since syllable onsets are obligatory, they must be acquired either from the lexical entry itself, from
the application of the incorporation and degemination processes or via null onset formation.

Epenthesis of [ə] also seems to arise due to syllable structure constraints (primarily, the Sonority Hierarchy and the need for a syllabic nucleus) and due to the manner in which the syllable is built. The same syllable structure constraints and their interaction with underspecified segments allow the correct surface forms to be predicted for Dutch diminutive formation. Finally, provided that stress rules and the revised epenthesis rule for diminutives can only apply to rhymes that contain (at least partially) specified nuclei (as discussed in section D), it follows that [ə] will never receive stress, and that epenthesis will not apply to stems that bear a [ə] in the final nucleus at surface structure.
Footnotes:

1. Note that [E] must be specified as [+Low] in order to keep it from falling together with [O] in this system. An equally acceptable approach would be to include the feature [Front], so that [E] is specified [+Front] (and [-Low] as well), and [O] is [-Front] by default. However, this requires an extra feature in the matrix, which contravenes Archangeli's Feature Minimization Principle. Since it is possible to distinguish between the various phonemes without this extra feature, as long as [E] is classified as demonstrated in the chart above, and these classifications appear to be completely theory-independent and have no consequences for the grammar of Dutch, I will retain the former system outlined above.

2. It should be noted that the representation of an unspecified feature [vocalic] as [0 voc] is only used to make the overall system clear to the reader. I will make no theoretical claims concerning the "reality" of '0' as a possible alternate to '+' or '−'.

3. Lieber (1985) refers to both [+consonantal] and [-syllabic] for consonants, although she notes that the feature [vocalic] could be used instead of [syllabic] within her framework. Later in the same work, she proposes that the feature [anterior] may be more appropriate for the characterization of underspecified consonants. Vowels are then underspecified for [anterior] while consonants are specified for this feature underlyingly. This proposal requires more in-depth study, however.

4. Since I will not be concerned with the representations of consonants to any great extent, beyond the notion of the empty onset position, consonants will be represented here by phonetic symbols attached to timing slots.

5. It should be noted that the Deletion strategy is only able to apply to completely underspecified segments in the grammar, since in other instances of Class I affixation to vowel-final stems, (eg. proza [proza] 'prose' + -isch [is] => prozaisch [pro.za.is] 'prosaic') the final vowel is not deleted as readily. In the case of a word like prozaisch, it seems that a secondary repair strategy must be made available within the grammar, where an obligatory syllable onset is supplied whenever one cannot be obtained via the usual deletion strategy. In this instance, since the onset cannot be obtained by deletion of the [la], (that is, *[prozis]) it must be possible for an onset position to be inserted between the two nuclei. This type of derivation is given below:

\[
\begin{array}{cccc}
Y & & & \\
| & & & \\
X & X & X & X \\
| & | & | & \\
O & N & N & C \\
| & R & / & \\
\big\slash / & R & \big\slash \big\slash R \\
o & o & \big\slash \\
\end{array}
\]

where \(Y = \) some feature specification.
This position probably does not have the usual specification for [-vocalic], since it cannot arise as a glottal stop in slow speech. In fact, it may well be completely null in its segmental nature, with its features unable to be filled in at all, since it is only inserted into the onset position in order to satisfy WFC's on the syllable itself. In this case, Piggott and Singh's (1985) proposal that segments unspecified for [+vocalic] must be placed in the nucleus ought to be modified so that their generalization refers only to segments that are present as a result of lexical specification or insertion into an empty nucleus. The exact nature of the empty onset position in Class I suffixation processes of this type remains to be determined.

6. Another possible approach to the problem of epenthesis in diminutives is to have a syllabification-based rule rather than an epenthesis rule per se. In other words we might actually have a rule resembling the one given below, in which a new onset is created when the diminutive is affixed to the stem:

\[
\begin{array}{cccc|c|c}
{[+\text{son}]} & {[+\text{son}]} & {[-\text{son}]} & Y \\
\hline
1 & 1 & 1 & 1 \\
\hline
x \langle x \rangle & \rightarrow & x & x & / & \quad & x & x \\
\hline
1 & 1 & 1 & \quad & \backslash & / \\
\hline
N & N & 0 & 0 \\
\hline
R & R & & & & & \end{array}
\]

Following onset creation, a nucleus must be inserted since a syllable containing only an onset position would be ill-formed. The nucleus would eventually become [Ø] by default. A rule such as this must still be listed separately from the well-formedness conditions that control most of the phonological alternations seen up to this point. As such, it remains to be seen whether the epenthesis rule or onset creation (or some other analysis) is the correct analysis for the diminutive data.
References:


