Spell-Out of Phonological Domains

The Case of Slovenian

by

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Abstract

Novo mesto Slovenian, a South Slavic language, exhibits a process of unstressed /i/-deletion that appears to be *construction-specific*: it applies in verbs and participles, but not in other word classes, such as nouns or adjectives under identical phonotactic conditions. This thesis proposes a phonological analysis of this deletion process, which determines that the masculine plural exponent /-i/ may attach to a participial stem, as in [PTC]-/i/, and undergo deletion under specific phonotactic conditions, but it may also attach to a nominal or adjectival stem, as in [ADJ]-/i/, where it is preserved in the same phonotactic conditions in which it deletes with participles. This process of construction-specific vowel deletion cannot be derived by the standard approaches to construction-specific phonology, such as Cophonology Theory (Orgun 1996; Inkelas et al. 1997; Inkelas & Zoll 2007; Inkelas 2008, 2011), or the grammar with phonological levels (Cyclic/Word/Phrase level) as in Embick (2013), which stems from Halle & Vergnaud (1987) and effectively mirrors Lexical Phonology (Kiparsky 1982a,b; Mohanan 1986). The problem is rooted in the way these approaches define *phonological domains*. A system with the fixed distinction between Cyclic and Word levels is shown to be inadequate. This thesis subscribes to the research program laid out in Marvin (2002), Marantz (2007), Samuels (2009), Piggott & Travis (2013) and Newell & Piggott (2014), which seeks to interpret the *phasal cyclicity* of syntax (Chomsky 2001, 2008) as a locality boundary that defines phonological domains. It is shown that a simple generalization on the /i/-deletion facts can be formulated by making reference to phases as phonological spell-out domains. In addition, this thesis proposes a tentative formal solution to the problem of deriving the deletion of the masculine plural /-i/: since the deletion effect is specified in the stem to which the /-i/ attaches, it is proposed that the phonological grammar stores phonology-specification in a *buffer*, which may persist to the end of the spell-out domain as set by the phase. Through this, the stem-specified deletion phonology effects the masculine plural suffix /-i/.

Preface

This thesis is original, unpublished, independent work by the author, J. Božič.

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Acknowledgements

What pushed me to analyze the distribution of the high vowel /i/ and schwa, and their intricate connection with cyclicity in Novo mesto Slovenian was a sudden, personal realization that I had no adequate understanding of even the basic processes that govern the phonology and morphology in my native language, Novo mesto Slovenian. This recognition of my ignorance first triggered a basic survey of the morpho-phonological properties of the language, which turned out to be of substantial interest for the morphology-phonology interface (the 'PF-interface', in my case), culminating in the present thesis.

I first need to state that this thesis could not have been produced in its current form and in such a timely fashion were it not for my supervisor, Gunnar Hansson. I am very grateful to him for his guidance in my research, and especially for helping me organize my second year at UBC so as to leave enough time for thesis writing. I will miss our meetings and, especially, the discussions on the phonology-morphology interface and cyclicity. A big thanks also needs to go out to my remaining committee members: Doug Pulleyblank always pushed me to consider a broad range of theoretical approaches so that I would ultimately arrive at the most objective picture possible, whereas Joe Stemberger very helpfully supplied me with just the right counter-examples from Slovenian that substantially improved my analyses. I have also had several discussions on Slovenian phonology with Peter Jurgec, for which I am grateful. In my time at UBC, I was greatly influenced by Michael Rochemont's course on syntax, which enabled me to properly understand and appreciate the Minimalist Program. Also, I would like to thank Michael for the discussions we have had on Phase Theory and the grammar in general, which has had an impact on the present thesis. I am also grateful to Rose-Marie Déchaine for all the morpho-syntactic discussions that we had when I initially became interested in the topic.

I want to express how grateful I am to my wife, Staša, who was stuck with me throughout my thesis-writing days and helped me keep in touch with reality by pointing out the small things in life that ultimately matter the most. Finally, I want to extend a warm thanks to my family in Slovenia for their continuous support in my academic pursuits abroad.

Chapter 1

Introduction

The idea that phonological processes may be specific to some morphological constructions but not others is not novel: in the founding document of generative phonology, Chomsky & Halle (1968) needed to make a distinction between affixes that trigger stress re-assignment in English and those that do not, which was formally implemented by phonological rule-indexation to morphological contexts. This general topic of 'construction-specific' phonology has remained with the field throughout its development: formal answers for this phenomenon have been sought in Lexical Phonology (Kiparsky 1982a,b; Mohanan 1986), and later in Stratal Optimality Theory (Kiparsky 2000; Bermúdez-Otero 2011), in Cophonology Theory (Orgun 1996; Inkelas et al. 1997; Inkelas & Zoll 2007; Inkelas 2008, 2011) and Constraint Indexation within Optimality Theory (Itô & Mester 1995, 1999; Pater 2000, 2007, 2010). A recent view that attempts to deal with construction-specific phonological processes takes the specific view of the morphology-phonology interface put forth by Distributed Morphology (Halle & Marantz 1993); an example of this is Embick (2013),

In this thesis, we will also adopt the view of the interfaces advocated by Distributed Morphology. We will discuss data from Novo mesto Slovenian, a South Slavic language, which reveals a construction-specific process of unstressed vowel deletion. These data are of much interest for theories of construction-specific phonology because they reveal that the same word-final affixal vowel, viz. masculine plural /-i/, deletes in some morphological constructions but not in others. This generates the question of what the 'domain' for a construction-specific phonological process should be. We will discuss how the standard approaches fail in modelling this process of vowel deletion, which should set specific guidelines for future research on this and related phenomena. At the very end of the thesis, we also show that it is possible to formulate a plausible generalization of this problematic process of vowel deletion by referring to syntactic locality, viz. Phase Theory (Chomsky 2001, 2008). A tentative formal implementation of this idea is offered, which seeks to define the spell-out of phonological domains primarily through syntactic phases. This thesis places emphasis on the hope that

locality boundaries for phonological processes may be found in the independently motivated locality constraints on syntactic computation, making for a modularly distinct, but unified theory of grammar.

This introductory chapter has two sections. Section 1.1 introduces the crucial concepts of Distributed Morphology that are followed in this thesis, most of which a reader familiar with the theory may skip, while section 1.2 lays out the goal of the thesis in more detail.

1.1 Interface: Distributed Morphology

In the chapters that follow, this thesis adopts the general outlook provided by the Minimalist Program (Chomsky 1993, 1995, 2000, 2001), together with a specific view of the interface between morphosyntax and phonology, viz. Distributed Morphology (Halle & Marantz 1993, 1994; Embick 2010). This section is dedicated to a general description of the basic assumptions that will be made; this seems especially necessary since there is no fully unified theory of Minimalist grammar or Distributed Morphology. The assumption that will underly all the analyses to follow is that natural human language is the reflection of a cognitive language faculty, essentially a grammar, that can be teased apart into several modularly distinct components. We will assume a 'Y-model' of grammar, which stems from work in the Minimalist Program:

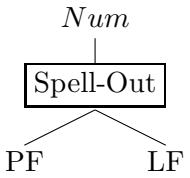

Figure 1.1: Y-model of grammar

In a Y-model of grammar, syntactic computation provides the 'central' linguistic structure, which is then 'spelled out' to the two interfaces: the Phonetic Form (PF) is used to interface syntax with the 'sensory-motor' systems, while the Logical Form (LF) interfaces syntax with the 'conceptional-intentional' systems (Chomsky 1995). The grammar is fed by a Lexicon, which includes the lexical information which syntax requires to project structure. The 'Numeration set' *Num* represents the input where the lexical components for a particular sentence are collected; out of these lexical primitives, the syntax projects structure, which is subsequently spelled out to the two interfaces. As a terminological point, it should be noted that 'Phonetic

Form' does not involve anything 'phonetic', but its role is to convert syntactic information into phonological representations, which only then interface with the sensory-motor system, giving rise to articulatory (motor) movements. This thesis will be concerned with the PF-branch of computation.

Distributed Morphology subsumes the notion of a Y-model of grammar and lays out very specific claims about the interface between morphosyntax and phonology. It crucially assumes *Late Insertion* (Halle & Marantz 1994: 275), which implies that morphemes are not yet associated with any phonological features in the syntax or the lexicon, and that any phonological features are mapped onto the morphemes at the level of PF; before that, the morphemes are only represented by bundles of morphosyntactic features. This process of mapping phonological features to the morphemes is termed *Vocabulary Insertion* (often abbreviated as 'VI'). The process of mapping phonological features to morphosyntactic ones is formalized by a system of VI-rules. Consider the following two VI-rules that insert /d/ for the English past tense and /z/ for the English third person singular present tense suffix:

(1) Vocabulary Insertion

[PAST]	↔	d
[3P.SG.PRES.]	↔	z

This way, syntax does not need to compute any features that are not required in that part of the grammar. Distributed Morphology also contends that VI-rules may be *underspecified* (Halle & Marantz 1994: 276) for morphosyntactic features. This means that a rule may specify only [PRESENT], or it may specify [3P.SG.PRES.], which means that the more underspecified exponent could be inserted for several different morphemes, as long as they contained the feature [PRESENT]. This is an important mechanism that is very valuable for overcoming the danger of freely positing homophonous exponents. As regards homophony throughout this thesis, we will subscribe to the following principle laid out by Embick (2003):

(2) AVOID ACCIDENTAL HOMOPHONY (Embick 2003: 156)
Learners seek to avoid accidental homophony; absent evidence to the contrary, identities in form are treated as systematic.

Positing an accidentally homophonous exponent must generally be grounded in good independent (morphosyntactic and morphosemantic) reasons. But let us turn back to the two rule specifications, [PRESENT] and [3P.SG.PRES.]. Above we mentioned that both are valid exponent specifications for VI-rules, but they make different predictions, viz. the more underspecified ex-

ponent would be inserted for more different morphemes that bear the feature [PRESENT]. Note, however, if *both* these exponents existed in the same grammar only one of them could apply for a given morpheme. In case of a morphosyntactic node that would contain a third person singular present tense morpheme, only the rule which specifies [3P.SG.PRES.] could apply, crucially because the rule which specifies just [PRESENT] is less specific, and so cannot apply. This is regulated by the *Subset Principle* (Halle 1997):

(3) *Subset Principle* (Halle 1997: 128)
The phonological exponent of a Vocabulary item is inserted into a morpheme in the terminal string if the item matches all or a subset of the grammatical features specified in the terminal morpheme. Insertion does not take place if the Vocabulary item contains features not present in the morpheme. Where several Vocabulary items meet the conditions for insertion, the item matching the greatest number of features specified in the terminal morpheme must be chosen.

A key tenet of Distributed Morphology is also its explanation of word-formation. Distributed Morphology denies the 'morphological word' the status of a theoretical primitive, and rather seeks to explain all word-formation as the reflection of independently motivated syntactic processes: specifically, morphological words are complexes of syntactic heads, adjoined to one another through syntactic movement operations (Embick & Noyer 2001; Embick 2007, 2010), or also lowering operations (Skinner 2009). For instance, consider the morphological structure [[[$\sqrt{}$ROOT] x] y]:

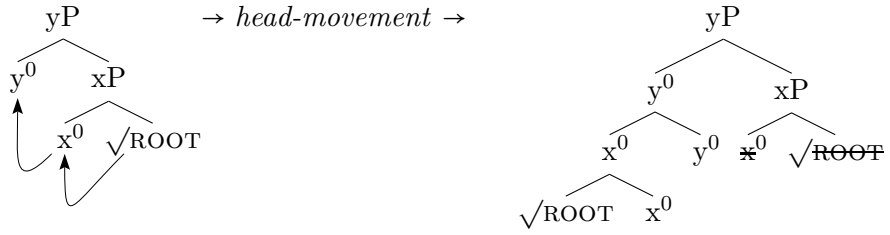

Figure 1.2: [[[$\sqrt{}$ROOT] x] y]

On the left-hand side is the syntactic structure prior to any movement has applied. On the right-hand side, is the resulting structure. To derive this result from the syntactic structure on the left, a process of successive cyclic head movement has to apply. The root of the structure moves and adjoins to the head x^0, which yields the following adjunction structure: [[$\sqrt{}$ROOT] x]. After that, the newly created adjunction structure moves again and adjoins

to the higher head y^0, yielding [[[$\sqrt{}$ROOT] x] y]. Since the morphemes in this structure are essentially syntactic heads, they must abide by the Head Movement Constraint (Travis 1984), which states that no intermediate head may be skipped when moving to a higher head; this also explains why the entire adjunction complex of heads is always pied-piped to the higher target of head movement. As a side-effect, this syntactic phenomenon explains why rigid orderings of morphemes may be observed in words. Such an approach to morphology makes Distributed Morphology a *syntactic approach* to word-formation along the lines of Lieber (1992), and contrasts it heavily with *lexicalist approaches* (Halle 1973; Aronoff 1976; Lieber 1980; Anderson 1982; Kiparsky 1982a), where word-formation more or less takes place in the lexicon; see Marvin (2002: 11) for an overview and comparison with Distributed Morphology.

This brings us to the discussion of roots. Roots are treated as acategorial heads (Marantz 1997; Embick & Halle 2005; Embick 2010; Harley 2014) which need to be categorized by a categorial head. The basic categorial heads are the nominalizer n^0, the verbalizer v^0 and the adjectivizer a^0. Heads that are used to construct tense, participles, mood constructions, and so on, are treated as non-categorial functional heads. Let us consider a sample derivation that will shed light on these relations between different heads and will also illustrate the head movement that was discussed above.

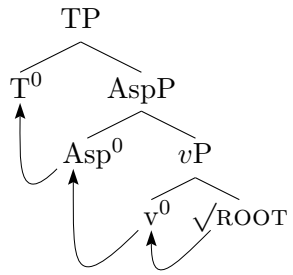

Figure 1.3: [[[[$\sqrt{}$ROOT] v^0] Asp^0] T^0]: Before head movement applies

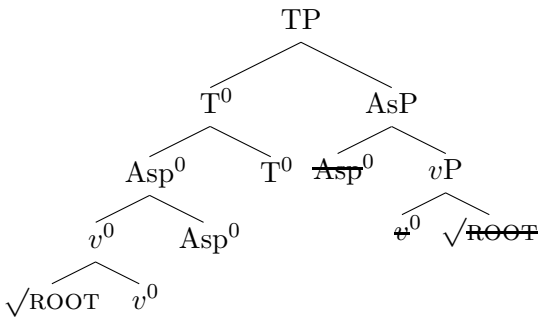

Figure 1.4: [[[[$\sqrt{}$ROOT] v^0] Asp^0] T^0]: After head movement applied

This example illustrates how the morphological word [[[[$\sqrt{}$ROOT] v^0] Asp^0] T^0], a verb, is derived. In the first syntactic tree above, the root is in a position where one would usually find the verbal head V^0 in other approaches to syntax, and indeed it performs the same role, with the exception that it is an acategorial head; it may even project up to $\sqrt{}$P, as it may c-command an object. But the crucial aspect of such an analysis for us is that it is acategorial, and it needs to be categorized. It moves to the verbalizer v^0, which, on the other hand, is categorial, and it categorizes the root, making it verbal. The movement then proceeds to the aspectual head Asp^0 and subsequently to the tense head T^0, both of which are non-categorial functional heads. It is usually assumed that the agreement head Agr^0, expressing the ϕ-features (gender, number, person) is adjoined to the complex of heads (if they are clausal predicates that seek agreement such, as verbs and participles) after syntactic spell-out, at PF (Halle & Marantz 1993; Embick 2010; Arregi & Nevins 2012), and we will make that assumption, as well.

Nouns or adjectives are formed in exactly the same way. Take the noun *breakability*, which can be decomposed into *break-able-ity*, essentially a verb, an adjective and finally a noun, where only the verb operates on the root. Such a formation starts out as the syntactic structure [$_{nP}$ n^0 [$_{aP}$ a^0 [$_{vP}$ v^0 $\sqrt{}$BREAK]]], and emerges as the adjunction complex [[[[$\sqrt{}$BREAK] v^0] a^0] n^0] after head movement has applied. What must happen at this point is the process of converting this adjunction complex, which is a syntactic formation, to information that can be processed by phonology. The first step is that of *linearization*: Embick (2010: 32-35) assumes a process of linearization that is in line with Sproat (1985) and Marantz (1984, 1988), which means that the heads must be concatenated so that they can be interpreted as a linear string. We will follow Embick & Noyer (2001) and Embick (2007) by using two concatenation operators, viz. $\oplus$, which concatenates

heads in an adjunction complex (used for 'word internal' concatenation), and $\frown$, which concatenates heads not merged in an adjunction complex (used for 'word external' concatenation, for ordering 'words'). What is important to note is that these are binary operators, which means that they yield maximally binary concatenation statements. The concatenation of the adjunction complex $[[[[\sqrt{\text{BREAK}}]\ v^0]\ a^0]\ n^0]$, therefore, yields the following concatenation statements:

(4) Concatenating the heads in $[[[[\sqrt{\text{BREAK}}]\ v^0]\ a^0]\ n^0]$
$[[[[\sqrt{\text{BREAK}}]\ v^0]\ a^0]\ n^0] \rightarrow \sqrt{\text{BREAK}}\oplus v^0,\ v^0\oplus a^0,\ a^0\oplus n^0$

Such a process of concatenation might function in binary steps, as represented above, but crucially it outputs a list of heads that reflect a linear precedence relation. For more on this see subsection on the locality of exponence below. The structure that we have produced in (4) may be preceded or followed by other heads (or, adjunction complexes) in the syntax. For instance, if we wish to capture the fact that it is preceded by, say, a determiner head, D^0, we use the word external operator $\frown$ to do this, as follows: $D^0 \frown [\sqrt{\text{BREAK}}\oplus v^0,\ v^0\oplus a^0,\ a^0\oplus n^0]$.

The next step is that of Vocabulary Insertion, as mentioned before. Embick (2010: 42) explains that VI-rules apply in an 'inside-out' fashion, which means that they proceed derivationally (or rather, as a reflection of that derivation) and start with the most embedded head and the work their way up. In this case, they have to start with the root:

(5) VI-rules applying to $[\sqrt{\text{BREAK}}\oplus v^0,\ v^0\oplus a^0,\ a^0\oplus n^0]$

a. Step #1: $[\sqrt{\text{BREAK}}] \leftrightarrow$ breɪk
b. Step #2: $[v^0] \leftrightarrow \varnothing$
c. Step #3: $[a^0] \leftrightarrow$ əbɪl $/v^0\_$
d. Step #4: $[n^0] \leftrightarrow$ ɪti $/a^0\_$

In these four steps, the exponents are inserted for their corresponding morphemes (syntactic heads). Vocabulary Insertion and head concatenation before it are operations that illustrate the crucial task of the PF-interface, which is one of converting morphosyntactic information to the form that can be processed by phonology.

After Vocabulary Insertion has inserted the relevant exponents, the string of exponents is ready for phonological processing. The output of VI-rules essentially constitutes an input to the phonological component. This creates the following overall conception of the PF-branch computation in terms of modularity:

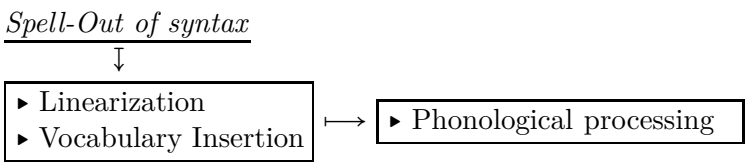

Figure 1.5: PF-branch modularity

A note on terminology is on order: it is important to distinguish between 'spelling out syntactic structure' and the 'spell-out of a morphosyntactic head'. The former refers to sending the syntactic structure to the interfaces for processing (linearization, etc.), while the latter simply refers to VI-rules inserting a certain exponent for a certain morphosyntactic head; this last definition has nothing to do with 'spelling out' syntactic structure to the interfaces, but it is used nonetheless.

Much work on Distributed Morphology assumes a system of phonological re-write rules to formalize phonological processing, in the sense of Chomsky & Halle (1968), including Halle & Marantz (1993) and Embick (2010). However, in this thesis, we shall assume that the phonological component is in fact an Optimality-Theoretic grammar, in the standard sense (Prince & Smolensky 2004), following approaches such as that by Svenonius & Bye (2010) and Bye & Svenonius (2012), which subsume some version of Distributed Morphology, but with an OT-based phonological grammar. We shall also assume, in the spirit of Cophonology Theory (Orgun 1996; Inkelas et al. 1997; Inkelas & Zoll 2007; Inkelas 2008, 2011), that phonological computation is generally free of morphosyntactic information, such as reference to individual morphemes, with the exception of 'telling apart' the morphological primitives, such as exponent boundaries and root-affix distinctions, which for some processes still seem necessary. Though even these will be subject to morphosyntactic locality constraints (see the following subsection). In this way, such an approach by default argues against lexically indexed constraints, be they merely faithfulness constraints or faithfulness and markedness constraints (Itô & Mester 1995, 1999; Pater 2000, 2007, 2010). The approach advanced here will, on the other hand, make use of *phonological cycles*, as also employed in Cophonology Theory, Lexical Phonology (Kiparsky 1982a,b; Mohanan 1986) and Stratal OT (Kiparsky 2000; Bermúdez-Otero 2011), and are subsumed in most work on Distributed Morphology, stemming back to Halle & Vergnaud (1987) and Chomsky & Halle (1968). It should nevertheless be pointed out that the conclusions with respect to the 'domains of phonological spell-out' (see sections 4.2 and 4.5) could be reached either under an OT-based or rule driven phonological com-

ponent, and are hence relevant for both approaches.

Now that we have introduced the basic assumptions that will be subsumed throughout this thesis, it is important to clarify one more thing that pertains to the treatment of roots. Marantz (1997), Embick & Halle (2005) and Embick (2010) assume that roots, unlike all other morphemes, are not subject to Late Insertion, but enter the syntactic derivation with a prespecified phonological make-up. This is an assumption that is rooted in the idea that root suppletion does not exist. This is far from uncontroversial: Bonet & Harbour (2012) and Merchant (2015) convincingly demonstrate that root suppletion is a reality, and Merchant (2015) together with Harley (2014) argues that roots must be subject to Late Insertion, just like any other morpheme. In this thesis, we will side with Merchant (2015) and Harley (2014), in particular, we may follow Harley and assume that roots are nothing more than sets of random integers (e.g. $\sqrt{23875}$, $\sqrt{98045}$, etc.), which receive their phonological make-up at PF and their semantic interpretation at LF. But for ease of exposition, we will represent each root by the most appropriate English translation of its semantics: for instance, the Slovenian root $\sqrt{}$xɾan- 'feed', will be represented as $\sqrt{\text{FEED}}$ in the morphosyntax. While this is an important point to make, it is not crucial to the overall argument of the thesis.

Syntactic locality

A common claim in Minimalist syntax is that syntactic structure is not spelled out globally, but rather in cycles, which are termed phases (Chomsky 2000, 2001, 2008). According to Chomsky, this is a reasonable way of encoding locality as such cyclic spell-out must be rooted in principles of computational efficiency. Certain morphosyntactic heads are 'phase heads' and trigger spell-out to the interfaces.

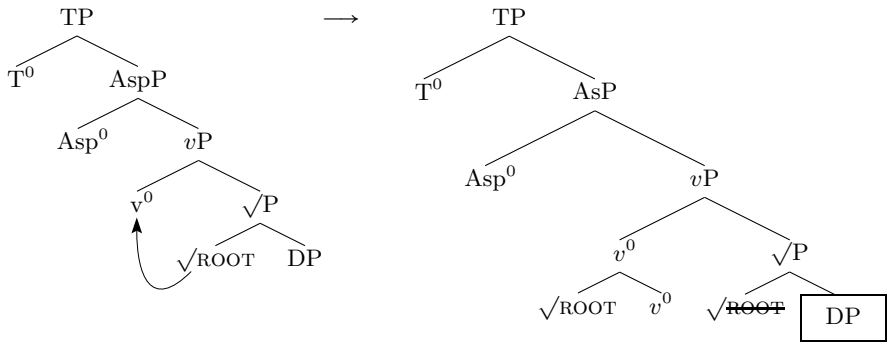

Figure 1.6: Building [[[[$\sqrt{}$ROOT] v^0] Asp^0] T^0]

In the structrure in Figure (1.6), we have the syntactic projections whose heads make up a typical verb – the root also takes a DP object complement. Note that on the left-hand side, the root undergoes movement and adjoins to v^0; this step is shown on the right-hand side. Notice also that the DP object is spelled out (represented by a frame-box) as soon as that happens. This is because v^0 is a 'phase head'. The initial idea was that there were two phase heads, v^0 and C^0, so that every clause would be computed in two cycles. However, this assumption was extended to all categorial heads (Marantz 2001, Marvin 2003, Marantz 2007, Embick and Marantz 2008), which means that v^0 as well as n^0 and a^0 trigger phase spell-out to the interfaces. This, however, does not hold for non-categorial functional heads: in Figure (1.6) above, only v^0 triggers phase spell-out, while Asp^0 and T^0 will not do so when the derivation continues. Phase heads generally trigger spell-out of their complements, and this only happens once the final maximal projection of the phase head has been constructed. It should be understood that in Figure (1.6), the DP object was only spelled out when vP was built. This means that any elements in the specifier of vP, or adjoined to vP can escape spell-out in this phase, and are so called the *edge* of the phase.

Notice that the root itself is also the complement of the phase head v^0, and yet it escapes spell-out in this phase. We will subsume the assumptions on phases that are outlined in Embick (2010, 2013) and Marantz (2013). (Marantz 2013: 98-99) notes that the root must always be processed in the same cycle as the categorial head that categorizes it. If we, therefore, have a case of a noun that is derived from an adjective and the adjective from a verb (like *break-able-ity*), we predict the following phase spell-outs:

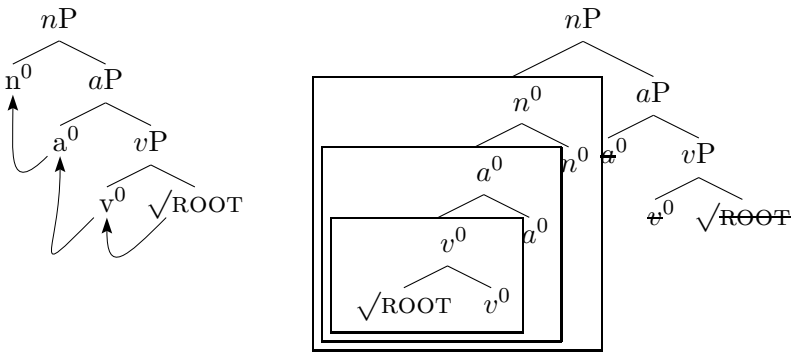

Figure 1.7: $[[[[\sqrt{\text{ROOT}}]\ v^0]\ a^0]\ n^0]$

In the example above we see three phases: the verbal phase, the adjectival phase and the nominal phase. The construction of such structure of course proceeds derivationally: first the root is adjoined to v^0, but the first phase

spell-out only occurs when they are merged with a^0. In the second phase, a^0 is spelled out when it is merged with n^0, and n^0 undergoes spell-out as the final phase.[1] Embick (2010: 18) states that 'when a cyclic head is merged [to the structure], it triggers the Spell-Out of cyclic domains in its complement', which explains why the root itself is not spelled out, as roots are not cyclic (i.e. phase) heads.[2] We can now formally refer to this as the *Domain of Phase Spell-Out*:

(6) *Domain of Phase Spell-Out* (Embick 2010, 2013; Marantz 2013)
A phase head will trigger spell-out of domains that host a phase head.

It is quite crucial to observe what this principle predicts for the spell-out of non-phase heads, as Embick (2010, 2013) notes. Consider an adjective that is built on a verbal phase, where the verbal phase also hosts an aspectual head and a participial head (so the adjective is built on a participial base):

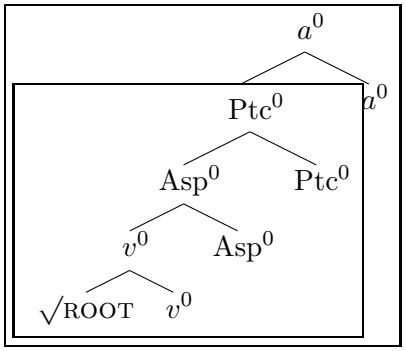

Figure 1.8: [[[[[$\sqrt{\text{ROOT}}$] v^0] Asp^0] Ptc^0] a^0]

Notice that the only two phase heads in this adjectival formation are the verbalizer v^0 and the adjectivizer a^0, simply because the other heads are not categorial. The domain of the first, verbal phase is the root and anything between itself and the next phase head, which constitutes the heads Asp^0 and Ptc^0. Embick (2010: 51) terms such heads that fall into the phase domain of a preceding phase head as the *edge*$^+$ of a phase domain.

[1] Not only parts of the adjunct complex of heads are spelled out through phases, but the entire syntactic structure is, as well, but this is difficult to represent graphically in Figure (1.7), so it is avoided.

[2] The phase heads, such as a^0 and n^0 above, are not strictly speaking in the complement position once head movement applies, but see Marvin (2002: 26), who explains that the 'complement' is too specific a term and proposes that this should be defined as a 'phase domain' in some other way.

The application of phase spell-out also has direct repercussions for the definition of *Bracket Erasure* in Distributed Morphology. Bracket Erasure essentially 'erases' any trace of the morphological affiliation of exponents as the derivation proceeds higher up the tree, and it has been present, in one form or another, in most theories of the phonology-morphology interface (Chomsky & Halle 1968; Kiparsky 1982a,b; Inkelas & Zoll 2007; Inkelas 2008). Embick (2013: 8) argues for a principle of *Phase Impenetrability for Phonology*, which in essence dictates that all the heads (i.e. morphemes) present in the same phase cycle may be identified as roots or affixes. Given the structure in Figure (1.8), the first phase cycle would include $\sqrt{\text{ROOT}}$, v^0, Asp^0, and Ptc^0, but not a^0. When a^0 would be merged to the previously constructed structure, $\sqrt{\text{ROOT}}$, v^0, Asp^0, and Ptc^0 would be spelled out to the interfaces and would undergo linearization and Vocabulary Insertion at PF (and also phonological processing; see section 4.2 on this). When a^0 would be spelled out, the root would lose its identity as a morpheme and would only be identifiable as a string of phonological segments, while v^0, Asp^0, and Ptc^0 would still be able to interact with a^0, until a new phase head is spelled out. For details on this, see Embick (2013). Since all our data will only represent formations within a single phase cycle, this is not discussed further here. But Embick's Phase Impenetrability for Phonology is essentially a type of Bracket Erasure principle.

Probably the most interesting insight of phase cyclicity is the domain in which spell-out proceeds: while structure is built in purely derivational steps, as dictated by the operation *Merge*, spell-out is not purely derivational. As noted by Marantz (2001), the idea that syntax is spelled out in phases, as defined by Chomsky, implies that there is no rigorous overlap of the strictly derivational mechanism of *Merge* and the spell-out of the structure it builds, which makes human syntax less like the spell-out employed in theories that closely follow the principles of formal logic, such as Montague Grammar (Montague 1970): Marantz explains that every structure building operation is accompanied by immediate spell-out in such theories, which is unlike phases, which must 'delay' spell-out. If phase spell-out is the best way of capturing locality in human syntax, it will represent a point of departure (among many) between natural and artificial language.

Locality of exponence

In the previous section, we discussed an important locality constraint on syntactic computation, viz. phase spell-out. Here, on the other hand, we will briefly define the assumptions on the locality of exponence; in other words,

the locality of Vocabulary Insertion. This will touch on the topic of allomorphy. To begin with, it should be noted that, throughout this thesis, the term 'allomorphy' refers to different exponents of the same morphosyntactic head, which cannot be predicted phonologically. In that sense, an allomorph will refer only to a morphologically determined exponent, unless specified otherwise. An example of such allomorphy would be the use of a special exponent for the second person singular morpheme in the perfect verbal forms in Latin – this example is taken from Embick (2010: 70-75). Latin systematically employs [-s] as the exponent of the second person singular agreement morpheme, viz. $\text{Agr}^0_{[\text{2P.SG}]}$: consider the present tense indicative [√am-aː-s] 'you love (2P.SG)' and the corresponding perfect form [√am-aː-v-istiː], where the second person singular exponent is [-istiː], different from the exponent used in the present indicative form. The morphosyntactic structure for the perfect form supplied by Embick is the following:

(7) $[[[[[\surd\text{ROOT}]\ v^0]\ \text{Asp}^0_{[\text{PERF}]}]\ \text{T}^0]\ \text{Agr}^0_{[\text{2P.SG}]}]$

Crucially, $\text{Asp}^0_{[\text{PERF}]}$ is exponed by [-v], T^0 by [-∅] and $\text{Agr}^0_{[\text{2P.SG}]}$ by [-istiː]. A typical analysis in Distributed Morphology would say that VI-rules are sensitive to the context of the $\text{Asp}^0_{[\text{PERF}]}$ head, and in its presence insert the exponent [-istiː] for $\text{Agr}^0_{[\text{2P.SG}]}$, instead of the default [-s]. The locality of VI-rules now comes into play, as it becomes important to define in what way VI-rules 'see' the presence of neighbouring heads in the string.

In this thesis, we will subscribe to the *Span Adjacency Hypothesis*, as defined by Merchant (2015), who takes the notion of a 'span' from the work of Svenonius (2012, 2013). This approach defines VI-rule locality in terms of 'spans of heads' that are adjacent to the point of insertion. A span of heads is defined in the following way by Merchant (2015):

(8) *Span* (Merchant 2015: 288)[3]
Let T be an ordered n-tuple of terminal nodes $\langle t_1, ..., t_n \rangle$ such that for all $t \in T, t = t_1$ or t is an element of the extended projection of t_1.
   a. For all $k = 1...n, t_k$ is a span. (Every node is a trivial span.)
   b. For any $n > 0$, if t_k is a span, then $\langle t_k, ..., t_{k+n} \rangle$ is a span.

This definition of a span crucially expresses that a single head or a number of different heads may form a span, but that, in the former case, the span

[3] A quick note on terminology is required: a *(terminal) node* is equivalent to any linearized head here, and an *extended projection* may simply be understood as any collection of heads between two points in a linear string for our purposes.

is trivial. It also expresses that a span between two heads in a linear string must by default include all the heads in between, which entails that no heads can be 'skipped' when referring to heads in spans. According to Merchant (2015: 294), 'allomorphy is conditioned only by an adjacent *span*'. Returning to the Latin example that we discussed above, this approach to the locality of exponence predicts that the VI-rule inserting [-isti:] in the perfect form will only do so when adjacent to the span encompassing $\text{Asp}^0_{[\text{PERF}]}$ and T^0. We could represent this span through the concatenation statement with the word-internal concatenation $\oplus$-operator, as in '$\text{Asp}^0_{[\text{PERF}]} \oplus \text{T}^0$', but since the application of this operator essentially yields a list of linear precedence relations, we may represent spans as n-tuples. This is something that we will follow throughout this thesis. In this case, we only need to state the ordered pair $\langle \text{Asp}^0_{[\text{PERF}]}, \text{T}^0 \rangle$:

(9) Latin allomorphy

$[\text{Agr}^0_{[\text{2P.SG}]}] \leftrightarrow$ s

$[\text{Agr}^0_{[\text{2P.SG}]}] \leftrightarrow$ isti: / $\langle \text{Asp}^0_{[\text{PERF}]}, \text{T}^0 \rangle$_

The default VI-rule that inserts /-s/ as the second person singular exponent specified no conditioning environment, while the more specific VI-rule specified the span $\langle \text{Asp}^0_{[\text{PERF}]}, \text{T}^0 \rangle$ as the context in which /-isti:/ will be inserted for the second person singular agreement head. This is the way allomorphy will be derived throughout this thesis.

Embick (2010: 49) proposes a different locality constraint on exponence, one which only permits VI-rules to see immediately adjacent single nodes and not spans, which Merchant (2015) terms the *Node Adjacency Hypothesis*. Embick's approach does appear more restrictive, but it requires the use of additional stipulative operations such as 'node deletion (Pruning)' and the use of 'Readjustment Rules'. Both these operations are relatively unconstrained and will not be adhered in the analysis of this thesis. While these assumptions need to be specified, it should be noted that the locality of exponence has no relevant bearing on the key proposal of this thesis discussed in section 4.5, and Embick's view on VI-locality through immediate head adjacency could very well be adopted there.

1.2 Goal of the thesis

As briefly noted in the introduction to this chapter, this thesis is primarily concerned with construction-specific phonology. In particular, we will examine how the domains of phonological computation need to be defined in

order to adequately derive construction-specific phonological processes. The data for the crucial analyses in this thesis are from Novo mesto Slovenian, a dialect of Slovenian, a South Slavic language. We will show that Novo mesto Slovenian contains a process of unstressed /i/-deletion in verbs and participles, but not in other word classes such as nouns or adjectives. For instance, we will show that the masculine plural (M.PL) agreement suffix /-i/ may attach to a participial stem, as in [PTC]-/i/, where it will have to undergo deletion under specific phonotactic conditions. But the same M.PL suffix may also attach to a nominal or adjectival stem, as in [ADJ]-/i/, where it will be preserved in the surface form under the exact same phonotactic conditions in which it deletes with participial stems. In essence, we are dealing with an affix that attaches to different stems and 'inherits' the phonological effects to which that stem subscribes.

We will show that the phenomenon described above is problematic for the standard accounts of construction-specific phonological processes. For instance, Embick (2013) assumes Distributed Morphology with a phonological grammar that stems from Halle & Vergnaud (1987), which means that there is a 'Cyclic level' of phonology, feeding a 'Word level', which in turn feeds the 'Phrasal level' – a system that in effect mirrors the levels in Lexical Phonology (Kiparsky 1982a; Mohanan 1986). In such a system, construction-specific phonology is tied to the Cyclic level, where exponents may introduce diacritics that trigger specific phonological effects. In [[[$\sqrt{}$ROOT] x] y], x can trigger a pass through some phonology, where /ROOT-x/ are processed to the exclusion of y – this is because Vocabulary Insertion proceeds from the root outwards, and when the exponent for x is inserted it triggers a pass through the phonology, but no exponent has been inserted for y at this point. In our scenario of [PTC]-/i/ vs. [ADJ]-/i/ above, it is clear that a phonological process, triggered by some exponent before M.PL /-i/ is inserted, cannot effect /-i/ itself. After /-i/ is inserted, the whole set of exponents is sent to the Word level phonology, a level of phonology fixed for the entire grammar, where construction-specific phonological effects cannot be derived. The idea that M.PL /-i/ can 'inherit' the construction-specific phonology of its stem cannot be derived in such a system. Cophonology Theory (Inkelas & Zoll 2007; Inkelas 2008, 2011) cannot readily derive this phenomenon either – see section 4.4 on specifics.

The problem itself appears to stem from the way the spell-out of phonological domains is defined. The distinction between the Cyclic and Word levels under-generates and over-generates at the same time: situating /i/-deletion on the Cyclic level would fail to delete the M.PL /-i/, while situating it on the Word level would trigger /i/-deletion across all word classes in the

grammar. Section 4.4 defines this problem more explicitly. To begin to address this problem in section 4.5, we subscribe to the over-reaching research program laid out by Marvin (2002), Marantz (2007), Samuels (2009), Piggott & Travis (2013) and Newell & Piggott (2014), which seeks to interpret the *phasal cyclicity* of syntax (Chomsky 2001, 2008) as a locality boundary that defines phonological domains. We will demonstrate that a very simple generalization on the /i/-deletion facts can be formulated if reference to phases is invoked. We will suggest that phasal cycles should replace the rigid distinction between Cyclic and Word level phonology as phonological spell-out domains. We will also formulate a brief tentative proposal that offers a formal explanation of why the M.PL is allowed to 'inherit' its stem's phonology, which will heavily rely on the locality as set by phase cycles.

In this way, the contribution of this thesis is twofold. It presents an empirical challenge for the standard accounts of construction-specific phonological processes and, at the same time, it provides support for Phase Theory as a crucial model of locality that has repercussions 'all the way down'. More specifically, this thesis demonstrates that phase cycles seem to represent a crucial locality boundary for construction-specific phonological processes.

This thesis has four remaining chapters. In chapter 2 of this thesis, we devote a generous amount of time to discussion of the phonological generalizations that the Novo mesto Slovenian data offer. It will be shown that the verbs and participles undergo a process of unstressed /i/-deletion. Chapter 3 presents a phonological analysis of this process of /i/-deletion and how it interacts with other relevant processes in the phonology of Novo mesto Slovenian, most prominently with schwa epenthesis. In Chapter 4, we turn to examine the PF-interface: some crucial points about the morphosyntax of Novo mesto Slovenian are made, and the spell-out of phonological domains is discussed. It is shown that the data on /i/-deletion from Novo mesto Slovenian cannot be accounted for by the standard approaches to construction-specific phonology, which is followed by a brief proposal on how to derive such processes. Chapter 5 concludes the thesis.

Chapter 2

Novo mesto Slovenian

Novo mesto Slovenian is a dialect of Slovenian, a South Slavic language situated in Central Europe in Slovenia. It is spoken in the area of the town Novo mesto, which is located in the Dolenjska region in the south-east of the country, also referred to as Lower Carniola. While the Dolenjska dialects have received several treatments, which are mainly concerned with the diachronic aspects of their phonological processes (Ramovš 1995; Lenček 1982; Toporišič 1992; Logar 1993; Greenberg 2000, 2006), the dialect of Novo mesto has remained undiscussed. In terms of synchronic studies, Standard Slovenian, which is the language used in formal setting, has been studied the most (Toporišič 2000; Herrity 2000; Jurgec 2007a). Overall, Novo mesto Slovenian has eluded a basic description.

The following sections present a basic overview of the segmental inventory of Novo mesto Slovenian, but, more importantly, also reveal data that shed light on the distribution of the vowels [i] and [ə]. In particular, we examine how their distribution correlates with different morphological contexts. Section 2.1 gives a basic overview of the segmental inventory of Novo mesto Slovenian, and 2.2 discusses the distribution of [i] in verbs and participles. A detailed discussion of schwa is postponed until chapter 3.

The data presented in this chapter were selected by the author who is a native speaker of Novo mesto Slovenian. In addition, all the data were also checked against grammaticality judgements of two to three other native speakers of the language.

2.1 Basic overview

This section presents a basic overview of the vowel and consonantal inventories of Novo mesto Slovenian (henceforth, NM Slovenian). Section 2.1.1 discusses the basic distinctive properties of vowels in NM Slovenian, including quality, quantity and tone. Section 2.1.2, on the other hand, presents the basic consonantal distinctions.

2.1.1 Vowels

NM Slovenian is characterized by an eight-vowel system. This system can roughly be captured by the approximated vowel-values, representing the possible surface forms of vowels below in Figure (2.1):

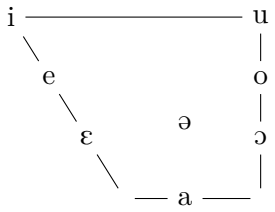

Figure 2.1: Vowel system of NM Slovenian

This system of vowel qualities is much like that of Standard Slovenian (Toporišič 2000; Šuštaršič et al. 1995, 1999; Herrity 2000). At this point, two more distinctive properties of vowels in NM Slovenian need to be discussed: vowel length and tone specification.

In Standard Slovenian, as described in Toporišič (2000: 60), length is a contrastive property of vowels. It can only be contrasted in stressed syllables and not in unstressed syllables. Recent studies have, however, performed phonetic studies of Standard Slovenian as spoken in the Ljubljana region (the capital city of Slovenia) (Srebot Rejec 1988; Šuštaršič et al. 1995, 1999; Petek et al. 1996; Jurgec 2007a, 2011), and they all show that length is no longer a contrastive property of Standard Slovenian, at least not the way it is spoken in the Ljubljana region. NM Slovenian seems to reflect a similar state of affairs in terms of vowel length: NM Slovenian correspondents of the vowel length contrasts that are found in Standard Slovenian, as discussed in Toporišič (2000), are either (i) encoded through a quality contrast, or (ii) they are not encoded at all. To illustrate this, I first list the typical vowel length contrasts illustrated by Toporišič (2000) (but the actual examples are taken from Jurgec (2007a)):

SHORT		LONG	
ʋas	'you (ACC.PL.PRON)'	ʋaːs	'village (NOM.SG.F)'
ɾat	'fond of (M.SG.ADJ)'	ɾaːt	'radian (NOM.SG.M)'
slap	'bad (NOM.M.SG.ADJ)'	slaːp	'waterfall (NOM.SG.M)'
sit	'sated (NOM.M.SG.ADJ)'	siːt	'sieve (GEN.PL.N)'
bit	'be (INF.VERB)'	biːt	'being (NOM.SG.M)'
kup	'pile (NOM.SG.M)'	kuːp	'cup (GEN.PL.F)'

Table 2.1: Length contrasts according to Toporišič (2000) (from Jurgec 2007a: 31)

The table in (2.1) presents a list of minimal pairs that illustrate vowel length contrast in Standard Slovenian according to Toporišič (2000). Now, observe the corresponding examples from NM Slovenian listed in the table below:

SHORT		LONG	
vəs	'you (ACC.PL.PRON)'	vas	'village (NOM.SG.F)'
ɾət	'fond of (M.SG.ADJ)'	ɾat	'radian (NOM.SG.M)'
sləp	'bad (NOM.M.SG.ADJ)'	slap	'waterfall (NOM.SG.M)'
sit	'sated (NOM.M.SG.ADJ)'	sit	'sieve (GEN.PL.N)'
bit	'be (INF.VERB)'	bit	'being (NOM.SG.M)'
kup	'pile (NOM.SG.M)'	kup	'cup (GEN.PL.F)'

Table 2.2: Vowel length contrasts (or, lack thereof) in NM Slovenian

Notice that the supposed length contrast for [a] is always encoded through quality in NM Slovenian: [ə] contrasts with [a]. For the high vowels [i] and [u], however, no length contrast seems to occur at all: the pairs listed above are completely homophonous.[4] The mid vowels [e], [o] and [ɛ], [ɔ], on the other hand, can appear to be generally longer in duration than all the other vowels (which has also been claimed for Standard Slovenian (Toporišič 2000)). Furthermore, a slight difference between the mid vowel segments seems to occur depending on whether they occur in an open or closed syllable, cf. ['pet] 'five (NUM)' vs. ['neː.xam] 'stop (1ST.SG.VERB)'. No contrastive length can, however, be found in identical syllable structures containing the mid vowels, which means that the 'lengthening effect' in the mid vowels could possibly be an entirely phonetic, perceptual matter, and perhaps has no phonological correlate (though this does warrant a further, but independent phonetic study). Let us also mention that, like Standard Slovenian, NM Slovenian has no length contrast in unstressed syllables, which means that no length interaction is possible in the absence of stress.

Whether the mid vowels exhibit actual phonological lengthening or not is not an issue for the present study. It should be noted that the phenomena discussed in the sections to come cut directly across the vowel distinctions based on quality, and, hence, also any potential length differences. Due to this and the uncertain status of phonological length of the mid vowels, I will not retain the notation of (potential) length in the data presented from

[4] In some cases, it seems that there might be a slight difference in vowel length, but the effect is most likely due to different tonal specification: cf. ['dìxát] 'breathe (INF.VERB)' vs. ['dvígàt] 'lift (INF.VERB)', where [ì] in ['dìxát] seems longer than the [í] in ['dvígàt]. This is probably a side-effect of the low tone on [i] in ['dìxát], which is phonetically rising. See next page for more on tone.

now on. Vowel length is, at best, a marginal phenomenon in NM Slovenian phonology, and I, therefore, leave further examination of it to future studies.

The second distinctive property of vowels that needs to be discussed is tonal specification. Vowels may contrast for tone: specifically, high tone and low tone. Similar to Standard Slovenian, NM Slovenian seems to place a tone on the stressed syllable of the word, but the final post-stressed syllable in the word bears a 'boundary tone', viz. it receives the opposite tone value of the one realized on the stressed syllable, as discussed in Toporišič (1968, 2000), Jurgec (2007a: 71–94) and Becker & Jurgec (2015).[5] This yields patterns such as [ˈóσò] ~ [ˈóσσò] and [ˈòσó] ~ [ˈòσσó], where the final, boundary tone is dependent on the tone of the stressed syllable and, hence, fully predictable. Consider the following examples of verbs, in which the (boundary) tone on the final syllable is determined by the stressed syllable (the root syllable in these cases):

(10) Tones in NM Slovenian
   a. L-tone on √dix-
      [ˈdìx-á-t] 'breathe (INF.VERB)'
   b. H-tone on √dvig-
      [ˈdvíg-à-t] 'lift (INF.VERB)'

Jurgec (2007a) and Becker & Jurgec (2015) also show that, when the final syllable of the word receives stress (and hence a tone), the boundary tone is realized on that same syllable, creating a contour tone. It does not seem that this is the case in NM Slovenian. Instead, the tone on the final stressed syllable of a word seems to be a simple high or low tone.[6] Consider the following example of participles with final stress (in these cases, the theme vowel [-i] is stressed):

(11) Tones on final stressed syllables
   [√xɾaˈn-ì-l] 'feed (M.PL.PTC)'
   [√vaˈb-ì-l] 'invite (M.PL.PTC)'
   [√powˈn-ì-l] 'fill (M.PL.PTC)'
   [u-√gasˈn-ì-l] 'turn off (M.PL.PTC)'

Since the sections to come will mainly be concerned with processes that affect suffixes, we shall chiefly be dealing with a fixed set of suffixes. This

[5] Strictly speaking, in Toporišič (1968, 2000) only the immediate post-stressed syllable of any word is discussed, while Jurgec (2007a) and Becker & Jurgec (2015) show the existence of 'boundary tones' on the very final syllables of words.

[6] I urge future phonetic studies to examine this in detail.

means that no tonal variation will be found on stressed suffixes (as illustrated by the suffix [-i] above), as the same suffix will always be specified for the same tone. Because of this, only low-toned examples are given above (but high-toned ones can be found in constructions other than participles). However, tonal variation will be possible when an unstressed suffix carries a boundary tone determined by the tone on the (stressed) root syllable, since different roots may be specified for different tones. The notation of tones in this thesis is primarily added for a more complete representation of the data, as the processes examined further is insensitive to tonal specification.

2.1.2 Consonants

In NM Slovenian, the following consonants may appear in the surface representations of phonological forms:

	Bilabial	Labio-dent.	Dental	Alveolar	Palat.-alveo.	Palatal	Velar
Stop	p b		t̪ d̪				k g
Fric.		f v		s z	ʃ ʒ		x
Affric.					ʧ ʤ		
Nasal	m		n̪				ŋ
Tap				ɾ			
Approx.	w			l		j	

Table 2.3: Consonants in NM Slovenian

It should be noted that the labio-dental fricative [v] is often described as a labio-dental approximant, viz. [ʋ], in the descriptions of Standard Slovenian (Šuštaršič et al. 1995, 1999; Jurgec 2007a), but this does not seem to hold for NM Slovenian. This is in no way connected to the data examined in this thesis, which is why I defer an investigation of the status of this segment to future work. I also relax the notation of the dental segments in the sections (and chapters) that follow, by simply notating them without any subscript diacritics, e.g. [t̪] as [t], etc.

2.2 Status of the high vowel [i]

This section discusses the distribution of the high vowel [i]. First, a very general overview of the structure of Slavic verbs and participles is given in 2.2.1. In 2.2.2 and 2.2.3, the status of [i] is discussed in the verbal and participial paradigms of NM Slovenian, with an interim overview in 2.2.4. In section 2.2.5, the status of [i] inside prefixes and roots is discussed, and section 2.2.6 discusses how the alternations found in verbs and participles connect with stress.

2.2.1 Verbs in Slavic morphology

A rather standard 'template' for Slavic verbal morphology exists, as discussed in various works, including Rubach (1984: 35-39), Svenonius (2004a,b), Manova (2011: 13), Biskup (2012), where the root is followed by a *theme suffix*, typically a vowel, which is followed by the agreement suffix coding person and number:

√ROOT	–	THEME	–	AGR

Table 2.4: Slavic (finite) verbs

On the verbal stem, the '*l*-participles' can be constructed, which are participles derived with the /-l/ suffix. This suffix is again followed by an agreement suffix, just that it here codes gender and number:

√ROOT	–	THEME	–	PTC-*l*	–	AGR

Table 2.5: Slavic *l*-participles

Standard Slovenian (Toporišič 2000; Herrity 2000) follows this general template, as does NM Slovenian. In Standard Slovenian, different theme vowels may occur in the theme position, such as /-a/, /-i/ and /-e/, which are also subject to different stress assignment. Stress in Standard Slovenian may occur on the root or on the theme, which Toporišič (2000: 378-380) uses as a criterion to distinguish between different verbal and participial classes. We will witness the same in NM Slovenian, and we will also focus on an interesting phenomenon in connection with stress: when constructing participles in NM Slovenian, some roots may either have stress on the root or on the theme vowel, which means that stress is variable with some roots.

2.2.2 Verbs

The purpose of this section is to present the most typical and relevant patterns of NM Slovenian verbal morphology. The data in this section do not say anything crucial with respect to the distribution of the high vowel [i]. However, they will be of use to us in several of the sections to come, where we will have to refer to them to construct a complete morphological analysis of verbs and participles, and discuss their phonological properties.

All the verbs in NM Slovenian are constructed by following the same type of morphological pattern, as discussed in 2.2.1. Verbs in NM Slovenian code person in verbs through expressing a three-way contrast: first, second and third person. The number system expresses a three-way contrast so that singular, dual and plural number are distinguished. NM Slovenian is characterized by a fusional system of morphology, which means that person and number are coded through a single phonological exponent. In what follows, the infinitive, though a non-finite form, is given in the verbal paradigms as well, for convenience.

Verbs that are suffixed with the theme vowel [-a] form a representative example of how NM Slovenian verbal morphology works. Consider the root $\sqrt{}$del- 'work' whose verbal paradigm in the indicative mood is given, as is the paradigm in the imperative and infinitive:

	INDIC.			INFIN.
	SG	DU	PL	
1ST.P	ˈdél-à-m	ˈdél-a-và	ˈdél-a-mò	
2ND.P	ˈdél-à-ʃ	ˈdél-a-tà	ˈdél-a-tè	ˈdèl-á-t
3RD.P	ˈdél-à-∅	ˈdél-a-tà	ˈdél-a-jò	

Table 2.6: Verbs formed with [-a] (*a*-CLASS)

	IMPER.		
	SG	DU	PL
1ST.P		ˈdèl-ej-vá	ˈdèl-ej-mó
2ND.P	ˈdèl-éj-∅	ˈdèl-ej-tá	ˈdèl-ej-té
3RD.P			

Table 2.7: Imperative verbs formed with [-a] (*a*-CLASS)

The imperative forms of verbs generally contrast the same three-way number and person categories, but not all persons are contrasted. The infinitive, on the other hand, does not contrast number and person. Notice that the

imperatives of this verbal class are suffixed with [-ej].[7] It is not certain whether this could perhaps be theme vowel [-a], suffixed with [-j], an imperative derivational morpheme, which would imply that [-a] assimilates to [-j], yielding [e] before [j]. Since [e] is always followed by [j] in the imperative forms of [a]-stem verbs, I treat [-ej] as a single morpheme that is used to code the imperative – perhaps an imperatival theme suffix. Infinitives, on the other hand, are simply signalled by the suffix [-t]. The final inflectional morphemes coding person and number all have overt exponents, except for the third person singular inflection, which reveals a zero-exponent.

Verbs that belong to this class that employs the theme vowel [-a] include the following members (the list is not exhaustive):

ROOT	INFINITIVE	MEANING
jok-	ˈjòk-á-t	'cry'
pix-	ˈpìx-á-t	'blow'
dix-	ˈdìx-á-t	'breathe'
dvig-	ˈdvíg-à-t	'lift'
ruk-	ˈrúk-à-t	'hit'
tsuk-	ˈtsúk-à-t	'tug'
kix-	ˈkíx-à-t	'sneeze'

Table 2.8: Roots suffixed with [-a] to form verbs (*a*-CLASS)

This class of verbs is formed exactly as laid out in Table (2.6): the theme vowel is [-a], and the root is the one that always receives stress.

Another class of verbs employs a different theme vowel, viz. [-i]. The inflectional morphemes are precisely the same, but there are some differences in the stress and imperative formations. Consider the verbal paradigm of the root $\sqrt{}$kad- 'smoke':

	INDIC.			INFIN.
	SG	DU	PL	
1ST.P	kaˈd-ì-m	kaˈd-ì-vá	kaˈd-ì-mó	
2ND.P	kaˈd-ì-ʃ	kaˈd-ì-tá	ˈkaˈd-ì-té	ˈkaˈd-í-t
3RD.P	kaˈd-ì-∅	kaˈd-ì-tá	kaˈd-ì-jó	

Table 2.9: Verbs formed with [-i] (*i*-CLASS)

[7] An interesting aspect of the imperatival paradigm is that it seems to employ a different tonal pattern then the one found in the indicative paradigm.

	IMPER.		
	SG	DU	PL
1ST.P		ˈkád-Ø-và	ˈkád-Ø-mò
2ND.P	ˈkát-Ø-Ø	ˈkát-Ø-tà	ˈkát-Ø-tè
3RD.P			

Table 2.10: Verbs formed with [-i] (*i*-CLASS)

The *i*-CLASS paradigm is different from the *a*-CLASS paradigm in term of stress assignment: the [-i] theme vowel must be stressed in this verbal class, and not the root syllable as in the *a*-CLASS. Notice that the imperative derivational morpheme is realized by a zero-exponent and that the stress does not occur on the theme vowel in these forms, but rather remains on the root. The infinitival form employs the [-i] theme vowel, which also receives stress, and the final inflection is [-t] as in the *a*-CLASS verbs. Some members of this verbal class comprise the following roots:

ROOT	INFINITIVE	MEANING
del-	deˈl-í-t	'deal'
tərd-	tərˈd-í-t	'claim'
dob-	doˈb-í-t	'get'
sled-	sleˈd-í-t	'follow'
bud-	buˈd-í-t	'awaken'
tsed-	tseˈd-í-t	'strain'

Table 2.11: Roots suffixed with [-i] to form verbs (*i*-CLASS)

The next class of verbs is slightly different from the *a*- and *i*-CLASSes. In this class, we find verbs that have no overt theme vowel, though in some positions a schwa occurs instead. In terms of stress assignment, these verbs always have stress on the root syllable, precisely like the *a*-CLASS verbs. Let us call this class the Ø-CLASS of verbs. Consider the paradigm of the root √xran- 'feed':

	INDIC.			INFIN.
	SG	DU	PL	
1ST.P	ˈxɾàn-Ø-əm	ˈxɾàn-Ø-vá	ˈxɾàn-Ø-mó	
2ND.P	ˈxɾàn-Ø-ə́ʃ	ˈxɾàn-Ø-tá	ˈxɾàn-Ø-té	ˈxɾàn-Ø-t
3RD.P	ˈxɾàn-Ø-Ø	ˈxɾàn-Ø-tá	ˈxɾàn-Ø-jó	

Table 2.12: Verbs formed with [-Ø] (Ø-CLASS)

IMPER.			
	SG	DU	PL
1ST.P		ˈxɾán-Ø-và	ˈxɾán-Ø-mò
2ND.P	ˈxɾán-Ø-Ø	ˈxɾán-Ø-tà	ˈxɾán-Ø-tè
3RD.P			

Table 2.13: Imperative verbs formed with [-Ø] (Ø-CLASS)

As mentioned above, this class of verbs has a zero theme suffix. Notice the schwa in the first and second person singular: it may be possible that this schwa is phonologically motivated and, hence, has no morphological affiliation, especially since the first and second person singular inflections occur as [-m] and [-ʃ] in the other verbal classes, crucially without schwa. Such an assumption is discussed in section 3.1 and can be set aside for now. Roots that form verbs according to this pattern that includes a zero theme suffix include the following (the list is not exhaustive):

ROOT	INFINITIVE	MEANING
plan-	ˈplàn-Ø-t	'leap'
xlin-	ˈxlìn-Ø-t	'fake'
pil-	ˈpìl-Ø-t	'file'
mam-	ˈmàm-Ø-t	'tempt'
kuɾ-	ˈkùɾ-Ø-t	'burn'
vol-	ˈvɔ̀l-Ø-t	'vote'
mol-	ˈmɔ̀l-Ø-t	'pray'

Table 2.14: Roots suffixed with [-Ø] to form verbs (Ø-CLASS)

However, some roots follow the Ø-pattern as laid out in Table (2.12), but with a difference in the infinitival form: their infinitive also contains a schwa. These roots always end in an obstruent. Since the roots that form an infinitive with zero always end in a sonorant (Table 2.14), this phonological property seems to be correlated with the presence or absence of schwa in the infinitives of Ø-verbs. Roots ending in an obstruent include these:

ROOT	INFINITIVE	MEANING
stop-	ˈstòp-Ø-ət	'step'
potʃ-	ˈpòtʃ-Ø-ət	'crack'
pɾos-	ˈpɾɔ̀s-Ø-ət	'ask'
slut-	ˈslùt-Ø-ət	'suspect'

Table 2.15: Ø-CLASS roots with with schwa in the infinitive

Up to this point we have discussed the three predominant classes of verbs in NM Slovenian, viz. *a*-CLASS, *i*-CLASS and ∅-class. Another minor class of verbs exists: in this class, verbs are formed by suffixing the theme [-e] to the root. Consider √pis- 'write':

	INDIC.			INFIN.
	SG	DU	PL	
1ST.P	ˈpìʃ-ə́-m	ˈpìʃ-e-vá	ˈpìʃ-e-mó	
2ND.P	ˈpìʃ-ə́-ʃ	ˈpìʃ-e-tá	ˈpìʃ-e-té	ˈpìs-á-t
3RD.P	ˈpi̗ʃ-é-∅	ˈpìʃ-e-tá	ˈpìʃ-e-jó	

Table 2.16: Verbs formed with [-e] (e-CLASS)

	IMPER.		
	SG	DU	PL
1ST.P		ˈpíʃ-∅-và	ˈpíʃ-∅-mò
2ND.P	ˈpíʃ-∅-∅	ˈpíʃ-tà	ˈpíʃ-∅-tè
3RD.P			

Table 2.17: Imperative verbs formed with [-e] (e-CLASS)

Several things need to be said about this paradigm. While the indicative verb forms are suffixed with [-e], the imperative forms are derived by using a zero theme suffix, instead. Also, notice that the root-final consonant in the indicative and imperative forms is [ʃ], but [s] in the infinitive. The theme vowel [-e] generally has a palatalizing effect on verbal roots, which need not receive further discussion here, e.g. also [ˈkàʒ-é-∅] (3RD.P) vs. [ˈkàz-á-t] (INF) 'show', [ˈmàʒ-é-∅] (3RD.P) vs. [ˈmàz-á-t] (INF) 'smear', etc. Another matter needs to be mentioned in connection with the infinitives: though the indicative verbal forms are formed with [-e] in this class, the theme vowel used in the infinitive is either [-a] or [-∅], as shown in the list of roots belonging to this class in Table (2.18), where both themes are represented.

The most curious aspect of the verbal *e*-CLASS is, however, the absence of the theme [-e] in the first and second person singular, and the presence of schwa. Notice that I have notated the schwa as a regular theme vowel morpheme. More shall be said about this matter in section 3.1, which is on schwa in NM Slovenian, where we will speculate that this schwa could belong to the following inflection.[8]

[8]Note, also, that the theme [-e] can occur as [-ɛ] when stressed. This happens with a small group of roots, see the following footnote. This is an expected alternation as the

The root-members belonging to the verbal class formed with the theme [-e] are the following (the list is not exhaustive):[9]

ROOT	INFINITIVE	MEANING
pel-	ˈpɛ̀l-á-t	'drive, lead'
kaz-	ˈkàz-á-t	'show'
maz-	ˈmàz-á-t	'smear'
petʃ-	ˈpètʃ-Ø-t	'bake'
ɾetʃ-	ˈɾètʃ-Ø-t	'pray'
tetʃ-	ˈtètʃ-Ø-t	'run'

Table 2.18: Roots suffixed with [-e] to form verbs

The theme vowel [-e] is not only used to form the indicative verbal forms of the *e*-CLASS roots (listed above), but also to mark a specific semantic effect: verbal roots can be suffixed with an aspectual morpheme, viz. [-n], which seems to yield a 'semelfactive' reading; i.e. it denotes an action that is perfective and instantaneous (Comrie 1976). The indicative verbal forms of roots suffixed with [-n] are always accompanied by the theme vowel [-e]. Consider the root √pix- 'blow', which otherwise belongs to the verbal *a*-CLASS, but when suffixed with the semelfactive [-n], it selects for the [-e] theme vowel, and the reading can then be translated as 'give a quick blow':

	INDIC.			INFIN.
	SG	DU	PL	
1ST.P	ˈpìx-n-ə́-m	ˈpìx-n-e-vá	ˈpìx-n-e-mó	
2ND.P	ˈpìx-n-ə́-ʃ	ˈpìx-n-é-ta	ˈpìx-n-e-té	ˈpìx-ə́n-Ø-t
3RD.P	ˈpìx-n-é-Ø	ˈpìx-n-é-ta	ˈpìx-n-e-jó	

Table 2.19: Semelfactive formed with [-e] (e-CLASS)

	IMPER.		
	SG	DU	PL
1ST.P		ˈpíx-ən-Ø-và	ˈpíx-ən-Ø-mò
2ND.P	ˈpíx-ən	ˈpíx-ən-Ø-mò	ˈpíx-ən-Ø-tè
3RD.P			

Table 2.20: Imperative semelfactive formed with [-e] (e-CLASS)

mid vowels [e], [o] do not contrast with [ɛ], [ɔ] in unstressed position, a pattern also seen in Standard Slovenian (Jurgec 2011).

[9]Note that a small list of roots, such as √mr- 'die' and √dr- 'knock over', require the stress to occur on theme [-e]. See sections 2.2.3, 3.1 and 3.2 for discussion of this class.

Notice that some additional schwa-vowels occur in the imperative forms of the semelfactive. Along with other instances of schwa, these will be discussed in section 3.1.

Now that we have covered all the verbal classes in NM Slovenian, we can represent them in the following table:

ROOTS	THEME	STRESS$_{indicative}$
$\left\{ \begin{array}{c} \surd\text{del-} \\ \surd\text{pix-} \\ \surd\text{dix-} \\ \text{...} \end{array} \right\}$	[-a]	$\surd'\sigma - \sigma$
$\left\{ \begin{array}{c} \surd\text{kad-} \\ \surd\text{dob-} \\ \surd\text{sled-} \\ \text{...} \end{array} \right\}$	[-i]	$\surd\sigma - '\sigma$
$\left\{ \begin{array}{c} \surd\text{xɾan-} \\ \surd\text{stop-} \\ \surd\text{xlin-} \\ \text{...} \end{array} \right\}$	[-∅]	$\surd'\sigma - \varnothing$
$\left\{ \begin{array}{c} \surd\text{pel-} \\ \surd\text{maz-} \\ \surd\text{peʧ-} \\ \text{...} \end{array} \right\}$	[-e]	$\surd'\sigma - \sigma$
$\left\{ \surd\text{ROOT+}semelf. \right\}$	[-e]	$\surd'\sigma - \sigma$

Table 2.21: Verbal classes in NM Slovenian (indicative forms)

2.2.3 Participles

Now that we have given an overview of the NM Slovenian verbal morphology, we can move on to a discussion of participial morphology, which is crucially based on that of the verbs. In this section, we shall discuss the general morphological properties of participles and their formation patterns. In addition, the data in this section will enable us to demonstrate that unstressed [i] synchronically alternates with [ə] or [∅] in NM Slovenian.

The participles we shall discuss are usually termed *l*-participles in most literature on Slavic morphology simply because they are formed with the morpheme [-l]. In NM Slovenian, [-l] is the participial derivational morpheme that is suffixed to a verbal stem, i.e. [-l] is attached to a $\surd$ROOT that is

followed by a THEME vowel. This constitues the participial stem. Consider the root √jok- 'cry', which is suffixed with the theme [-a], yielding the verbal stem [√jok-a-], to which we add [-l] to create the participial stem [√jok-a-l]. The participial stem is then followed by an inflection, e.g. the feminine singular inflection [-a], to yield [√jok-a-l-a]. Participles in NM Slovenian code gender and number, but not case nor person. They also use different exponents of inflection than verbs (which code person and number). *l*-participles are essentially 'active' participles: they are used to construct future and past tenses (periphrastically) together with the auxiliary *biti* 'to be', and they also participate in forming conditionals together with the particle *bi* (Marvin 2002).

Let us begin by discussing the first class of participles. Like verbs, I term the participles that are based on a verbal stem derived by the theme vowel [-a] *a*-CLASS participles. Such a classification will prove necessary because participles sometimes select different verbal theme vowels than the verbs themselves do. Furthermore, participles are fraught with different stress patterns, much more so than their verbal counterparts. To distinguish between different stress patterns within a participial class, I designate them with a roman numeral next to the class designations: for instance, the class of participles that are built on the verbal stem which employs the theme vowel [-a], and have stress on the root, are classified as *a*-CLASSI participles. Consider √dix- 'breathe', which represents *a*-CLASSI participles:

	SG	DU	PL
MASC	ˈdìx-ó-w-∅	ˈdìx-a-l-á	ˈdìx-á-l-∅
FEM	ˈdìx-a-l-á	ˈdìx-a-l-é	ˈdìx-a-l-é
NEUT	ˈdìx-a-l-ú	ˈdìx-a-l-á	ˈdìx-a-l-á

Table 2.22: *a*-CLASSI participle (STRESS: √ˈσ − σ)

The stress is always on the root syllable in this class of participles. Notice that instead of the participial [-l], this class shows [w] in the masculine singular form, and the theme [-a] is replaced by [o].[10] All the participles classes will either show [w] or [u] instead of [l] in the masculine singular form. However, we can set these differences aside for now, as they will be discussed in the sections to come.

Let me also take this opportunity to briefly comment on the tonal specification of participles in general: participles follow the tonal pattern laid out

[10]This seems to be a purely phonological process of rounding [a] when it precedes [w].

in section 2.1.1, which means that either the vowel in the root syllable determines the final boundary tone (if it is stressed), or the suffix determines it (again, if it is stressed). The tone patterns indicated on the relevant vowels in this section represent the most typical tonal realization in NM Slovenian: sometimes tone specification can be somewhat variable, viz. a low or a high tone on the root syllable may be acceptable. In the majority of the cases, NM Slovenian speakers opt for a low tone on most stressed roots and all the stressed verbal and participial suffixes discussed in this section. In cases like that, I notate the preferred specification, viz. low tone. When a high tone is in fact preferred, I notate a high tone. The crucial point of this brief tonal interlude is to note than tone assignment may not be as rigid as reflected in the notations in this section and it may vary to some extent – I have only attempted to capture the relevant preferences.

Let us now return to discussing the *a*-CLASSI participles. To recapitulate, these participles have the root syllable stressed and are formed on the verbal stem containing the theme [-a]. Some roots that are used to build such participles are the following (the list is not exhaustive):

ROOT	M.PL.PTC	VERBAL CLASS	
dix-	ˈdìx-á-l-∅	*a*	'breathe'
dvig-	ˈdvìg-á-l-∅	*a*	'lift'
tsuk-	ˈtsùk-á-l-∅	*a*	'tug'
nex-	ˈnéx-à-l-∅	*a*	'stop'

Table 2.23: Roots used to form *a*-CLASSI

Note that the third column, 'VERBAL CLASS ', indicates what class the verb, corresponding to the participle, belongs to based on the theme vowel it employs. All the roots that form *a*-CLASSI participles also form verbs with the theme vowel [-a].

A different set of roots may also be used to form participles with the verbal stem containing [-a], but these have a different stress pattern: stress in this group of participles is always on the theme vowel. Let us call this group *a*-CLASSII participles. Consider the example of $\sqrt{}$pel- 'drive, lead':

	SG	DU	PL
MASC	ˈpɛ̀l-ó-w-∅	peˈl-à-l-á	peˈl-à-l-∅
FEM	peˈl-à-l-á	peˈl-à-l-é	peˈl-à-l-é
NEUT	peˈl-à-l-ú	peˈl-à-l-á	peˈl-à-l-á

Table 2.24: *a*-classII participle (STRESS: $\sqrt{}\sigma-{}'\sigma$)

Notice that there is an exception to the overall stress pattern: the masculine singular form has stress on the root syllable and not on the theme vowel. Roots that form participles of *a*-classII are the following:

ROOT	M.PL.PTC	VERBAL CLASS	
pel-	pe'l-à-l-∅	*e*	'drive, lead'
pis-	pi's-à-l-∅	*e*	'write'
dəɾʒ-	dəɾ-'ʒ-à-l-∅	*i*	'hold'
beg-	be-'ʒ-à-l-∅	*i*	'run away'

Table 2.25: Roots used to form *a*-classII participles

Roots that are used to form this class of participles may use different theme vowels to form verbs. Consider [$\surd$pel-a-l-∅]: the verbal stem upon which the participle is built is indeed [$\surd$pel-a-], but this same stem cannot be used to form verbs. A verb can only be formed with $\surd$pel by suffixing the theme [-e] to it, which makes the verbal stem upon which verbs are built [$\surd$pel-e-]. This, in essence, implies that two different verbal stems may exist per root, but only one of them will actually be used to construct a verb. The same applies for roots that use the theme [-i] to form verbs, but [-a] to form participles. It seems that this class of participles can only be formed from verbal stems that take the themes [-i] or [-e] when forming verbs.

A third set of roots may employ the theme vowel [-a] in the stem that is used to construct a participle. Participles built from this third set of roots can be stressed variably: stress may occur on the root syllable or on the theme-vowel. Speakers of NM Slovenian might have an individual preference for one of the stress types, but most usually they indicate that they would use either of them. Let us call this third group of participles the *a*-classIII. Consider the root $\surd$jok- 'cry':

	SG	DU	PL
MASC	'jòk-ó-w-∅	'jòk-a-l-á	'jòk-á-l-∅
FEM	'jòk-a-l-á	'jòk-a-l-é	'jòk-a-l-é
NEUT	'jòk-a-l-ú	'jòk-a-l-á	'jòk-a-l-á

Table 2.26: *a*-classIII participle: $\surd$'$\sigma - \sigma$

	SG	DU	PL
MASC	'jòk-ó-w-∅	jo'k-à-l-á	jo'k-à-l-∅
FEM	jo'k-à-l-á	jo'k-à-l-é	jo'k-à-l-é
NEUT	jo'k-à-l-ú	jo'k-à-l-á	jo'k-à-l-á

Table 2.27: *a*-CLASSIII participle: $\surd\sigma-{}'\sigma$

The variable nature of stress assignment in this participial class means that, for instance, the feminine singular participle of $\surd$jok- may be either realized as [ˈjòk-a-l-á] or [joˈk-à-l-á]. However, observe that, like with the *a*-CLASSII participles, the masculine singular again fails to host stress on the theme vowel. Roots that are used to form *a*-CLASSIII participles are the following (the list is not exhaustive), and they all correspond to verbs that are formed with the theme vowel [-a]:

ROOT	M.PL.PTC	VERBAL CLASS	
jok-	ˈjòk-á-l-∅ / jo-ˈkà-l-∅	*a*	'cry'
pix-	ˈpìx-á-l-∅ / pi-ˈxà-l-∅	*a*	'blow'
val-	ˈvàl-á-l-∅ / va-ˈlà-l-∅	*a*	'roll'
kop-	ˈkòp-á-l-∅ / ko-ˈpà-l-∅	*a*	'bathe'

Table 2.28: Roots used to form *a*-CLASSIII participles

We have now exhausted the list of roots that form participles through employing [-a] as the theme vowel in their verbal stem. Let us, therefore, turn to participial classes that make use of the theme [-i] in their verbal stem. Most participles that use the theme [-i] assign stress to this theme vowel, even in the masculine singular form (recall that this does not happen in the *a*-CLASSII of participles, which also contain a stressed theme for all the other forms). Participles constructed in this fashion are termed *i*-CLASSI of participles. Consider $\surd$kad- 'smoke':

	SG	DU	PL
MASC	kaˈd-ì-w-∅	kaˈd-ì-l-á	kaˈd-ì-l-∅
FEM	kaˈd-ì-l-á	kaˈd-ì-l-é	kaˈd-ì-l-é
NEUT	kaˈd-ì-l-ú	kaˈd-ì-l-á	kaˈd-ì-l-á

Table 2.29: *i*-CLASSI participle (STRESS: $\surd\sigma-{}'\sigma$)

Notice that stress is on the verbal theme vowel [-i], throughout this paradigm. However, not all participles that employ the verbal theme [-i] act in this way. Some have the theme vowel stressed in all the forms but the masculine singular forms (like the *a*-CLASSII participles). We term the group of participles that fail to assign stress to the theme [-i] in the masculine singular *i*-CLASSII participles. Consider the example $\surd$dub- 'get':

	SG	DU	PL
MASC	ˈd-ùb-∅-ú-∅	duˈb-ì-l-á	duˈb-ì-l-∅
FEM	duˈb-ì-l-á	duˈb-ì-l-é	duˈb-ì-l-é
NEUT	duˈb-ì-l-ú	duˈb-ì-l-á	duˈb-ì-l-á

Table 2.30: *i*-CLASSII participle (STRESS: $\surd\sigma-{}'\sigma$, except M.SG)

In this group of participles, stress is assigned to the theme vowel [-i] in all the forms, e.g. [duˈb-ì-l-á] (F.SG.), [duˈb-ì-l-∅] (M.PL), etc., except in the masculine singular, where it remains on the root, cf. [ˈd-ùb-∅-ú-∅] (M.SG), and the theme [-i] fails to show up. This alternation looks suspiciously like the result of a vowel-deletion process (which we will ultimately propose).

Roots that make use of the verbal theme vowel [-i] and have stress on the theme throughout the participial paradigm (viz. *i*-CLASSI participles) are the following (the list is not exhaustive):

ROOT	M.PL.PTC	VERBAL CLASS	
kad-	kaˈd-ì-l-∅	*i*	'smoke'
tərd-	tərˈd-ì-l-∅	*i*	'claim'

Table 2.31: Roots used to form *i*-CLASSI participles

Most of these roots use the same theme vowel and the same stress-pattern in their verbal formations. Roots that, on the other hand, make up *i*-CLASSII participles, are the following (the list is not exhaustive):

ROOT	M.PL.PTC	VERBAL CLASS	
dub-	duˈb-ì-l-∅	*i*	'get'
mol-	moˈl-ì-l-∅	∅	'pray'
voz-	voˈz-ì-l-∅	∅	'drive'

Table 2.32: Roots used to form *i*-CLASSII participles

These roots can belong to the ∅-CLASS (e.g. $\surd$mol-), which implies that, in their verbal forms, they assign stress on the root syllable, or they can belong to the *i*-CLASS of verbs (e.g. $\surd$dub-), which in turn implies that they form verbs with the theme vowel [-i], which also carries stress. When forming participles, however, they all use the verbal theme [-i] and assign stress to it, except for the masculine singular form where the theme [-i] fails to show up and the stress is on the root syllable, as shown in Table (2.30).

The next class of participles that we discuss has no overt verbal theme vowel, i.e. the theme employed in the verbal stem that is used to form

participles is [-∅]. We term this class of participles ∅-CLASS. However, this class can be further subdivided into ∅-CLASSI and ∅-CLASSII. Let us first discuss the former. Consider the example of √xlin- 'fake':

	SG	DU	PL
MASC	ˈxlìn-∅-ú-∅	ˈxlìn-∅-l-á	ˈxlìn-∅-ə́l-∅
FEM	ˈxlìn-∅-l-á	ˈxlìn-∅-l-é	ˈxlìn-∅-l-é
NEUT	ˈxlìn-∅-l-ú	ˈxlìn-∅-l-á	ˈxlìn-∅-l-á

Table 2.33: ∅-CLASSI participle (STRESS: $\surd'\sigma - \sigma$)

The stress in this group of participles is always realized on the root syllable and the verbal theme is [-∅]. The curious aspect of this group of participles is the schwa-vowel that occurs in the masculine plural form (the precise morphological status of this schwa will be determined in the forthcoming sections; for now, we can group it together with the participial [-l]). Here are some roots that follow this pattern:

ROOT	M.PL.PTC	VERBAL CLASS	
xlin-	ˈxlìn-∅-ə́l-∅	∅	'fake'
pil-	ˈpìl-∅-ə́l-∅	∅	'file'
pad-	ˈpàd-∅-ə́l-∅	*e*	'fall'

Table 2.34: Roots used to form ∅-CLASSI participles participles

The second subgroup of the ∅-CLASS participles, viz. ∅-CLASSII contains a schwa as the stressed root vowel. One such example is (u-)√ˈmɾ- 'die'; notice that we specified no vowel in the root itself here, the reason for which will become clear presently.

	SG	DU	PL
MASC	u-ˈmə́ɾ-∅-ù-∅	u-ˈmə́ɾ-∅-l-à	u-ˈmə́ɾ-∅-ə̀l-∅
FEM	u-ˈmə́ɾ-∅-l-à	u-ˈmə́ɾ-∅-l-è	u-ˈmə́ɾ-∅-l-è
NEUT	u-ˈmə́ɾ-∅-l-ù	u-ˈmə́ɾ-∅-l-à	u-ˈmə́ɾ-∅-l-à

Table 2.35: ∅-CLASSII participle (STRESS: $\surd'\sigma - \sigma$)

In this subgroup of the ∅-CLASS participles, we can observe that the stressed syllable is always contained in the root and it is always realized by schwa. The theme suffix is realized by zero and another schwa occurs in the masculine plural form, between the position for the zero suffix and the participial form, exactly like in ∅-CLASSI participles. Some of the roots that form this class are the following:

ROOT	M.PL.PTC	VERBAL CLASS	
(u-)ˈmɾ-	u-ˈmə́ɾ-Ø-ə̀l-Ø	*e*	'die'
ˈtsvɾ-	ˈtsvə́ɾ-Ø-ə̀l-Ø	*e*	'fry'
(u-)ˈpɾ-	u-ˈpə́ɾ-Ø-ə̀l-Ø	*e*	'resist'

Table 2.36: Roots used to form Ø-CLASSII participles

The very reason for distinguishing between Ø-CLASSI and Ø-CLASSII is the root structure of the latter. Notice that in the roots given in Table (2.36) above, no schwa vowel is indicated, but a schwa does in fact appear in the participles built on these roots, and the schwa is actually the stressed vowel. However, these roots form verbs in a more peculiar way: they form verbs with the theme vowel [-e], as indicated above, but it is the theme [-e] that is stressed in the verbal forms and no schwa occurs inside the root. Consider the verbal form of u-$\surd$ˈmɾ-, which is [u-ˈmɾ-è-m] 'I die (1P.SG)', and the verbal form of $\surd$ˈtsvɾ-, which is [ˈtsvɾ-è-m] 'I fry (1P.SG)'. Since no schwa is to be found within the roots of these verbal forms, we can assume that it is specific to the participial formations (later on we will explain it as an expected consequence of NM Slovenian phonology). And if no schwa is available, these roots seem to stress whatever vowel is closest to the root; in the case of verbs, this is the theme vowel [-e]. In this sense, these roots have no vowel of their own, and it is this characteristic that sets them apart from Ø-CLASSI participles.

The next group of participles is subject to variable stress assignment: the stress in this group can either appear on the root or on the theme vowel (with the exception of the masculine singular, which only has stress on the root syllable). This makes them a direct equivalent to the *a*-CLASSIII participles, except that this group does not employ the theme vowel [-a], but actually exhibits alternation between [-i] and [Ø]. This is why we conveniently term this class of participles the Ø ~ *i*-CLASS. Consider $\surd$xɾan- 'feed':

	SG	DU	PL
MASC	ˈxɾàn-Ø-ú-Ø	ˈxɾàn-Ø-l-á	ˈxɾàn-Ø-ə́l-Ø
FEM	ˈxɾàn-Ø-l-á	ˈxɾàn-Ø-l-é	ˈxɾàn-Ø-l-é
NEUT	ˈxɾàn-Ø-l-ú	ˈxɾàn-Ø-l-á	ˈxɾàn-Ø-l-á

Table 2.37: Ø ~ *i*-CLASS participle (STRESS: $\surd$ˈσ − σ)

	SG	DU	PL
MASC	ˈxɾàn-Ø-ú-Ø	xɾaˈn-ì-l-á	xɾaˈn-ì-l-Ø
FEM	xɾaˈn-ì-l-á	xɾaˈn-ì-l-é	xɾaˈn-ì-l-é
NEUT	xɾaˈn-ì-l-ú	xɾaˈn-ì-l-á	xɾaˈn-ì-l-á

Table 2.38: Ø ~ *i*-CLASS participle (STRESS: $\surd$σ−ˈσ)

Notice that if the stress occurs on the root syllable, as in (2.37), the theme is realized by [∅], but it is also accompanied by [ə] immediately before the participial [-l] in the masculine plural form. However, if stress is assigned on the theme, as in (2.38), the theme surfaces as [i], even in the masculine plural where no schwa occurs then. The masculine singular is again exempt from stress variability, as it always occurs with stress on the root syllable and the theme [-i] always fails to show up. These data show that [-i] alternates with zero under different stress assignments: we are dealing with two different *stress-based* realizations of the *same paradigm*, and within this pattern the vowel [i] appears to be in *perfect complementary distribution* with zero in a way the is correlated with stress. If the theme is stressed it shows up as [i], but if not it shows up as zero. This suggests that a process of /i/-deletion is active in the phonology and that we are dealing with segmentally identical underlying forms for the theme vowel – we come back to this below. Additionally, the absence of [-i] seems correlated with the presence of the schwa in the masculine plural in (2.37) – see 3.1 for more on schwa. Roots that form ∅ ~ *i*-CLASS participles are the following (the list is not exhaustive):

ROOT	M.PL.PTC	VERBAL CLASS	
xɾan-	ˈxɾàn-∅-ə́l-∅ / xɾaˈn-ì-l-∅	∅	‘feed’
kuɾ-	ˈkùɾ-∅-ə́l-∅ / kuˈɾ-ì-l-∅	∅	‘burn’
mam-	ˈmàm-∅-ə́l-∅ / maˈm-ì-l-∅	∅	‘tempt’
govor-	goˈvóɾ-∅-ə̀l-∅ / govoˈɾ-ì-l-∅	*i*	‘talk’
(o-)tvoɾ-	(o-)ˈtvóɾ-∅-ə̀l-∅ / (o-)tvoˈɾ-ì-l-∅	*i*	‘open’

Table 2.39: Roots used to form ∅ ~ *i*-CLASS participles

The roots above all follow the pattern given in Tables (2.37) – (2.38). Their verbal correspondents are formed either by following the patterns represented by the ∅-CLASS of verbs or the *i*-CLASS of verbs.

What is particularly striking about this class of participles is that it is directly comparable with the *a*-CLASSIII participles in that it exhibits variable stress realization. But it is also crucially different from *a*-CLASSIII: notice that in the *i* ~ ∅-CLASS the alternation of the theme [-i] with zero is perfectly correlated with stress realization, as observed above: if stress is on the root syllable, the theme is zero, but if stress is on the theme, the theme is realized as [-i]. This correlation of phonological factors seems to suggest

that something more than morphology is at play here; it seems that we are dealing with a phonologically conditioned alternation, one involving the segment [-i], which realizes the theme suffix for this entire class. This must be the case because no such correlation of theme realization and stress can be uncovered in the *a*-CLASSIII participles, where the theme is realized as [-a], regardless of stress placement. Furthermore, it is a distinct possibility that even the ∅-CLASS participles are a part of this alternation.[11] This is a possibility because they uniformly have stress on the root syllable and never on the theme syllable, under which condition we expect the theme to be realized as zero (which it is), precisely as in the ∅ ~ *i*-CLASS. This can also be extended to the *i*-CLASS participles, which have stress uniformly on the theme, which is always realized as [-i]. This implies that the theme [-i] is in perfect complementary distribution with zero with respect to stress assignment. It is thus possible to entertain the option that these classes are all derived from a common '*i* based class': this would be a welcome solution, as it would lead to a three-way bifurcation involving a constant root stressed '*i* based class' (∅-CLASS), a constant theme stressed '*i* based class' (*i*-CLASS) and a variable stress '*i* based class' (*i* ~ ∅-CLASS), and this would directly mirror the *a*-CLASS participles, which have this same three-way split. This would not only unify, but also significantly simplify the morphology of NM Slovenian.

We have now discussed the major classes of participles in NM Slovenian. Let us, also, examine the participial formations that are based on semelfactives. Recall from section 2.2.2 that semelfactive verbs are derived by suffixing the root with the semelfactive suffix [-n], which is in turn followed by the theme [-e]. Semelfactive participles also suffix the root directly with [-n], but the theme that follows is either [-i] or [-∅] (and, crucially, not [-e]). The theme is followed by the participial [-l], and then the inflections follow. Consider for instance, √max- 'slap', which forms the semelfactive verbal stem [√max-n-i-]; to this stem the participial [-l] is added, yielding [√max-n-i-l-], to which we can add the inflection [-a] to express the feminine singular semelfactive participle, resulting in [√max-ˈn-i-l-a].

Semelfactive participles can also be subdivided into two classes depending on what stress-pattern they follow. First, we discuss the ∅-CLASS of semelfactive participles, which occur with the theme [-∅]. This class of semelfactive participles is here termed ∅-CLASS. Consider √but- 'hit':

[11] At least ∅-CLASSI, but not ∅-CLASSII participles. See section 2.2.6 for a more detailed discussion on this interplay of phonological factors

	SG	DU	PL
MASC	ˈbùt-n-Ø-ú-Ø	ˈbùt-ən-Ø-l-á	ˈbùt-ən-Ø-l-í
FEM	ˈbùt-ən-Ø-l-á	ˈbùt-ən-Ø-l-é	ˈbùt-ən-Ø-l-é
NEUT	ˈbùt-ən-Ø-l-ú	ˈbùt-ən-Ø-l-á	ˈbùt-ən-Ø-l-á

Table 2.40: Ø-CLASS semelfactive participle (STRESS: $\surd\text{ˈ}\sigma - \sigma$)

The stress in this class of semelfactive participles is always on the root syllable and the theme following the semelfactive [-n] is always Ø; these semelfactives are exactly like the Ø-CLASS pattern in Table (2.33) in that they always show root stress and the theme is realized as zero. In all cases but the masculine singular, the semelfactive [-n] is also preceded by a schwa-vowel. Notice, also, another curious aspects of these forms: the masculine plural inflection is here exponed by [-i] and not [-Ø], which is the exponent used in all the regular (non-semelfactive) participles. Some of the roots that belong to the Ø-CLASS of semelfactive participles are the following:

ROOT	M.PL.PTC	
but-	ˈbùt-ən-Ø-l-í	'hit'
bərts-	ˈbə̀rts-ən-Ø-l-í	'kick'
tsuk-	ˈtsùk-ən-Ø-l-í	'tug'
kap-	ˈkàp-ən-Ø-l-í	'trickle'

Table 2.41: Roots that form Ø-CLASS semelfactive participles

Some semelfactive participles can, however, undergo variable stress assignment, i.e. they correspond to the stress patterns of *a*-CLASSIII and Ø ~ *i*-CLASS of regular participles. This means that stress can either be assigned to the root syllable or to the theme. If the stress is assigned to the theme, the theme occurs as [-i], but if stress is assigned to the root, the theme occurs as [-Ø]; such semelfactive participles are termed Ø ~ *i*-CLASS. Consider u-$\surd$gas- 'turn off, put out':

	SG	DU	PL
MASC	u-ˈgàs-n-Ø-ú-Ø	u-ˈgàs-ən-Ø-l-á	u-ˈgàs-ən-Ø-l-í
FEM	u-ˈgàs-ən-Ø-l-á	u-ˈgàs-ən-Ø-l-é	u-ˈgàs-ən-Ø-l-é
NEUT	u-ˈgàs-ən-Ø-l-ú	u-ˈgàs-ən-Ø-l-á	u-ˈgàs-ən-Ø-l-á

Table 2.42: Ø ~ *i*-CLASS semelfactive participle (STRESS: $\surd\text{ˈ}\sigma - \sigma$)

	SG	DU	PL
MASC	u-ˈgàs-n-∅-ú-∅	u-gas-ˈn-ì-l-á	u-gas-ˈn-ì-l-∅
FEM	u-gas-ˈn-ì-l-á	u-gas-ˈn-ì-l-é	u-gas-ˈn-ì-l-é
NEUT	u-gas-ˈn-ì-l-ú	u-gas-ˈn-ì-l-á	u-gas-ˈn-ì-l-á

Table 2.43: ∅ ~ *i*-CLASS semelfactive participle (STRESS: $\surd\sigma-{}'\sigma$)

The stress properties of the semelfactive participle in (2.42) are identical to those of the ∅-CLASS semelfactive participles given in (2.40): the stress is always on the root syllable. The theme that follows the semelfactive [-n] is always [-∅] and the semelfactive is preceded by a schwa-vowel, except in the masculine singular form. The masculine plural inflection is exponed by [-i]. The semelfactive participle in (2.43), on the other hand, hosts stress on the theme. The theme, following the semelfactive [-n], is always [-i], but no schwa-vowel occurs before the semelfactive, and the masculine plural is now exponed by [-∅]. The expected exception to this is the masculine singular again: it shows root-stress and [-∅] as the theme. The realization of the theme as [-i] when it receives stress and its realization as zero when it is not stressed is identical to the pattern of stress and theme realization in *i* ~ ∅-CLASS participles shown in (2.37); the inability of the masculine singular to exhibit theme stress is also precisely like in *i* ~ ∅-CLASS participles, and also as in *i*-CLASSII as shown in (2.30).

∅ ~ *i*-CLASS of semelfactive participles also shows that the high vowel [-i], [-∅] and schwa alternate, depending on what stress pattern is used: if the stress is on the root syllable, a schwa occurs before the semelfactive [-n], the theme is [-∅], while the masculine plural inflection is [-i]. On the other hand, if the stress is on the theme, no schwa occurs before the semelfactive, the theme is [-i] and the masculine plural is [-∅]. Roots that exhibit such behaviour when forming semelfactive participles are the following (the list is not exhaustive):

ROOT	M.PL.PTC	
(u-)gas-	(u-)ˈgàs-ən-∅-l-í / (u-)gas-ˈn-ì-l-∅	‘turn off’
(od-)dax-	(od-)ˈdàx-ən-∅-l-í / (od-)dax-ˈn-ì-l-∅	‘catch breath’
(na-)tak-	(na-)ˈtàk-ən-∅-l-í / (na-)tak-ˈn-ì-l-∅	‘spike’
max-	ˈmàx-ən-∅-l-í / max-ˈn-ì-l-∅	‘slap’
(o-)gəɾ-	(o-)ˈgèr-ən-∅-l-í / (o-)gər-ˈn-ì-l-∅	‘wrap’

Table 2.44: Roots that form ∅ ~ *i*-CLASS semelfactives

However, not only semelfactive participles show such behaviour with respect to the occurrence of schwa, the theme [-i] and the masculine plural

inflection [-i]. A class of regular (non-semelfactive) participles acts in precisely the same way. These are participles that are formed from roots with a √CVCR- structure, i.e. such roots contain two consonants that follow the vowel, of which the second one is a sonorant (represented by 'R'). Let us term this group √CVCR-CLASS participles. Stress in this group may also be variable: it may occur on the root or on the theme, and the expected consequences witnessed in ∅ ~ *i*-CLASS semelfactive participles in Tables (2.42) and (2.43) follow. Consider √pown- 'fill':

	SG	DU	PL
MASC	ˈpòwn-∅-ú-∅	ˈpòwən-∅-l-á	ˈpòwən-∅-l-í
FEM	ˈpòwən-∅-l-á	ˈpòwən-∅-l-é	ˈpòwən-∅-l-é
NEUT	ˈpòwən-∅-l-ú	ˈpòwən-∅-l-á	ˈpòwən-∅-l-á

Table 2.45: √CVCR-CLASS participle (STRESS: $\surd{}'\sigma - \sigma$)

	SG	DU	PL
MASC	ˈpòwn-∅-ú-∅	powˈn-ì-l-'a	powˈn-ì-l-∅
FEM	powˈn-ì-l-á	powˈn-ì-l-é	powˈn-ì-l-é
NEUT	powˈn-ì-l-ú	powˈn-ì-l-á	powˈn-ì-l-á

Table 2.46: √CVCR-CLASS participle (STRESS: $\surd\sigma - {}'\sigma$)

If stress is on the root syllable, which is the case in (2.45), a schwa occurs before the final root-consonant [n], the theme is [-∅], and the masculine plural exponent is [-i]. If the stress, however, is on the theme, as in (2.46), no schwa occurs before the root-final [-n], the theme is [-i], and the masculine plural exponent is [-∅]. The masculine singular is, expectedly, exempt from any alternation, shows root-stress and has the theme [-∅].

An explanation is order. Why should we not simply treat the √CVCR-CLASS participles as semelfactive participles? Firstly, the roots √pown- 'fill', √dərgn- 'rub', √prazn- 'empty' listed in (2.48) never occur without the final [n]. This is not true of the semelfactive participles where regular verbs can be formed without the [-n], cf. the semelfactive participle based on √pix- 'blow', [ˈpìx-ən-∅-l-í] 'having given a quick blow (M.PL.)' vs. the regular participle [ˈpìx-á-l-∅] 'having blown (M.PL.)'. Secondly and more importantly, none of the roots in (2.48) actually display semelfactive semantics. Be it the verb [ˈpòwn-é-∅] 'fill (3P.SG)' or the participle [ˈpòwən-∅-l-í] 'fill (M.PL.)', none of them denote an instantaneous and, at the same time, perfective action. In fact, the semantics of √pown- is best described as denoting a 'continuous action of filling (something)', which means that its denotation is not even

perfective. This is true of all the roots in in (2.48), and this is how they are sharply contrasted with semelfactives: for instance, the regular participle [ˈpìx-á-l-∅] 'blow (M.PL.)' denotes an imperfective action of 'blowing', while the semelfactive participle [ˈpìx-ən-∅-l-í] 'blow (M.PL.)' denotes the action of 'a quick, short blow'.

It should also be noted that √pown- and √pɾazn- also exist as adjectives [ˈpowən] 'full (M.SG)' and [ˈpɾazən] 'empty (M.SG)', and the [n] here could be interpreted as the adjectivizing suffix /-n/ ([ˈpɔt] 'sweat (M.SG)' → [ˈpɔt-ən] 'sweaty (M.SG)', etc.), but this is not so likely because constructions with the adjectiziving /-n/ do not usually form verbal structures. Notice that √dəɾgn- 'rub', on the other hand, cannot exist as an adjective *[ˈdəɾgən], and it forms a uniform class with √pown- and √pɾazn-. For this reason, we will rather assume that the adjectives [ˈpowən] and [ˈpɾazən] are roots suffixed with a zero adjectivizing morpheme in this thesis.[12]

The class of √CVCR-CLASS does not consist exclusively of [CVCn]-type roots. It seems that other roots that contain a sonorant as the second coda consonant of the root also pattern with this group. Consider √misl- 'think':

	SG	DU	PL
MASC	ˈmìsl-∅-ú-∅	ˈmìsəl-∅-l-á	ˈmìsəl-∅-l-í
FEM	ˈmìsəl-∅-l-á	ˈmìsəl-∅-l-é	ˈmìsəl-∅-l-é
NEUT	ˈmìsəl-∅-l-ú	ˈmìsəl-∅-l-á	ˈmìsəl-∅-l-á

Table 2.47: Participle built on √misl- (STRESS: $\surd{}'\sigma - \sigma$)

Notice that this root forms participles in exactly the same way as the other roots in the √CVCR-CLASS (viz. those with the structure [CVCn-]) when they occur with a stressed root syllable. √misl- cannot undergo variable stress assignment, though: the stress must remain fixed on the root syllable. Much like the other members of this participial class, √misl- conveys no perfective or semelfactive semantics.

Some of the roots that follow this pattern are the following:

[12] A future study that compares √CVC-n adjectives with the √CVCn-∅ adjectives would be of interest for morphological inquiry. Examples (39) and (40) in section 4.3 introduce a diagnostic that confirms the assumptions on √pown-, and potentially other such roots.

ROOT	M.PL.PTC	
pown-	ˈpòwən-ø-l-í / powˈn-ì-l-ø	‘fill’
dərgn-	ˈdàrgən-ø-l-í / dərgˈn-ì-l-ø	‘rub’
prazn-	ˈpràzən-ø-l-í / prazˈn-ì-l-ø	‘empty’
misl-	ˈmìsəl-ø-l-í	‘think’
kərm-	ˈkàrəm-ø-l-í	‘feed (cattle)’

Table 2.48: Roots that form √CVCR-CLASS

We have established that the √CVCR-CLASS of participles cannot have the same morphological make-up as the semelfactives. And yet, it is interesting that the group of √CVCR-CLASS participles displays exponence identical to that of the semelfactives. The theme must always be either [-i] or [-ø] and the masculine plural is either exponed by [-i] or [-ø]. But what is relevant at this point is that this group of participles shows alternation between [-i] and [-ø] and [ə] that respects the same conditions of stress assignment as the same alternations in ø ~ *i*-CLASS participles and ø ~ *i*-CLASS semelfactive participles do. In general, the observation about the complementary distribution of [i], zero and schwa under different stress conditions carries over from the regular (non-semelfactive) participles. This complementary relation, which appears phonological in nature, is perfectly obeyed by the theme suffixes, but not so perfectly by the M.PL suffix [-i]. This suffix can appear unstressed as well, but crucially even this can only happen under very specific *phonotactic conditions*: in the data that we have seen so far, the M.PL [-i] only appears when the root has the ‘√CVCR’ phonotactic shape, or when the root is followed by the semelfactive suffix [-n], again creating the structure where the root is followed by a sonorant.

Our discussion on NM Slovenian participles draws to an end, but two more participles need to be discussed, which are quite different from any described so far. These are the participles based on the roots √b- ‘be’ and √ʃ- ‘go’, both of which consist of a single consonant. Let us first discuss √ʃ-, which forms participles with the [-ø] theme, the participial suffix [-l] and the usual inflections. Here is its paradigm:

	SG	DU	PL
MASC	ˈʃ-ø-ù-ø	ˈʃ-ø-l-à	ˈʃ-ø-l-ì
FEM	ˈʃ-ø-l-à	ˈʃ-ø-l-ɛ̀	ˈʃ-ø-l-ɛ̀
NEUT	ˈʃ-ø-l-ù	ˈʃ-ø-l-à	ˈʃ-ø-l-è

Table 2.49: Single-consonant roots: √ʃ- ‘to go’

The theme is [-∅] throughout the paradigm, and the masculine plural inflection is always [-i]. No specific stress patterns can be observed because all the forms are monosyllabic. Now, consider the paradigm of √b- 'be':

	SG	DU	PL
MASC	ˈb-ì-w-∅	ˈb-∅-l-à	ˈb-∅-l-ì
FEM	ˈb-∅-l-à	ˈb-∅-l-ɛ̀	ˈb-∅-l-ɛ̀
NEUT	ˈb-∅-l-ù	ˈb-∅-l-à	ˈb-∅-l-è

Table 2.50: Single-consonant roots: √b- 'to be'

The theme of this participle is always [-∅], as well, except in the masculine singular form, where it occurs as [-i]. The masculine plural exponent is [-i], as in (2.49). Notice, also, that stress is always on the inflection in all the forms but the masculine singular form, where it occurs on the theme [-i]. It would appear that stress and the theme [-i]~[-∅] alternation are correlated in this participle, as well. More crucially, however, we have now discovered that the M.PL [-i] may also occur in the absence of a '√CVCR' environment; it seems that the M.PL [-i] simply appears in these two paradigms because it can be stressed due to it being the only vowel in the form. This still implies that the M.PL [-i] is correlated with phonotactic environment: it must appear either in the '√CVCR'/'√CVC-R' environment, or if it bears stress. More on this alternation shall be said in section 3.2.

2.2.4 Interim overview: Verbs and participles

As we have now reached the end of our detailed discussion on participial morphology in NM Slovenian, now is the appropriate time to emphasize the most relevant observations that shed light on the [i]~[∅]~[ə] alternation in verbs and participles in NM Slovenian. In the verbal system, as discussed in section 2.2.2, we discussed the *a*-CLASS, *i*-CLASS, ∅-CLASS and *e*-CLASS of verbs. Throughout the entire verbal system, the theme vowel only occurs if it is stressed, but never as unstressed.

In the system of participles, the theme vowel has the same distribution: it never surfaces unstressed. In addition, participles exhibit variable stress assignment, where the stress varies between the root and the theme. With *i*−∅-CLASS participles, *i*−∅-CLASS semelfactive participles and also √CVCR-participles the theme is always as zero when the root is stressed but when the theme is stressed is is realized as [-i]. This is a active synchronic alternation that seems indicative of a vowel-deletion process affecting the theme vowel

/-i/, as [i] and zero are in perfect complementary distribution with respect to stress assignment

Furthermore, we have made a crucial observation with respect to the M.PL suffix [-i]. This suffix will never be realized as [-i] when it is unstressed, except when it is preceded by a ['CVC] configuration that is followed by a sonorant: all semelfactives, making up ['√CVC-n], as well as √CVCR shaped roots trigger the realization of the M.PL as [-i]. It is also realized as [-i] when it can be stressed, as expected, which occurs with the two single-consonant roots. This alternation seems to be connected to the alternation of the theme [-i] with zero, but with an extra phonotactic condition.

All the verbal and participial data that we have examined so far suggest that the alternation between the theme [-i] and zero, and the M.PL [-i] and zero, are phonological in nature: they are correlated with purely phonological factors and cut across different morphological classes of participles. The status of these two alternations is further elaborated on in section 2.2.6 and it receives a formal analysis in 3.2.

2.2.5 Roots and prefixes

We have now determined that the high vowel [i], when realizing the theme vowel [-i] and the masculine plural exponent [-i], alternates with zero and schwa within two different stress-based realizations of the same participial paradigm. This alternation seems to correlate with the variable stress assignment: recall from sections 2.2.3 and 2.2.4 that the theme [-i] has to occur as zero if it is not stressed, while the masculine plural inflection occurs as [-i] only when it is stressed, or when it is unstressed but this happens only in '√CVCR'/'√CVC-R' phonotactic environments.

Since the only cases of alternation between [i], zero and schwa that were observed were in the suffixes, it is important to also survey roots and prefixes to determine if any [i] segments alternate with zero or schwa under the same stress conditions. Let us begin with roots. There do not appear to be any roots in NM Slovenian that would have an [i] in a position where it directly follows a stressed syllable. However, [i] may occur in a position that directly precedes the stressed syllable:

ROOT	F.SG.PTC	
igɾ-	iˈgɾ-à-l-á	'play'
pis-	piˈs-à-l-á	'write'
isk-	isˈk-à-l-á	'search'

Table 2.51: Roots with an unstressed [i] in PTC

In the cases listed above and others not given here, [i] occurs without any alternations being induced. In any derived or underived form, the root always retains its [i] vowel segment.

A more complex situation can be found in prefixes. In order to discuss prefixes and the possible alternations of [i], we must first determine which prefixes in NM Slovenian contain [i]: two possible prefixes exist that contain [i], viz. [pɾi-] with the meaning 'close to, nearby' (or it may denote semantic perfectivity), and the other prefix is [iz-], which has the meaning 'from, out of' (and it may also denote semantic perfectivity). It is important to mention that prefixes in general in NM Slovenian cannot be stressed,[13] which means that it will not be possible to find any positions in which [pɾi-] and [iz-] would occur in a position that directly follows a stressed syllable. However, [pɾi-] does seem to have an alternant, viz. [pəɾ-] with quite similar semantics and a schwa instead of an [i] vowel. Let us review some data to determine if this could be a possible alternation:

1P.SG.V	F.SG.PTC	
pəɾ-ˈ√tìsk-á-m	pəɾ-ˈ√tìsk-a-l-á	'press'
pəɾ-√diˈʃ-ì-m	pəɾ-√diˈʃà-l-á	'smell'
pəɾ-√ˈstòp-ə́m	pəɾ-√ˈstòp-l-á	'stand close'
pəɾ-√loˈʒ-ì-m	pəɾ-√loˈʒ-ì-l-á	'attach, add'
pɾi-ˈ√zn-à-m	pɾi-ˈ√zn-à-l-á	'confess'

Table 2.52: Prefixes [pɾi-] and [pəɾ-] (verbs and participles)

NOUN_{NOM}	
pɾi-ˈ√tìsk (M.SG)	'(air) pressure'
pɾi-ˈ√dìx (M.SG)	'feel, sense'
pɾi-√ˈstɔ̀p (M.SG)	'approach'
pɾi-√ˈlóg-a (F.SG)	'side dish'
pɾi-ˈ√zn-à-n-j-é (N.SG)	'praise'

Table 2.53: Prefixes [pɾi-] and [pəɾ-] (nouns)

Notice that while [pɾi-] is almost always found with nouns, the prefix [pəɾ-] is almost always found with verb and participles. However, this is not a clear-cut division, as [pɾi-] may occur with participles and nouns, cf. [pɾi-ˈ√zn-à-l-á] 'confess (F.SG.PTC)' and [pɾi-ˈ√zn-à-n-j-é] 'praise (N.SG)'. However,

[13] There are, of course, cases that constitute a somewhat grey area. Consider [ˈpɾ-√id-əm] 'I come (1P.SG.V)' vs. [oˈd-√id-əm] 'I leave (1P.SG.V)' vs. [iˈz-√id-əm] 'I am published (1P.SG.V)', where it is not clear if the prefix in the first case is [pɾi-] or just [pɾ-], but we shall set such cases aside for the purpose of this thesis.

in most of the forms above, there is an important semantic difference in the use of [pɾi-] and the use of [pəɾ-]: when [pəɾ-] is used with a verb or participle, the meaning is completely compositional (transparent), but this is not the case with the nouns that use [pɾi-]. For instance, while [pəɾ-ˈ√tìsk-a-l-á] 'press (F.SG.PTC)' denotes an act of 'pressing', the corresponding noun [pɾi-ˈ√tìsk] 'pressure (M.SG)' denotes 'pressure', but as a technical term in the sense of 'blood pressure' or 'air pressure'. Consider also [pəɾ-√diˈʃà-l-á] 'to emanate smell (F.SG.PTC)' as compared to the noun (built on the same root, viz. √dix-) [pɾi-ˈ√dìx] 'a sense (M.SG)', which would only be used when describing, for instance, the mood set by a certain poem or a song, but not to describe the act of 'emanating a smell'. In all the cases above, the prefix [pəɾ-] conveys the transparent, compositional meaning, whereas the prefix [pɾi-] conveys a more abstract, presumably non-compositional meaning.[14]

The observation that [pəɾ-] correlates with compositional semantics can be even better illustrated as the prefix [pəɾ-] also occurs with nouns. Consider the following examples:

1P.SG.V	F.SG.PTC	
pəɾ-ˈ√klòp-ə́m	pəɾ-ˈ√klòp-l-á	'connect'
pəɾ-ˈ√klùtʃ-ə́m	pəɾ-ˈ√klùtʃ-l-á	'plug in'
pəɾ-ˈ√tìsk-á-m	pəɾ-ˈ√tìsk-a-l-á	'press'

Table 2.54: Prefix [pəɾ-]: no semantic difference (verbs and participles)

NOUN_{NOM}	
pəɾ-ˈ√klɔ̀p (M.SG)	'connecting'
pəɾ-ˈ√klùtʃ-ə́k (M.SG)	'plug-in'
pəɾ-ˈ√tìsk (M.SG)	'a press'

Table 2.55: Prefix [pəɾ-]: no semantic difference (nouns)

The meaning of the verbs, participles as well as nouns seems to be completely transparent with the prefix [pəɾ-]. Notice that the participle [pəɾ-ˈ√tìsk-a-l-á] 'press (F.SG.PTC)' that was already listed in Tables (2.52) and (2.53) is again listed in (2.54) and (2.55), crucially because its corresponding noun may also be formed with [pəɾ-], i.e. [pəɾ-ˈ√tìsk] 'a press' (M.SG), which has a completely transparent meaning, denoting the act of 'pressing something'.

[14] Notice that [pɾi-] in [pɾi-ˈ√zn-à-l-á] 'confess' (F.SG.PTC)' and the noun [pɾi-ˈ√zn-à-n-j-é] 'praise (N.SG) seems to yield a non-compositional meaning in both cases. It is likely that the combination of [pɾi-] and the root √zn- 'to know' yields a non-compositional interpretation.

It seems that [pɾi-] and [pəɾ-] are correlated with different semantics. While it is possible that these are two lexically distinct prefixes, because they exhibit different semantics, it is also possible that they are two morphologically determined allomorphs of the same prefix. We leave this issue for a semantic treatment of NM Slovenian. What is crucial, however, is that no alternation of [i] with zero and schwa that would be correlated with different stress-based realizations of the same paradigm can be found. It seems that in the prefixes, [i] shows no stress-conditioned alternations at all.

For completeness, let us also consider the prefix [iz-], for which, as we will see, there exists a similar prefix that is perhaps its allomorph:

1P.SG.V	F.SG.PTC	
iz-ˈ√brùx-n-ə́m	iz-ˈ√brùx-ən-l-á	'burst out'
iz-ˈ√d-à-m	iz-ˈ√d-à-l-á	'betray'
iz-ˈ√dèl-á-m	iz-ˈ√dèl-a-l-á	'create'
iz-ˈ√klòp-ə́m	iz-ˈ√klòp-l-á	'turn off'

Table 2.56: Prefix [iz-] (verbs and participles)

NOUN_{NOM}	
iz-ˈ√brùx (M.SG)	'outburst'
iz-ˈ√d-á-j-à (F.SG)	'betrayal'
iz-ˈ√dèl-k (M.SG)	'product'
iz-ˈ√klɔ̀p (M.SG)	'turning off'

Table 2.57: Prefix [iz-] (nouns)

As can be observed [iz-] may occur with verbs, participles and nouns, and it reveals no alternations of any kind. It does, however, seem that [iz-] has a lexically/morphologically conditioned allomorph. Let us first mention that a [z-]/[s-] prefix exists in NM Slovenian, also denoting perfectivity of some sort. However, [z-]/[s-] is a separate prefix, as it generally is in Slovenian, though some of its occurrences overlap with the meaning typically associated with [iz-]. Historically speaking, such cases are the result of high vowel deletion ([iz-] > [z-]/[s-]) that have become lexicalized, as noted by Žaucer (2002: 33), blurring the division between [iz-] and [z-]/[s-].[15] However, we need not be concerned with this distribution, as [iz-] may occur in verbs, participles and nouns, and does not seem to correlate with any stress-related factors: when

[15]The two prefixes [pɾi-] and [pəɾ-] must also be the historical result of high vowel deletion and subsequent schwa-epenthesis, but, as discussed above, they show no synchronic phonological connection.

[iz-] is, however, realized as [z-]/[s-], this only correlates with the occurrence of specific roots; in other words, the distribution of [iz-] and it's allomorph [z-]/[s-] truly is lexicalized, as Žaucer observes.

The important observation made in this section is that no alternation of [i] with schwa and zero of the type found in the participles can be found with [i] vowels in the prefixes or in roots. In fact, the high vowel [i] does not seem to be restricted phonologically in any way in roots and prefixes.

2.2.6 Stress and alternations

The present section discusses the alternations that occur between the two possible stress-based realizations of the same participial paradigm of the regular and semelfactive *i* ~ ∅-CLASS participles, and also √CVCR-CLASS participles, in NM Slovenian. The theme vowel always occurs as zero or schwa in the realizations where stress is assigned to the root, and it always occurs as /-i/ when stress is assigned to the right of the root syllable. In addition, the masculine plural exponent /-i/ may occur in the semelfactive *i* ~ ∅-CLASS participles and √CVCR-CLASS participles: this occurs in the realization of the paradigm with stress assignment to the root syllable, but it must be replaced by zero in realizations of the same paradigm with stress assignment to the theme vowel.

The factor that underlies these alternations of theme vowel and masculine plural exponents is the two possible stress-based realizations of the same paradigm. This is why this section is dedicated to discussing this phenomenon, while chapter 3 will discuss the status of schwa and the high vowel /i/ in NM Slovenian.

Variable stress assignment

NM Slovenian has two possible ways of realizing its most prominent participial paradigms, as described in detail in section 2.2.3. Recall the example /√jòk-a-l-a/ 'having cried (F.SG)', which is an *a*-CLASSIII participle, and that it has two possible realizations: either as [ˈjòkalá] or [joˈkàlá]. Stress may either occur on the root syllable or on the theme-vowel: however, the phonological properties of the formed word have no clear correlation with stress assignment, which implies that these different positions of stress assignment do not seem to be triggered by any phonological factor. Rather, different stress patterns correlate either with specific roots, or with specific morphosyntactic constructions. This situates the regulation of stress assignment in NM Slovenian in the domain of morphosyntactic (i.e. lexical)

specification. This is precisely what happens with *i* ~ ∅-CLASS participles, *i* ~ ∅-CLASS semelfactive participles and √CVCR-CLASS participles. Such stress-realization essentially seems to be a case of *morphological class variability*: assignment of stress on the root syllable is the only option for some participles that employ the theme /-a/ (viz. *a*-CLASSI), and assignment of stress to the theme vowel is the only option available for some other participles that employ the theme /-a/ (viz *a*-CLASSII). It seems that a third group of participles, like /√jòk-a-l-a/, may belong to one class or the other.

Such morphological class variability, however, can be explained in two distinct ways in a generative theory of morphosyntax. Embick (2008) discusses both these approaches and defends the one that subscribes to the following principle:

(12) *Single Output* (Embick 2008: 65)
An input $\mathcal{N}$ to a derivation yields a single output.

The Single Output hypothesis essentially refers to morphosyntactic inputs. Notice that in the NM Slovenian data, two distinct stress patterns may realize the same morphosyntactic input form, which is in conflict with the Single Output hypothesis (provided that we dismiss the option of lexical representations that are accidentally homophonous on the segmental level). The Single Output approach to variable realization of the same morphological paradigm, which is upheld by Embick (2008), can only explain the NM Slovenian data in one way: a NM Slovenian speaker must possess two distinct grammars, $\mathcal{G}_1$ and $\mathcal{G}_2$. In $\mathcal{G}_1$, /√jòk-a-l-a/ surfaces as [ˈjòkalá], while in $\mathcal{G}_2$ it surfaces as [joˈkàlá]. This implies that $\mathcal{G}_1$ specifies root-stress for this participle, while $\mathcal{G}_2$ specifies theme-stress. Such an approach to variability is compatible with existing work on morphosyntactic variation and change (Kroch 1989; Pintzuk 1991), and also language learning (Yang 2002).

The other approach discussed by Embick (2008) is that which incorporates a 'probabilistic' component in the grammar. Under this approach, the NM Slovenian variable stress assignment can be captured in the following way: the rule $\mathcal{R}$ that regulates stress assignment (a morphosyntactic rule in NM Slovenian, as noted above) is regulated by a 'probabilistic operator' $\mathcal{P}$, which means that $\mathcal{P}$ essentially determines whether $\mathcal{R}$ applies in a given derivation or not, and its application is probabilistic. Embick (2008: 68) claims that the probabilistic approach to variation may in some cases weaken the 'Modularity Assumption', viz. that '*Grammar* and *language use* are modularly distinct', which implies that we no longer have a theory of pure linguistic competence. Embick claims that this happens with cases

where 'external' factors, e.g. sociolinguistic factors, play a role in determining which 'variant' is used, which introduces the notion of 'use' to a theory of grammar, viz. 'socilinguistic contexts [would need to be] built into the probability calculation' (Embick 2008: 68) in the grammar. However, this is not an assumption that is accepted by everybody: for instance, Nevins & Parrot (2010) disagree with Embick (2008) on this issue and claim that a probabilistic component that explains some variable aspects of grammar need not weaken the Modularity Assumption, which means that the use of probabilistic operators need not push a theory from the domain of linguistic competence to the domain of use. While we cannot engage in further discussion on this topic here, we will ultimately side with Nevins & Parrot (2010) and may assume a probabilistic operator in our analysis (though nothing crucial will hinge on this), especially since the stress variability in NM Slovenian does not seem to be correlated with any apparent sociolinguistic factors.

Probabilistic approach: $\mathcal{P}(stress)$

At this point it becomes important to assess if the two approaches to variability can make different predictions for the analysis of the alternations between /-i/, zero and schwa. To give a concrete example, let us take the masculine plural of a $\sqrt{}$CVCR-CLASS participle, namely [ˈ$\sqrt{}$pòwən-∅-l-i] / [$\sqrt{}$powˈn-ì-l-∅] 'having filled'. The alternation of [-i], zero and schwa between the two realizations of the morphological paradigm of the participle built on $\sqrt{}$pòwn- is correlated with stress assignment, as already discussed above and in section 2.2.3. If we are dealing with one grammar with probabilistic stress assignment, then it is clearly the case that the alternations in question are correlated with the variable stress patterns:

(13) ˈ$\sqrt{}$pòwən-∅-l-i / $\sqrt{}$powˈn-ì-l-∅ under probabilistic stress assignment

a. ˈ$\sqrt{}$$\sigma$-$\sigma$
[ˈpòwənlí] ⇝ THM [∅], M.PL [-i]

b. $\sqrt{}$$\sigma$-ˈ$\sigma$
[powˈnìl] ⇝ THM [-i], M.PL [∅]

If this is parsed by a single grammar, then the alternation in the THM and M.PL must be phonological because it is conditioned by a phonological factor, viz. the location of stress, and the alternations are manifested under the same morphosyntactic conditions (i.e. those that make up a participle with $\sqrt{}$pown-). According to this, it is tempting posit a process of *vowel deletion*,

so that the theme [-i] can be deleted when the root is stressed, and that the final masculine plural exponent [-i] is deleted when the theme is stressed.[16]

Such an analysis could then assume that all the alternating participles have /-i/ as the exponent of THM specified in the UR, and we can even extend this to the ∅-CLASSI and *i*-CLASSI/II because they reveal the exact same distribution of THM as [-i] and zero under different stress assignments, as discussed in 2.2.3 and 2.2.4. These alternations of [i] with zero and schwa, under different, probabilistic stress conditions, would be rendered as a direct result of vowel deletion that targets [i] in specific positions. Additionally, we could also claim that all of the participles (even the ones that employ other theme vowels) have M.PL exponed by /-i/ in the UR, and that this /-i/ is deleted by the same process that we have posited to derive the deletion of the theme vowel. If such a process of vowel deletion has any grounding in the phonology (in 3.2 we will show that it indeed does[17]), then this is a very economic way of deriving the alternations in question: all that the grammar needs to possess is a (morphosyntactic) operator that induces different stress assignment probabilistically (which is also needed on independent grounds for *a*-CLASS participles) and a vowel deletion process in the phonology. No special morphologically predetermined allomorphy need be stipulated.

However, one could alternatively speculate that the two surface forms given in (13) are the result of pure morphological manipulation: it would, in principle, be possible to claim that morphology is sensitive to the location of stress, and that it assigns /-∅/ for the THM when the stress is on the root syllable and /-i/ for the M.PL under these same conditions. This would derive the form in (13a). To derive the form in (13b), we would have to claim that another morphological rule that is also sensitive to the presence of stress assigns /-i/ as THM when the stress occurs to the right of the root syllable and /-∅/ to M.PL when the stress directly precedes it.

However, there are two issues with such a purely morphological analysis. Firstly, it is very stipulative since it is not grounded in any way, while the process of vowel deletion can be grounded phonologically (see section 3.2), as it correlates with purely phonological factors, making it predictable: ignoring this would imply a lost phonological generalization. Secondly, a morphological solution is much less economical than the solution of vowel

[16]The schwa occurring in (13a) can be explained as the result of general phonotactic requirements of NM Slovenian – see section 3.1 on this.

[17]Specifically, the M.PL exponent /-i/ surfaces only under specific phonotactic conditions: recall that it only occurs with roots with a 'CVC+sonorant' structure, cutting across different morphological classes, and the constraint driving its deletion can be appropriately grounded in terms of markedness, see 3.2

deletion: to derive the forms in (13) morphologically, it is necessary to accommodate three distinct lexically conditioned factors: (i) two different stress assignments, (ii) two allomorphs of THM for the same root, (iii) two allomorphs of M.PL for the same root. The phonological solution of vowel deletion, however, must assume that the grammar contains a process of vowel deletion, operating under certain factors, and that two stress patterns are possible for the given underlying form. This is, essentially, an *Occam's Razor* argument against the purely morphological analysis of (13).

The most economical and grounded (as we are yet to show) analysis is therefore the one which, firstly, assumes that the system of morphology sets specific stress patterns for specific classes of participles, and that these stress-rules may be probabilistic (regulated by $\mathcal{P}$) for some classes; and secondly, it assumes that the phonological grammar contains a process of vowel-deletion targeting the high vowel [i], as schematized below:

Morphology	$\mathcal{P}(stress) \rightarrow$	/ˈ√pòwn-i-l-i/	/√powˈn-ì-l-i/
Phonology	Vowel deletion	ˈpòwnlí	powˈnìl
	ə-epenthesis	ˈpòwənlí	*vac.*
		[ˈpòwənlí]	[powˈnìl]

Table 2.58: Probabilistic stress and vowel-deletion

Multiple grammars approach

Now that we have explained why vowel-deletion should be employed under a probabilistic theory of stress assignment, let us turn to the alternative approach, viz. the multiple grammars solution, which respects the Single Output hypothesis. Let us again consider the masculine plural of the participle [ˈ√pòwən-Ø-l-i] / [√powˈn-ì-l-Ø]:

(14) ˈ√pòwən-Ø-l-i / √powˈn-ì-l-Ø: multiple-grammars (first version)

a. $\mathcal{G}_1 \rightsquigarrow$ ROOT stress, THM /-Ø/, M.PL /-i/
/ˈ√pòwn-Ø-l-i/ → [ˈpòwənlí]

b. $\mathcal{G}_2 \rightsquigarrow$ THM stress, THM /-i/, M.PL /-Ø/
/√pòwˈn-i-l-Ø/ → [powˈnìl]

Much like the probabilistic approach to variability, the multiple-grammar analysis can also attempt a purely morphological analysis of the two outputs [ˈpòwənlí] and [powˈnìl]. It is possible to claim that $\mathcal{G}_1$, which places

stress on the root syllable, contains an input form /ˈ√pòwn-∅-l-i/, which produces the output [ˈpòwənlí]. $\mathcal{G}_2$, on the other hand, assigns stress on the theme vowel, and contains the input /√pòwˈn-i-l-∅/, the output of which is [powˈnìl]. However, even in the multiple-grammars approach it seems that such a morphological solution should be disfavoured. Assume the alternative: $\mathcal{G}_1$ has stress assignment on root syllables, and $\mathcal{G}_2$ has stress assignment on theme vowels. If we simply assume that the phonological grammar of both $\mathcal{G}_1$ and $\mathcal{G}_2$ contains a vowel deletion process, the outputs [ˈpòwənlí] and [powˈnìl] follow from that assumption automatically.

(15) /√pòwn-i-l-i/: multiple-grammars (final version)

a. $\mathcal{G}_1 \rightsquigarrow$ ROOT stress, Vowel deletion
/√pòwn-i-l-i/ → [ˈpòwənlí]

b. $\mathcal{G}_2 \rightsquigarrow$ THM stress, Vowel deletion
/√pòwn-i-l-i/ → [powˈnìl]

In other words, selecting a less complex analysis is a matter of derivational economy: the morphological analysis requires the two grammars to posit (i) different stress assignments, (ii) different theme vowels, and (iii) different masculine plural exponents, all for the same root, viz. √pown-. The phonological alternative, however, only requires the two grammars to posit different stress assignments, while the input forms (i.e. /√pòwn-i-l-i/) can be precisely the same, and the phonological grammars both contain the vowel deletion process. This makes it possible to maintain minimal difference between the two grammars (surely a desirable result), as the phonological approach only requires them to differ in terms of stress assignment, no other morphologically specified allomorphs need to be posited. It seems that even under the multiple-grammars analysis, the solution to the two outputs, viz. [ˈpòwənlí] and [powˈnìl], should be derived by a phonological process of vowel deletion that targets the high vowel [i].

Predictions for UR's

In this section, we have established that the variable stress-based alternations between [i], zero and schwa need to be recognized as a phonological reaction on the different (variable) stress patterns. This implies that the THM [-i] is specified in the UR for the participial classes which participiate in the aforementioned alternation, and the M.PL exponent should be analyzed as /-i/ in the UR of every participle (full phonological argumentation

will be given in 3.2).[18]

	CLASS	THM	M.PL	THM	M.PL
a.	*a*-CLASS	/-a/	/-i/	[-a]	[-∅]
b.	*i*-CLASS	/-i/	/-i/	[-i]	[-∅]
c.	*i* ~ ∅-CLASS	/-i/	/-i/	[-i]~[-∅]~[ə]	[-∅]
d.	∅-CLASSI	/-i/	/-i/	[-∅]	[-∅]
e.	√CVCR-CLASS	/-i/	/-i/	[-i]~[-∅]	[-i]~[-∅]
f.	∅-CLASS$_{semelf}$	/-i/	/-i/	[-∅]	[-i]
g.	*i* ~ ∅-CLASS$_{semelf}$	/-i/	/-i/	[-i]~[-∅]	[-i]~[-∅]
h.	∅-CLASSII	/-∅/	/-i/	[-∅]	[-∅]
i.	√SINGLE-C	/-∅/	/-i/	[-∅]	[-i]

Table 2.59: Participial UR's and SR's

Now all the participles in NM Slovenian have /-i/ as the M.PL exponent; we will be able to show (in 3.2) that the absence of M.PL /-i/ on the surface in (a–d) and (h) above is due to the same phonological process of deletion that deletes the THM /-i/ under different stress conditions in the remaining participial classes. This is what makes specifying /-i/ in these classes a much more economical solution than to specify an additional morphologically determined allomorph (viz. /-∅/) for their M.PL exponent,[19] i.e. the phonology can derive the absence of M.PL in (a– d) and (h) 'for free', since it already contains the appropriate process that is needed to derive the rest of the participial classes. However, the crucial piece of evidence will come from the following observation: the M.PL /-i/ happens to show up as [-i] whenever a √CVCR (sonorant) cluster occurs, which cuts across the morphological classes (semelfactive and √CVCR-CLASS participles) and so requires the explanation of why M.PL /-i/ surfaces to be in the domain of phonology. This will be an important factor that we will consider when we discuss the details of the vowel deletion process that targets [i] in section 3.2. The arguments for positing the /-i/ as the only available M.PL exponent are, therefore, that of derivational economy and that of capturing a phonological generalization.

[18] The case of the √SINGLE-C ['blì] 'to be (M.PL.PTC)' and the supposed [i]~∅ alternations it exhibits (given in (2.50)) will be explained as a result of morphologically determined allomorphy in section3.2 and chapter 4. For now, let us just assume it has a zero theme suffix.

[19] In fact, some theories of morphological exponence, such as the version of Distributed Morphology advocated by Embick (2010), predict that it is impossible to specify two morphologically determined allomorphs of a morpheme that follows the same overt morpheme; in our case, this is the participial morpheme (overt /-l/), which is followed by the M.PL inflection.

Notice that an analysis of vowel deletion, where the vowel [i] is targeted in specific position, also allows us to unify the classes in (b– g) in terms of their theme vowel specification. If we supply all these classes with the theme /-i/, the phonology should output the correct surface forms, as [i] and zero (and schwa) are in perfect complementary distribution with stress in these classes. The ∅-classII might also seem like a likely candidate for this at first glance, but looking back section 2.2.3, the roots of this class seem to have no root vowel specified in the UR. In addition, their stress specification is such that they would stress any theme vowel that would be assigned to them in the UR: recall that √mr- 'die' builds a participle with two schwas and no [i], viz. [u-ˈ√mə́r-∅-ə̀l-∅] 'having died (m.pl)'. The single consonant roots in (i) are also inherently different from any other participles in NM Slovenian, which is why they cannot be assigned /-i/ as the exponent of their theme suffix; we shall not elaborate on them here, but see sections 3.2 and 4 for discussion.

Observe that in Table (2.59) the three stress-based instantiations of the *a*-class participle have been subsumed under one rubric, as the different stress realizations trigger no relevant alternations (alternations across their different paradigms, or the same paradigm with different stress assignment for the case of variable stress). However, looking at the underlying forms, it now seems that we have unified a great number of the other seemingly different classes morphologically: the ∅-classI, *i*-class and *i* ~ ∅-class, √CVCr-class as well as the semelfactives have the same underlying forms, in terms of the theme vowel and the inflections, just with different stress realization. The semelfactives are somewhat different still, because of their special semantics (and morphology, recall the semelfactive morpheme /-n/), but crucially even they now have the same theme vowels and the same exponents of inflection as the other mentioned classes. Such a unification of different morphological participle 'classes' is a benefit of positing a phonological vowel deletion process that targets [i], which is surely a desirable result.

Chapter 3

Phonological analysis

This chapter offers the phonological analyses of schwa and the high-vowel /i/ in NM Slovenian. In 3.1, schwa is analyzed as an epenthetic vowel which is the result of a repair strategy for illicit phonotactic consonant clusters. In 3.2, the unstressed high vowel /i/ is analyzed as undergoing deletion in word-final position. 3.3 examines the status of the alternations that occur in the masculine singular of participles, while 3.4 examines whether /i/-deletion also applies in nouns and adjectives in NM Slovenian.

3.1 Schwa

Up to now, we have encountered the vowel schwa in two specific positions in our discussion of participles in NM Slovenian: one was its occurrence between the root and the participial exponent /-l/ in *i* ~ ∅-CLASS participles, cf. [ˈ√xɾàn-∅-ə́l-∅] 'having fed (M.PL)', and the other between the root and the semelfactive exponent /-n/ in semelfactive participles, cf. [ˈ√pìx-ən-l-i] 'having blown (M.PL)'. This section, however, presents a more general picture of schwa in NM Slovenian in order to discuss its distribution, and determine precisely what its role is in the system of participles. In what follows, the standard version of Optimality Theory (Prince & Smolensky 2004) is assumed in the discussion of the phonological properties of schwa in NM Slovenian.

3.1.1 Phonotactics and schwa

The only pre-existing treatment of Slovenian schwa in a theory of generative phonology is that given in Jurgec (2007a,b), which concentrates on Standard Slovenian as spoken in the capital city, Ljubljana. We will show that the crucial aspects of schwa distribution in that version of Slovenian carry over to NM Slovenian. Jurgec treats most instances of schwa in Slovenian as cases of epenthesis motivated by purely phonotactic reasons, viz. sonority sequencing through the constraint SONSEQ (Prince & Smolensky 2004) and the avoidance of consonantal nuclei through *NUC/C.

Much like Standard Slovenian, NM Slovenian contains noun paradigms with nouns whose roots consist of only two or more consonants. Two such examples are given below, viz. √ps- 'dog' and √sn- 'dream':

	√p(ə)s- 'dog'	√s(ə)n- 'dream'
NOM.SG.M	ˈpə̀s-∅	ˈsə̀n-∅
GEN.SG.M	ˈps-à	ˈsn-à
DAT.SG.M	ˈps-ù	ˈsn-ù

Table 3.1: Schwa in nouns

Only the first three cases are given above, i.e. the accusative, locative and instrumental are omitted for ease of exposition. Notice that schwa only surfaces in the nominative case in which no overt suffix is available. However, in the other cases with overt suffixes the schwa is not present. The same observation can be extended to adjectival paradigms:

	√ˈpɔ̀t-(ə)n- 'sweaty'	√dèl-(ə)n- 'partial'
NOM.SG.M	ˈpɔ̀t-ə́n-∅	ˈdèl-ə́n-∅
NOM.SG.F	ˈpɔ̀t-n-á	ˈdèl-n-á
NOM.SG.N	ˈpɔ̀t-n-ú	ˈdèl-n-ú

Table 3.2: Schwa in adjectives

It is in principle possible to analyze these alternations between zero and schwa in two ways: we may assume that schwa is specified in the UR and that it deletes wherever it would occur in an open syllable on the surface, or we may assume that schwa is not specified underlyingly and that it is epenthesized in the contexts with zero suffixes. For Standard Ljubljana Slovenian, Jurgec (2007a,b) analyzes such instances of schwa as cases of phonotactically triggered epenthesis; that analysis is based on two observations: one is that syllabic consonants appear to be non-existent in Ljubljana Slovenian, which offers the generalization that such phonotactic configurations are avoided. Jurgec analyzes this as an effect of a high-ranked *Nuc/C constraint:

(16) *Nuc/C (Prince & Smolensky 2004)
Assign a violation mark for every consonant in the nucleus.

Jurgec interprets the occurrence of schwa as the result of epenthesis induced by the phonotactic requirements of the language; for instance, *[ps̩] is not a licit phonotactic configuration in Ljubljana Slovenian, which is why schwa

is epethesized as a repair strategy. NM Slovenian does not seem to have any instances of consonantal nuclei either, which is why this same reasoning may be adopted for our analysis. Notice that specifying schwa underlyingly and assuming that the grammar deletes it in certain positions would render the occurrence of schwa much more accidental: a deletion analysis would need to specify the schwa in the UR of every root and suffix where schwa alternation occurs on the surface. Since such schwa alternation seems to occur across different morphological contexts, an epenthesis analysis seems less stipulative, explaining schwa as a phonotactic repair strategy.

The second observation is that Ljubljana Slovenian never shows sequences of coda consonants that constitute a rise in sonority, nor does it show sequences of coda consonants that are insufficiently dissimilar to constitute a clear drop in sonority. This can be couched in the tendency of coda clusters to exhibit a fall in sonority, following the assumptions of a sonority scale like the following:

(17) Sonority scale (Clements 1990; Smolensky 1995; Parker 2011)
vowels > glides > liquids > nasals > fricative > stop

This scale is valid for Slovenian (Jurgec 2007a: 7), and Jurgec takes the observation at hand to imply a generalization, encoded by a high-ranked SonoritySequencing constraint (Clements 1990), prohibiting rising (or relatively 'level') sonority in complex codas. We may use the constraint SonSeq as defined by Kager (1999):

(18) SonSeq (Kager 1999: 267)
Complex onsets rise in sonority, and complex codas fall in sonority.

Jurgec again explains the occurrence of the alternating schwa as the result of phonotactically motivated epenthesis; in other words, it occurs as strategy that repairs illicit sonority relations in coda clusters. The same generalization is again found in NM Slovenian, which we discuss below.

The core data that we will examine will crucially involve the lateral [l] and the nasal [n]. Liquids and nasals, in general, are unable to form the second consonant of a coda cluster in NM Slovenian (and Standard Slovenian) (Jurgec 2007a,b), which is what the high-ranked SonSeq correctly predicts. If the first consonant in the cluster is an obstruent, then this yields an {obstruent+sonorant} coda cluster, constituting an illicit rise in sonority in the coda. Recall the adjective ['pɔ̀t-ə́n-∅] (NOM.SG.M) ~ ['pɔ̀t-n-á] (NOM.SG.F) 'sweaty', where the nominative singular masculine form contains a schwa that breaks up the potential '[t]+[n]' coda cluster. If, on the other hand,

we have {sonorant+sonorant} coda clusters, the two consonants do not exhibit a sufficient fall in sonority, even if the second consonant is a nasal and the first one a lateral liquid. Consider the adjective [ˈdèl-ə́n-∅] (NOM.SG.M) ~ [ˈdèl-n-á] (NOM.SG.F) 'partial', where the nominative singular contains a schwa that breaks up the potential '[l]+[n]' coda cluster. This seems to be particularly strong generalization because we may find such instances of schwa with relatively recent loanwords:

	√ˈfil(ə)m- 'film'	√saˈtùr(ə)n- 'Saturn'
NOM.SG.M	ˈfìlə́m-∅	saˈtùrə́n-∅
GEN.SG.M	ˈfilm-á	saˈtùrn-á
DAT.SG.M	ˈfilm-ú	saˈtùrn-ú

Table 3.3: Schwa in loanwords

The sonority based restriction in NM Slovenian seems to yield a strong generalization and so renders such alternating cases of schwa fully predictable (given the existence of the lexical items discussed above, of course). In section 3.1.4, we will see that 'obstruent+obstruent' coda clusters need not be phonotactically illicit in NM Slovenian, as they may not trigger epenthesis (e.g. [...sk]$_\sigma$, or [...st]$_\sigma$ are fully licit), but 'consonant+sonorant' coda clusters are always illicit, triggering epenthesis. The latter is true across the grammar. This implies that NM Slovenian motivates a specific sonority scale that determines which clusters count as expressing 'sufficiently falling' sonority, but this is not surprising given the fact that different languages may motivate different sonority scales (Steriade 1982; Rice 1992).

Arguing for an analysis of schwa that posits its presence underlyingly and then has the grammar perform schwa-deletion in open syllables seems more stipulative, as all the schwa vowels discussed up to now can be explained as the result of a phonotactic repair strategy. Throughout the rest of this section, we will show that the relevant instances of schwa (those in the participial system) can be directly predicted by the two phonotactic constraints that we have discussed. We will thus assume an analysis of schwa that explains its presence through phonotactically motivated epenthesis.[20]

[20] While the analysis of schwa, as epenthesis, presented in this thesis captures its overall pattern in NM Slovenian, potential counter-examples may be identified. I have come across only one such counter-example, viz. [ˈbəzək-∅] 'elderberry (NOM.SG.M)' ~ [ˈbəzg-a] (GEN.SG) – thanks to Joseph Stemberger for pointing it out – where the '[s/z]+[k]' coda cluster does not usually trigger epenthesis in NM Slovenian; see section 3.1.4 and footnote 29 in particular for more on this. However, cases of 'consonant+sonorant' coda clusters seem to be generally absent in NM Slovenian, which still offers a relevant, though more specific phonotactic generalization. Future work should examine this in greater detail.

However, in the final subsection (3.1.5), we will briefly contrast this analysis with a schwa-deletion account of the NM Slovenian data, and show that such an alternative analysis misses some basic observations in NM Slovenian. Since the schwa-epenthesis analysis manages to capture a plausible explanation through the two phonotactic restrictions that we have discussed, we will demonstrate that it is ultimately more appropriate to choose such an analysis over the deletion one.

We may, therefore, proceed by assuming that alternating schwa vowels are due to phonotactically motivated epenthesis, but we will proceed carefully and always check if such phonotactic motivation can be found. The two phonotactic generalizations presented above were formalized by positing a high-ranked SonSeq constraint and a high-ranked *Nuc/C. To construct an analysis we must also assume that the grammar of NM Slovenian has the following two constraints that will have to be low-ranked:

(19) a. *ə
Assign a violation mark for any schwa in the output.

b. Dep
Assign a violation mark for any segment in the output that has no correspondent in the input.

These constraints must be ranked in a way to promote schwa-epenthesis as a repair strategy for configurations with consonantal nuclei.[21]

/**ps-**∅/	SonSeq	*Nuc/C	Dep	*ə
a. ˈpn̩		*!		
b. ☞ ˈpəs			*	*

Table 3.4: Repairing consonantal nuclei: /ps-∅/ → [ˈpə̀s]

/**sn-**∅/	SonSeq	*Nuc/C	Dep	*ə
a. ˈsn̩		*!		
b. ☞ ˈsən			*	*

Table 3.5: Repairing consonantal nuclei: /sn-∅/ → [ˈsə̀n]

[21] Note that from now on I omit tones from the representation in the candidates of OT tableaux primarily for better readability and because they play no role in the topics under discussion.

In this way, schwa is epenthesized in order to avoid having [s] or [n] as the syllable nucleus in the examples above. This same ranking also promotes schwa-epenthesis as a repair for illicit sonority relations in coda clusters:

/ˈ**film-∅**/		SonSeq	*Nuc/C	Dep	*ə
a.	ˈfilm	*!			
b. ☞	ˈfiləm			*	*

Table 3.6: Repairing illicit sonority: /ˈfilm-∅/ → [ˈfiləm]

/ˈ**pɔ̀t-n-∅**/		SonSeq	*Nuc/C	Dep	*ə
a.	ˈpɔtn	*!			
b.	ˈpɔtn̩		*!		
c. ☞	ˈpɔtən			*	*

Table 3.7: Repairing illicit sonority: /ˈpɔ̀t-n-∅/ → [ˈpɔ̀tə́n]

These tableaux illustrate that very often it is SonSeq and *Nuc/C together that promote schwa epenthesis as a phonotactic repair strategy. However, for ease of exposition, I will only represent *Nuc/C in the tableaux from now on, unless specific reference to SonSeq will be necessary.[22]

The constraint set used above does explain why schwa must occur, however, it says nothing about the site of epenthesis. Notice that these constraints alone would not be able to exclude candidates that would epenthesize schwa in absolute word-final position, yielding *[ˈpsə], *[ˈsnə], *[ˈpɔ̀tnə́] and *[ˈfilmə́]. For now, we shall assume that NM Slovenian must also contain a high-ranked constraint that prohibits schwa from occurring in open syllables, which explains the ungrammaticality of *[ˈpsə], *[ˈsnə], and other examples.[23] We, therefore, require a markedness constraint along the following lines:

[22]Note that there are unpredictable cases of schwa in NM Slovenian – see footnote 20 and section 3.1.4. This implies that schwa may also be specified underlyingly, which means that the ranking of Max(ə) with respect to *ə will need to be 'Max(ə) ≫ *ə', where Dep(ə) is ranked lower than the Dep-constraints on the other vowels. This predicts a system with underlying schwa, as well as schwa-epenthesis, which is precisely what we need in order to adequately model NM Slovenian.

[23]A candidate such as *[ˈəps] is also not an option – it would violate SonSeq, but also for another important reason: in most cases, schwa in initial position is not available because it violates constraints that prohibit deletion or insertion in initial position in the Prosodic Word – see footnote 33.

(20) *ə]$_\sigma$ (MacBride 2000: 8)
Schwa is not in an open syllable.

Macbride (1996) explains the failure of schwa in Berber to occur in open syllables (Guerssel 1976; Chtatou 1982; Dell & Tangi 1992) as the result of the high-ranked constraint *ə]$_\sigma$, and similar phenomena are attested in Salish and Wakashan languages (Shaw 1996; Blake 2000). For now, we shall make use of *ə]$_\sigma$. Because we will analyze the data in a step-by-step fashion, we will ultimately be forced to abandon *ə]$_\sigma$ for an Alignment constraint (see section 3.1.3), which will unify the range of data that we will consider. Observe *ə]$_\sigma$ at work in NM Slovenian:

	/**ps-**∅/	*Nuc/C	*ə]$_\sigma$	Dep	*ə
a.	ˈpṣ	*!			
b.	ˈpsə		*!	*	*
c. ☞	ˈpəs			*	*

Table 3.8: Schwa epenthesis and *ə]$_\sigma$: /ps-∅/ → [ˈpəs]

	/**sn-**∅/	*Nuc/C	*ə]$_\sigma$	Dep	*ə
a.	ˈsn	*!			
b.	ˈsnə		*!	*	*
c. ☞	ˈsən			*	*

Table 3.9: Schwa epenthesis and *ə]$_\sigma$: /sn-∅/ → [ˈsən]

In what follows, we will see that *ə]$_\sigma$ explains most epenthesis sites in the data of verbs and participles.

It is now time to discuss the status of schwa in verbs and participles. In the remainder of this section, we will consider the interaction of schwa and the high vowel /i/; specifically, we will discuss the interaction of schwa epenthesis and vowel deletion. Recall from the previous section (2.2.6) that the verbal theme vowel /-i/ as well as the masculine plural exponent /-i/, occurring in participles, both delete on some occasions. What the precise details of this deletion process are is left for the section that will deal exclusively with /i/-deletion (section 3.2). For now, we can just assume that a constraint such as *i̯ is found in the phonology of NM Slovenian, and that it prohibits any unstressed [i] vowels. First, consider the simple case of *i* ~ ∅-class participles:

UR of STEM	M.PL /-i/	N.PL /-a/	F.PL /-e/
/√xɾàn-i-l-/ ‘feed’	ˈxɾànə́l	ˈxɾànlá	ˈxɾànlé
/√kùɾ-i-l-/ ‘burn’	ˈkùɾə́l	ˈkùɾlá	ˈkùɾlé

Table 3.10: $i \sim \varnothing$-CLASS participles: Root stress

UR of STEM	M.PL /-i/	N.PL /-a/	F.PL /-e/
/√xɾàn-i-l-/ ‘feed’	xɾaˈnìl	xɾàˈnilá	xɾàˈnilé
/√kùɾ-i-l-/ ‘burn’	kùˈɾíl	kùˈɾilá	kùˈɾilé

Table 3.11: $i \sim \varnothing$-CLASS participles: Theme stress

The two tables above show two different stress realizations of the same forms, with which the occurrence or absence of the theme vowel [-i] correlates. This correlation implies that the theme vowel /-i/ is deleting, as established in section 2.2.6. However, the final masculine plural exponent is also present underlyingly (as also established in 2.2.6) and it deletes as well. Notice that the schwa, in turn, only shows up in the masculine plural forms with root stress and nowhere else. Such a distribution of schwa can be easily motivated by the constraints that we have been assuming so far. In addition to those constraints, we assume the constraint *ĭ for now, which prohibits [i] in unstressed syllables, and also MAX(i), which prohibits /i/-deletion:

/xɾan-i-l-a/	*NUC/C	*ĭ	*ə/σ	MAX(i)	DEP	*ə
a. ˈxɾanila		*!				
b. ☞ ˈxɾanla				*		
c. ˈxɾanəla			*!	*	*	*

Table 3.12: Schwa in $i \sim \varnothing$-CLASS participles: /ˈxɾan-i-l-a/ → [ˈxɾànlá]

/xɾan-i-l-i/		*NUC/C	*i̯	*ə]σ	MAX(i)	DEP	*ə
a.	ˈxɾanili		**!				
b.	ˈxɾanil		*!		*		
c.	ˈxɾanli		*!		*		
d.	ˈxɾanl̩	*!			**		
e. ☞	ˈxɾanəl				**	*	*
f.	ˈxɾanlə			*!	**	*	*
g.	ˈxɾanələ			**!	**	**	**

Table 3.13: Schwa in $i \sim \varnothing$-CLASS participles: /ˈxɾan-i-l-i/ → [ˈxɾànə́l]]

In (3.12), the theme vowel /-i/ deletes, but no schwa occurs, i.e. no schwa is epenthesized because no illicit phonotactic configuration is created through /i/-deletion. The schwa in candidate c. is ruled out both by *ə]$_\sigma$ and the general violation of the low-ranked constraints that regulate the presence of schwa. Let us move on to (3.13): in this form, there are two /i/-vowels to delete, which could potentially result in the participial /-l/ syllabifying as the syllables nucleus (candidate d.); of the forms with schwa, only candidate e. is available, as candidates f. and g. violate *ə]$_\sigma$, as well as incur double violations of the lower-ranked constraints. This tableau shows that *ə]$_\sigma$ must be active in the system to rule out candidates such as f., which would otherwise fare equally well as candidate e. under the rest of the constraints.

What is crucial about these participial data that we have discussed so far is that a constraint such as *ə]$_\sigma$ does seem to be necessary to account for the distribution of schwa. Specifically, it prohibits schwa in open syllables, just like in the system of nouns discussed before, which is exactly what we seem to require to derive the system of participles.

Let us now turn to the $\sqrt{}$CVCR-CLASS. In the previous section we showed that $\sqrt{}$CVCR-CLASS participles are essentially a case of $i \sim \varnothing$-CLASS participles in that they have the same UR specification: /-i/ for THM and, of course, /-i/ for M.PL.

UR of STEM	M.PL /-i/	N.PL /-a/	F.PL /-e/
/$\sqrt{}$pòwn-i-l-/ 'feed'	ˈpòwənlí	ˈpòwənlá	ˈpòwənlé
/$\sqrt{}$pɾàzn-i-l-/ 'slap'	ˈpɾàzənlí	ˈpɾàzənlá	ˈpɾàzənlé

Table 3.14: $\sqrt{}$CVCR-CLASS participles: Root stress

UR of STEM	M.PL /-i/	N.PL /-a/	F.PL /-e/
/√pòwn-i-l-/ 'feed'	powˈnìl	powˈnìlá	powˈnìlé
/√pràzn-i-l-/ 'slap'	prazˈnìl	prazˈnìlá	prazˈnìlé

Table 3.15: √CVCR-CLASS participles: Theme stress

Schwa in this class occurs only in the root stress version of the paradigm. The interesting fact is that schwa is not epenthesized in the same site where the theme would be deleted, but it rather occurs between the two final consonants of the root. The constraint ranking we have set up previously can easily derive this situation:

/ˈ**pown-i-l-i**/		*NUC/C	*i̯	*ə]σ	MAX(i)	DEP	*ə
a.	ˈpownili		**!				
b.	ˈpown̩li	*!	*		*		
c.	ˈpownəli		*	*!	*	*	*
d. ☞	ˈpowənli		*		*	*	*

Table 3.16: Schwa in √CVCR-CLASS PTC: /ˈpown-i-l-i/ → [ˈpòwənlí]

/**powˈn-i-l-i**/		*NUC/C	*i̯	*ə]σ	MAX(i)	DEP	*ə
a.	powˈnili		*!				
b. ☞	powˈnil				*		
c.	powəˈnil			*!	*	*	*

Table 3.17: Schwa in √CVCR-CLASS PTC: /powˈn-i-l-i/ → [powˈnìl]

In Table (3.16), no candidates in which the final M.PL /-i/ would be deleted, such as *[ˈpownəl], are given as we are yet to discuss why this /-i/ surfaces (see section 3.2 on this); for now let us just consider the candidates that retain the final /-i/. Notice that the schwa actually epenthesizes in a site that is different from that of the deleted vowel: it occurs between the final two consonants of the root. The constraints in Table (3.16) automatically explain this as the result of the constraint *ə]$_\sigma$ (i.e. a ban on schwa in open syllables), which unifies the distribution of schwa in √CVCR-CLASS

participles with the rest of the participial system and, in fact, the noun system: recall that schwa is epenthesized in /sn-∅/ 'dream (NOM.M.SG)' to yield [ˈsən], and a candidate such as *[ˈsnə] must be ruled out somehow – here by *ə]$_\sigma$. This represents further evidence in favour of the constraint *ə]$_\sigma$. In Table (3.17) the epenthesized schwa is simply redundant (/i/-deletion creates no illicit phonotactic structure for it to repair), which stems from the general violation of DEP and *ə.

We can now consider the system of semelfactive participles. The distribution of schwa in both these classes is precisely as in the √CVCR-CLASS of participles, which means that it can be unified with the rest of the data that we have discussed so far. Consider the following examples:

UR of STEM	M.PL /-i/	N.PL /-a/	F.PL /-e/
/u-√gàs-n-i-l-/ 'turn off'	uˈgàsənlí	uˈgàsənlá	uˈgàsənlé
/√màx-n-i-l-/ 'slap'	ˈmàxənlí	ˈmàxənlá	ˈmàxənlé

Table 3.18: Schwa in semelfactive participles: Root stress

UR of STEM	M.PL /-i/	N.PL /-a/	F.PL /-e/
/u-√gàs-n-i-l-/ 'turn off'	ugasˈnìl	ugasˈnìlá	ugasˈnìlé
/√màx-n-i-l-/ 'slap'	maxˈnìl	maxˈnìlé	maxˈnìlé

Table 3.19: Schwa in semelfactive participles: Theme stress

In the semelfactives, schwa is epenthesized between the root and the semelfactive exponent /-n/, rather than between /-n/ and the participial exponent /-l/, in order to avoid a violation of *ə]$_\sigma$: surface forms such as *[uˈgàsn̩lí] and *[uˈgàsnəlí] are clearly ungrammatical. The only difference between the √CVCR-CLASS participles and the semelfactives is one of morphological structure: the √CVCR-CLASS participles contain a root with a final consonant cluster where the second consonant is a sonorant (cf. √pown-, 'fill', √misl- 'think', etc.), while in the semelfactives the root is followed by the semelfactive morpheme (cf. √gas-n- 'turn off', √max-n- 'slap', etc.). But for phonotactic purposes, they both show a 'consonant + sonorant' cluster, so it is not surprising that they show identical behaviour with respect to the phonotactically triggered process of schwa epenthesis.

Notice that it is the 'consonant + sonorant' cluster after the stressed vowel that creates an illicit phonotactic structure: for instance, /ˈCVCR-l-i/ can only map to *[ˈCV.CR̩.li] (where 'R' represents any sonorant, as before) if no epenthesis is available, which is ungrammatical in NM Slovenian. It seems to be an issue of syllabification, as the sonorant cannot form a part of the

coda nor a part of the following onset, for independent phonotactic reasons.[24] That this is the case is confirmed by roots that are of the 'CVCC' phonotactic shape where, crucially, the final consonant is an obstruent. Consider an example that fits in the ∅-CLASS of participles, viz. √ust- 'mouth:

UR of STEM	M.PL /-i/	N.PL /-a/	F.PL /-e/
/iz-√ùst-i-l-/ 'to mouth'	iˈzùstə́l	iˈzùstlá	iˈzùstlé

Table 3.20: Participle built on √ust- 'mouth'

As can be observed above, there is no need to epenthesize schwa between [s] and [t], as [st] can be a well-formed coda as well as an onset cluster in NM Slovenian (e.g. [√kòst] 'bone (NOM.SG.N)', [√stòw] 'chair (NOM.SG.N)', etc.). Schwa epenthesis between the two consonants that precede the participial /-l/ is, therefore, needed only when the second consonant is a sonorant. Notice that the presence of the final M.PL /-i/ on the surface is also conditioned by this: whenever a 'consonant + sonorant' cluster occurs after the stressed vowel, the M.PL exponent must surface as unstressed [-i]. This is an interesting correlation and one that will be crucial for our analysis of /i/-deletion in section 3.2. The discussion of this correlation is postponed until then.

So far, all the cases of schwa that we have examined occur in phonotactic contexts where we would expect epenthesis to occur as a repair strategy in NM Slovenian. We have also only witnessed evidence that corroborates the use of the constraint *ə]$_\sigma$: schwa epenthesis seems to avoid creating configurations with schwa in open syllables.

3.1.2 Cyclic application

We have by now presented several pieces of evidence which indicate that schwa epenthesis in NM Slovenian occurs as a phonotactic repair strategy, and that it obeys the constraint *ə]$_\sigma$, which prohibits schwa in open syllables. However, some curious properties with respect to the distribution of schwa still need to be discussed. Some participles exhibit schwa in a position where it is not expected. These are participles that belong to the ∅-CLASS of participles and their roots only seem to consist of a few consonants underlyingly. Consider the following examples:

[24] For completeness, *[ˈCVCR.li] and *[ˈCVC.Rli] are equally ungrammatical. This stems from the insufficient sonority fall in the coda cluster and insufficient rise in the onset, as discussed before, but also from the general phonotactic prohibition on $_\sigma$[nl...] onsets, which are non-existent in NM Slovenian and probably in any dialect of Slovenian.

UR of ROOT		1P.SG.V	M.PL.PTC
/u-√ˈmɾ-/	'die'	uˈmɾèm	uˈmə́ɾəl
/po-√dɾ-/	'knock over'	poˈdɾèm	poˈdə́ɾəl
/u-√ˈpɾ-/	'resist'	uˈpɾèm	uˈpə́ɾəl
/√tsvɾ-/	'fry'	ˈtsvɾèm	ˈtsvə́ɾəl

Table 3.21: Schwa in an open syllable (in ∅-CLASS participles)

While these roots form participles with a zero verbal theme, they employ the /-e/ theme vowel when they form verbs. A first person singular verbal form and a masculine plural participial form is given for each root above. Notice that two schwa-vowels occur in the participial forms: a schwa in an open syllable and a schwa in a closed syllable. The first occurrence of the schwa violates the ban on schwa on open syllables (viz. *ə]$_\sigma$). It seems that both these schwa-vowels must be epenthetic: compare the verb [u-ˈmɾ-è-m] 'I die' with the participle [u-ˈmə́ɾ-∅-əl] 'having died'. No schwa surfaces in the verbal forms, which is expected; the theme vowel is the only vowel available and so is stressed.[25] However, since the participial form is built with a zero theme, no vowel is available, which is why schwa epenthesis occurs within the root to avoid creating syllabic consonants. But even so, it is unclear why two schwa-vowels occur in the participle: it is clear that *[uˈmə́ɾl] is insufficient, [rl] cannot form a licit coda due to sonority restrictions in NM Slovenian, nor can one of the consonants become syllabic. *[uˈmɾəl], on the other hand, is completely fine in terms of phonotactic restrictions that govern NM Slovenian. It is, in fact, equivalent to the verbal form, except that the stressed vowel is a schwa instead of the mid vowel [e]. The schwa even occurs in a closed syllable, which satisfies *ə]$_\sigma$. And yet, only [uˈmə́ɾəl] is the grammatical form here.

In chapter 4, where we discuss the morphology-phonology interface, we will assume the framework of Distributed Morphology (Halle & Marantz 1993; Embick 2010), which will allow us to treat phonological computation in cycles, implying that phonology can compute outputs of previous applications of phonology. That phonological application is cyclic was first conceived in Chomsky & Halle (1968), and this is also one of the basic claims of Lexical Phonology (together with Stratal OT) (Kiparsky 1982a,b; Mohanan 1986; Kiparsky 2000; Bermúdez-Otero 2011), Cophonology Theory (Inkelas & Zoll 2007; Inkelas 2008, 2011) and other instantiations of Optimality Theory, which we do not discuss here. What is relevant for the

[25] The initial [u] in u-√mɾ- is a prefix, and it is never stressed, as expected for Slovenian. The stress always falls on the syllable that follows [u], whichever syllable that is.

current discussion is that it is the notion of a cycle that greatly disambiguates the data with the redundant schwa-vowels in Table (3.21). With the schwa-related constraints that we have proposed so far, the data in Table (3.21) make perfect sense if we assume that we are dealing with cyclic application of phonology: recall that we are dealing with verbal and participial forms, and that participles are inherently built on verbal stems. If we assume that the verbal stems are computed in one phonological cycle, and that the rest of the structure, be it the verbal inflection, or the participial suffix and inflection, is computed in another, the data in Table (3.21) begin to make sense:

INPUT – VERBAL STEM	/u-ˈmɾ-e/
i-deletion	*vac.*
ə-epenthesis	*vac.*
SR	[uˈmɾe]

INPUT – FULL VERB	/uˈmɾe-m/
i-deletion	*vac.*
ə-epenthesis	*vac.*
SR	[uˈmɾem]

Table 3.22: Cyclic application exemplified with √ˈmɾ- 'die': verbs

INPUT – VERBAL STEM	/u-ˈmɾ-∅-/
i-deletion	*vac.*
ə-epenthesis	uˈmər
SR	[uˈmər]

INPUT – PARTICIPLE	/uˈmər-l-i/
i-deletion	uˈmərl
ə-epenthesis	uˈmərəl
SR	[uˈmərəl]

Table 3.23: Cyclic application exemplified with √ˈmɾ- 'die': participles

The assumption is that the verbal stem is always built first, and then a phonological cycle is run on it. After that, the grammar may build either a verb or a participle out of it – depending on the stem. When the grammar is constructing a verb with the theme /-e/, this yields no special effects. However, when constructing a verbal stem with a zero theme, the grammar must first build a verbal stem, which triggers a pass through the phonology with the effect that we want: the UR at that point is the verbal stem

/uˈmr-∅-/, and when it is processed by the phonology of NM Slovenian, schwa is epenthesized for the expected phonotactic reasons. The output of this cycle is [uˈmər], which is used as the input for the following participial cycle. In this cycle, the input, therefore, is /uˈmər-l-i/, which is then processed by the phonology. The final /-i/ is deleted and schwa epenthesis occurs for the expected phonotactic reasons. The first seemingly redundant schwa in [uˈmərəl], which occurs in an open syllable, is preserved from the previous, verbal cycle.

Notice that, with such an analysis in place, it is absolutely crucial to assume that the first cycle computes the root and the theme together. If this were not the case, then we would predict that schwa epenthesis occurs in the verbal forms of the examples above (e.g. *[uˈmərem] vs. [uˈmrem]), as that would mean that only the root is processed in the first cycle and, given its phonotactic form (√mr-), it would require a repair through schwa-epenthesis. The data that confirm this can also be found in other participial classes. For instance, take the root √pown- 'fill': it will have to be processed together with the theme vowel when the stress is on the theme, so that no epenthesis occurs to repair the illicit '[wn]' coda, yielding [powˈni] as the correct output of the first cycle, and not *[powəˈni]. The same can be said about roots like √jamr- 'moan' that take the /-a/ theme, which the first cycle needs to output as [ˈjamra] and not as *[ˈjaməra]. In short, there is ample evidence for stating that the first cycle has to encompass the root together with the theme, but to the exclusion of the following suffixes.

Let us return to the illustration in Tables (3.22) and (3.23). That schema makes use of rule-based mechanics, which explains the preservation of the schwa from the previous verbal cycle automatically. However, in a system of cyclic phonology, where phonological computation is driven by Optimality-Theoretic principles, we must explain why the schwa is retained in the participial cycle. We can do this by positing a high-ranked faithfulness constraint that prohibits the deletion of any schwa in the output of the previous cycle. We term this output the 'base':

(21) Max-Base
Assign a violation mark for any segment x that is in the output of the previous phonological cycle iff there is no correspondent of x in the output of the present cycle.

Let us now use this constraint to illustrate the derivation of the masculine participle [uˈmə́rə̀l], which must pass through two phonological cycles:

/uˈmr-∅/		*NUC/C	MAX-BASE	*i̯	*ə]σ	MAX(i)	DEP	*ə
a.	uˈmr̩	*!						
b.	uˈmrə				*!		*	*
c. ☞	uˈmər						*	*

Table 3.24: Cyclic derivation of [uˈmə́rə̀l]: 1ST CYCLE

/uˈmərl-i/		*NUC/C	MAX-BASE	*i̯	*ə]σ	MAX(i)	DEP	*ə
a.	uˈmərli			*!				
b.	uˈmərl̩	*!				*		*
c.	uˈmrəl		*!			*	*	*
d. ☞	uˈmərəl				*	*	*	**

Table 3.25: Cyclic derivation of [uˈmə́rə̀l]: 2ND CYCLE

In Table (3.24) above, the verbal stem with no overt theme undergoes epenthesis under the expected constraints (epenthesis avoids creating open syllables with schwa). This is then taken as input in the next, participial cycle in Table (3.25).[26] Since the schwa epenthesized in the verbal cycle is now part of the input, it can be referred to by MAX-BASE independently of any other schwa-vowels that are epenthesized in the participial cycle. The ranking prohibits the deletion of the input-specified schwa, but another schwa is needed to prevent the creation of a syllabic consonant. In this way, the first schwa becomes grounded phonologically as a remnant from the 'previous' cycle, where it was required phonotactically. But in the second cycle, it only needs to surface for reasons of high-ranked faithfulness, which captures the observation that it is phonotactically not needed. This approach, then, implies that the participial system of NM Slovenian needs to pass through at least two stages of phonological evaluation, viz. the verbal cycle and the participial cycle. The exact details of such a cyclic analysis, specifically why we should even call the first cycle a 'verbal' one and the second a 'participial'

[26] No candidate such as *[uˈmərlə] is given here. This is discussed further down.

one, together with a formal definition of a 'phonological cycle', will be given in section 4.3, where we discuss the phonology-morphology interface.

A general question that arises with a cyclic analysis of the participial system is whether such an analysis makes any unwelcome predictions for the rest of the data in NM Slovenian. Section 3.2 discusses this question and demonstrates that a cyclic analysis actually explains an important aspect of the process of /i/-deletion, which means that the distribution of schwa and /i/-deletion can be adequately unified under a cyclic analysis. The remaining part of this section, however, is dedicated to the evaluation of the constraint *ə]$_\sigma$, which we have been using, to see how it fares under the new possibilities that are opened under a cyclic analysis.

3.1.3 Re-evaluating the ban on schwa in open syllables

Up to now, we have been constructing an analysis in which *ə]$_\sigma$, prohibiting schwa in open syllables, has played an important role. Now that we have introduced a new variable into our analysis, viz. the cyclic application of phonology in the participial system, the adequacy of this constraint must be reconsidered. Let us return to the cyclic derivation of [uˈmɔ́rə̀l], in particular the participial cycle, which is given in Table (3.25) above. Footnote 26 on page 72 highlights the fact that no candidate such as *[uˈmərlə] is given in the tableau in Table (3.25). This is the case because the set of constraints that is used in that tableau seems to be insufficient to rule out *[uˈmərlə], where the final schwa is epenthesized in the absolute word-final position. The participial cycle from Table (3.25) is here repeated with the added candidate *[uˈmərlə]:

/**u**ˈ**m**ər**-l-i**/		*NUC/C	MAX-BASE	*i̯	*ə]$_\sigma$	MAX(i)	DEP	*ə
a.	uˈmərli			*!				
b.	uˈmərl̩	*!				*		*
c.	uˈmrəl		*!			*	*	*
d. ☞	uˈmərəl				*	*	*	**
e. ☞	uˈmərlə				*	*	*	**

Table 3.26: Participial cycle of [uˈmərəl]

Candidate d. (the grammatical candidate) cannot be evaluated as more or less harmonic than candidate e. This stems from the way syllabification interacts with schwa: in candidate d., the input-specified schwa ends up in an open syllable because the epenthesis of the second schwa pushes the [ɾ] into its onset, while in candidate e., the epenthesis of schwa in absolute final position pushes the [ɾ] into the coda position of the input-specified schwa. In this way, both candidates have precisely one schwa-vowel contained in an open syllable, and they also incur exactly the same number of violations of the other constraints. Our analysis must, however, explain why candidate e. is ruled out.

Is it perhaps time to re-think the constraint *ə]$_\sigma$? It is indeed the case that there are other ways of dealing with schwa that fails to occur in open syllables: van Oostendorp (2000: 141) discusses the status of schwa-epenthesis in Dutch, where schwa has a similar distribution to that in NM Slovenian, viz. it can never surface in the absolute final position of the word. While it is a fact that schwa would end up in an open syllable in the absolute final position of the prosodic word, it is not clear that its distribution is regulated by a constraint such as *ə]$_\sigma$. In van Oostendorp (2000: 142), the prohibition of schwa in absolute word-final position is encoded through a Generalized Alignment constraint (McCarthy & Prince 1993) that requires the right edge of the morphological word to be aligned with the right edge of the prosodic word. In this way, van Oostendorp explains that the avoidance of epenthesis in edge positions is grounded in the need to keep the morphological edges of words intact. We too can formulate such a constraint:

(22) ALIGN(MWd, R; PWd, R)
$\forall x \exists y$ such that x is a Morphological Word and y is a Prosodic Word, where the rightmost edge of x coincides with y.

While our definition does not define the relation 'coincide', we take it to be a primitive in (22) above and assume that 'coincide' demands the final segments that have morphological affiliation overlap with the final segment dominated by the Prosodic Word. This implies that epenthesis will incur a violation of ALIGN(MWd, R; PWd, R), as the epenthetic segment will 'intervene' between the edge of what constitutes the Morphological Word and the edge of the Prosodic Word. This constraint, in practical terms, is the same as EDGE-INTEGRITY (Kang 2004). For our data, ALIGN(MWd, R; PWd, R) would prohibit schwa-epenthesis in final position, but not in any word-internal positions. Looking back at the data discussed in this section, *ə]$_\sigma$ was actually mostly used to rule out epenthesis in final position.

But what about cases like [ˈpòwənlí] 'having filled (M.PL.PTC)'? Schwa is crucially not epenthesized in an open syllable to avoid creating *[ˈpòwnəlí]. However, we now know, for independent reasons, that participles need to pass through the verbal cycle of phonology before the rest of the participle is built. This implies that the input to the verbal cycle is /pown-i/. Could a constraint such as ALIGN(MWd, R; PWd, R) be used to rule out *[ˈpòwnó] in the verbal cycle, and so render [ˈpòwón] as the most harmonic candidate? ALIGN(MWd, R; PWd, R) would definitely be violated, and it would be violated by *[ˈpòwnó], but not [ˈpòwón], as the latter does not contain an epenthetic vowel between the edge of the Morphological Word and the Prosodic Word. Let us see if ALIGN(MWd, R; PWd, R) can also solve the puzzle of evaluating [uˈmɔ́rəl] vs. *[uˈmɔ́rlə]:

/**u**ˈ**m**ər-**l-i**/		*NUC/C	MAX-BASE	*i̯	AL-R$_{Mwd,Pwd}$	MAX(i)	DEP	*ə
a.	uˈmərli			*!				
b.	uˈmərl̩	*!				*		*
c.	uˈmrəl		*!			*	*	*
d. ☞	uˈmərəl					*	*	**
e.	uˈmərlə				*!	*	*	**

Table 3.27: Participial cycle of [uˈmərəl] with ALIGN(MWd, R; PWd, R)

ALIGN(MWd, R; PWd, R) correctly predicts that candidate d. is the winner. Even though the relevant candidates have deleted the final /-i/, ALIGN(MWd, R; PWd, R) is only violated by candidate e., but not by candidate d. This is because Alignment constraints do not typically encode an input-output correspondence relation (which is typically done by faithfulness constraints), but only refer to whatever string can be identified in the output that has morphological affiliation. Since ALIGN(MWd, R; PWd, R) manages to solve the puzzle of evaluating [uˈmɔ́rəl] vs. *[uˈmɔ́rlə], and since it can also derive the epenthesis site of schwa in the rest of the data (in a cyclic analysis), we have no further use for *ə]$_\sigma$ in our analysis. It seems that ALIGN(MWd, R; PWd, R) is the constraint that governs the site of epenthesis in NM Slovenian, and not a ban on schwa in open syllables.

3.1.4 Residual issues

In the present section, we have provided a description of schwa in NM Slovenian and have accounted for its distribution: in the relevant cases, schwa in NM Slovenian is epenthesized to repair a phonotactically illicit form, and the site of epenthesis is regulated by ALIGN(MWd, R; PWd, R). What is relevant for the present thesis is the fact that schwa in NM Slovenian has phonotactic motivation and acts in predictable ways. There are some occurrences of schwa that cannot be accounted for with certainty at this point, but these do not seem to be immediately relevant for the data discussed in this thesis. Such is the occurrence of schwa in the verbal system of ∅-CLASS participles, which were discussed in Table (2.12) in section 2.2.2 and are repeated below:

	INDIC.			INFIN.
	SG	DU	PL	
1ST.P	ˈxɾàn-∅-ə́m	ˈxɾàn-∅-vá	ˈxɾàn-∅-mó	
2ND.P	ˈxɾàn-∅-ó∫	ˈxɾàn-∅-tá	ˈxɾàn-∅-té	ˈxɾàn-∅-t
3RD.P	ˈxɾàn-∅-∅	ˈxɾàn-∅-tá	ˈxɾàn-∅-jó	

Table 3.28: Verbs formed with [-∅] (∅-CLASS)

	IMPER.		
	SG	DU	PL
1ST.P		ˈxɾán-∅-và	ˈxɾán-∅-mò
2ND.P	ˈxɾán-∅-∅	ˈxɾán-∅-tà	ˈxɾán-∅-tè
3RD.P			

Table 3.29: Verbs formed with [-∅] (∅-CLASS)

Schwa in the paradigms of this class of verbs occurs in the first and second person singular forms of the indicative. However, let us first concentrate on the *infinitival form*. Recall, from section 2.2.2, that schwa can also occur in the infinitive in this class of verbs: crucially, no schwa occurs after roots ending in a sonorant, but schwa does occur in roots ending in an obstruent, as shown in Tables (2.14) and (2.15) in section 2.2.2, respectively. This is why no schwa occurs in the inifinitival form of $\sqrt{}$xɾan- above. Such a bifurcation of infinitival forms could perhaps be explained through phonotactically motivated schwa-epenthesis. We mentioned at the beginning of this section that sonority sequencing is active in NM Slovenian. This is something that can explain the well-formedness of 'sonorant+[t]' coda sequences

as in [ˈxɾànt] above, but 'obstruent+[t]' coda-sequences could perhaps be argued to constitute a cluster where the two consonants are insufficiently different in terms of sonority, and would so require schwa-epenthesis. In other words, 'obstruent+obstruent' could be a sufficient coda environment to warrant epenthesis. There is, however, insufficient evidence to make such a claim: infinitives that belong other verbal classes show no schwa epenthesis in 'obstruent+obstruent' clusters; cf. the *e*-CLASS [ˈ√nès-∅-t] 'to carry' and [ˈ√pètʃ-∅-t] 'to bake'. Also, 'obstruent+obstruent' need not require epenthesis in the noun system, consider cases of '[s]+[t]' sequences: [ˈ√kòst-∅] 'bone (NOM.SG.F)', [ˈ√mòst-∅] 'bridge (NOM.SG.M)', [ˈ√pàst-∅] 'trap (NOM.SG.F)', etc. It seems that schwa in the infinitive of ∅-CLASS verbs is regulated morphologically in some way.

The schwa in the *first* and *second person singular forms* in the indicative is equally puzzling. The schwa in the first person singular forms could still be argued to be epenthetic: any 'consonant+[m]' coda sequence would require epenthesis in NM Slovenian, either due to the sonority restrictions (since [m] would never sufficiently different in terms of sonority than the preceding consonant), or in avoidance of syllabifying the [m] as a nucleus. However, the schwa in the second person singular cannot be explained through phonotactically motivated epenthesis so readily. Roots such as √xɾan- 'feed', as well as √kuɾ- 'burn' show a schwa before the inflection [-ʃ]. It would be possible to claim that the fall in sonority between any sonorant and [ʃ] is simply not sufficient in NM Slovenian, but the issue lies in the fact that such clusters are permitted in the system of nouns: consider, for instance, [ˈstɔɾʃ-∅] 'pine cone (NOM.SG.M)'. Several possibilities are open for this: either sonority sequencing is slightly different in the noun system than in the verbal system (which is a stipulative solution), or the schwa in these two forms (or at least the second person singular one) is not epenthetic at all. A likely possibility is that this schwa is a morphologically/lexically determined allomorph of the second person singular indicative category, viz. /-əʃ/, only occurring with roots that form ∅-CLASS verbs. The third option is that *all* the instances of the first and second person singular indicative suffixes are /-əm/ and /-əʃ/, respectively, and that the schwas usually delete when they come in contact with a theme vowel in order to avoid creating a hiatus. These are stipulations that need to be explored in the future. Notice that this unexpected occurrence of schwa would also make it difficult to analyze the ∅-CLASS verbs in a way that would parallel the participles: in the participles, we were able to claim that in most cases, the surface zero theme was the result of an underlyingly specified /-i/ theme vowel. The evidence for such a claim in the system of participles is abundant, but this is not a very

likely option for the verbal system. Further study of the verbal system in the future is needed to determine the status of the aforementioned schwas.

Another curious phenomenon can be observed in the paradigms of nouns with a diminutive suffix. Nouns that are formed with bare roots show no schwa epenthesis in 'obstruent+obstruent' codas, but if the second obstruent belongs to the diminutive suffix, then schwa may occur in that position. Consider [√oˈbísk-∅] 'visit (NOM.SG.M), [ˈ√písk-∅] 'whistle (NOM.SG.M)', [ˈ√blísk-∅] 'lightning (NOM.SG.M), and compare them to the diminutives [is-ˈ√pís-ək-∅] (NOM.SG.M) ~ [is-ˈ√pís-k-à] 'note (GEN.SG.M)', [ˈ√líst-ək-∅] (NOM.SG.M) ~ [ˈ√líst-k-à] 'small leaf (GEN.SG.M)', [ˈ√tsùkər-tʃək-∅] (NOM.SG.M) ~ [ˈ√tsùkər-tʃk-á] 'little sugar (GEN.SG.M)'.

The problem is that the two diminutive suffixes trigger schwa/zero alternations in contexts where one obstruent follows another, which are contexts that usually require no epenthesis repair ('obstruent+obstruent' codas are generally phonotactically well-formed in NM Slovenian). Historically speaking, the occurrence of such vowel/zero alternations with Slavic diminutive suffixes is not unexpected at all since the schwa must be the historical result of *yer* realization.[27] Yer-vowels typically trigger synchronic vowel/zero alternations in the diminutives of most Slavic languages with the following crucial characteristics: the alternating vowel shows up in cases where the diminutive suffix is followed by a zero inflection, and it disappears when the diminutive is followed by an overt vowel inflection; also, the alternation in question does not seem to be phonotactically triggered, though its alternation is conditioned phonologically; see Gussman (2007), Jarosz (2008) and Chociej (2009) on Polish, Kenstowicz & Rubach (1987) on Slovak and Gouskova (2012) on Russian. For instance, in Polish the masculine nominative singular and feminine genitive plural case-forms have a zero inflection, where the alternating vowel in the diminutive suffix surfaces.

In the cases that we looked at, viz. nominative and genitive singular masculine forms, this general Slavic observation is also true of NM Slovenian diminutives, but the observation that the schwa in the diminutive would surface with every zero inflection does not hold; to explain this we need to look at more data. The schwa in the suffix [-tʃək] does occur in the masculine NOM.SG [ˈtsùkər-tʃək-∅] and not in the genitive form [ˈtsùkər-tʃk-á], as predicted, as the latter has an overt inflection. The same is true of the [-ək] suffix: observe [ˈ√líst-ək-∅] (NOM.SG.M) ~ [ˈ√líst-k-à] 'leaf (GEN.SG.M)'. Let us now observe the feminine forms. With the suffix [-k], the schwa fails to surface in the NOM.SG because feminine forms have an

[27] Thanks to Gunnar Ólafur Hansson for reminding me of this.

overt inflection, as predicted: [ˈ√lòpat-k-á] 'little shovel (NOM.SG.F)'. However, the GEN.PL form rather surprisingly fails to reveal the schwa in the diminutive suffix as well, even though the inflection is zero: [ˈ√lòpát-k-∅] (GEN.SG.F). The same obtains for feminines constructed with the diminutive [-tʃək]: [ˈ√òw-tʃk-á] 'little sheep (NOM.SG.F)' ~ [ˈ√òw-tʃk-∅] (GEN.SG.F). Note that the GEN.PL form of feminines is not inert to phonotactic repairs through schwa epenthesis in any way. Consider the following examples that illustrate schwa epenthesis for phonotactic reasons: [ˈ√férm-à] 'company (NOM.SG.F)' ~ [ˈ√férəm-∅] (GEN.SG.F) and [ˈ√ʃtèrn-á] 'water-well (NOM.SG.F)' ~ [ˈ√ʃtèrən-∅] (GEN.SG.F).

Indeed, the schwa that occurs in the diminutive forms in the nominative singular of masculines is not phonotactically conditioned in any way, nor is it predictable from the phonological context in which the diminutive occurs. It is likely that we are dealing with morphologically specified allomorphs, viz. /-tʃək/ ~ /-tʃk/ and /-ək/ ~ /-k/, which are the historical remnant of Slavic *yer* realization in the diminutive suffixes.

Another curious instance of schwa occurs in the verbal system. A process of 'e~ə' alternation can be found, where the theme vowel [e] alternates with schwa (these data were initially presented in section 2.2.2):

	SG	DU	PL
1ST	ˈpìx-n-ə́-m	ˈpìx-n-e-vá	ˈpìx-n-e-mó
2ND	ˈpìx-n-ə́-ʃ	ˈpìx-n-é-ta	ˈpìx-n-e-té
3RD	ˈpìx-n-é-∅	ˈpìx-n-é-ta	ˈpìx-n-e-jó

Table 3.30: e~ə-alternation

It is curious that schwa should alternate with [e], which is a theme vowel available in the verbal system. However, no such alternation is ever found if the theme vowel [e] is stressed: cf. [podˈ√dɾ-e-m] 'knock over (1P.SG.V)', [poˈ√dɾ-e-ʃ] (2P.SG.V), [poˈ√dɾ-e-∅] (3P.SG.V), etc. The alternation in Table (3.30) could perhaps be analyzed if we assumed that a markedness constraint is prohibiting the mid vowel [e] in unstressed syllables, such as *ĕ, but that the restriction on schwa in the final position in the prosodic words, or the restriction on schwa in open syllables somehow blocks this in all the forms but the 1ST and 2ND singular. However, it is unclear how such a restriction could be achieved, as the system that we have developed so far has no way of ruling out candidates such as *[ˈpìxən] (3P.SG) or *[ˈpìxənvá] (1P.DU), etc. In addition, the postulation of two phonological cycles in the verbs and participles further complicates matters as this implies that only

the stem /ˈpìx-n-e-/ is processed first without any additional inflectional suffixes. The 'e~ə' alternation is perhaps not even an alternation in the phonological sense, but may be an elaborate case of morphologically fixed allomorphy or the result of some other interaction of phonology and morphology. We will refrain from discussing the e~ə-alternation from now on; an analysis of this phenomenon is best left for a future study of schwa in NM Slovenian.

The data presented in this subsection are, however, not of immediate concern to the present thesis, as we are mainly concerned with the participial system. While the distribution of schwa is an important aspect of our analysis, we have already provided a sufficient breadth of evidence which indicates that schwa often acts in predictable ways and is an epenthetic segment. The cases of schwa that are important for this thesis are those that occur between a consonant and the participial suffix /-l/ or the semelfactive /-n/ (or simply root-final /l/ or /n/): in such environments, schwa is predicted to occur in any form in NM Slovenian – as discussed at the beginning of this section, because an 'obstruent+{l, n}' sequence would always yield an unfavourable rise in the sonority in the coda position, and a 'sonorant+{l, n}' sequence would yield an insufficient sonority drop in the coda position, all as expected in central Slovenian generally (Jurgec 2007b). The question of the second person singular schwa in the verbal system, as well as the question of the schwa in the diminutive, are therefore independent topics, which we have only explained briefly. They should, however, be investigated in the future to create a clearer picture of the verbal and noun systems of NM Slovenian.

3.1.5 Epenthesis vs. deletion account

In this final section of the discussion on schwa, we will contrast the two possible analyses of the schwa in NM Slovenian, viz. the epenthesis account that we have been following versus the deletion account, which we have not discussed. A brief overview of the schwa epenthesis account is given in (23):

(23) Schwa-epenthesis

a. Nouns: √sn- 'dream'
/sn-∅/ → [ˈsən] (NOM.SG)
/sn-a/ → [ˈsna] (GEN.SG)

b. Participles: √xɾan- 'feed'
CYCLE 1: /ˈxɾan-i/ → [ˈxɾan]
CYCLE 2: /ˈxɾan-l-i/ → [ˈxɾanəl] (M.PL)

c. Participles: √pown- 'fill'
   CYCLE 1: /ˈpown-i/ → [ˈpowən]
   CYCLE 2: /ˈpowən-l-i/ → [ˈpowənli] (M.PL)

d. Participles: u-√mɾ- 'die'
   CYCLE 1: /u-ˈmɾ-∅/ → [uˈməɾ]
   CYCLE 2: /uˈməɾ-l-i/ → [uˈməɾəl] (M.PL)

None of the schwa-vowels here are specified underlyingly, but are explained as the result of a phonotactic repair, viz. schwa epenthesis. This repair occurs for reasons discussed at the beginning of the discussion on schwa, viz. to avoid faulty sonority sequencing in coda clusters and syllabic consonants. The crucially residual schwas that seem to have different motivation and cannot be adequately explained by this approach are the following (see previous subsection for discussion):

(24) Residual schwas under epenthesis analysis
   a. Schwa in infinitives of ∅-CLASS verbs
   b. Schwa in 1ST.SG and 2ST.SG INDICATIVE of ∅-CLASS verbs
   c. e~ə-alternation in *e*-CLASS verbs

The alternative analysis involves schwa deletion, as already mentioned. This means that the presence of schwa is posited underlyingly, as in the noun /sən-a/, and that the schwa undergoes deletion on the surface because it occurs in an open syllable, yielding [ˈsna] (cf. *[ˈsə.na]). Notice that here we cannot appeal to the use of an alignment constraint that would delete the schwa because it would intervene between the edges of the Morphological Word and the Prosodic Word, as the schwa in *[ˈsə.na] is word-internal. By pursuing such a strategy, we arrive at the following analysis:

(25) Schwa-deletion
   a. Nouns: √sn- 'dream'
      /sən-∅/ → [ˈsən] (NOM.SG)
      /sən-a/ → [ˈsna] (GEN.SG)
   b. Participles: √xɾan- 'feed'
      CYCLE 1: /ˈxɾan-i/ → [ˈxɾan]
      CYCLE 2: /ˈxɾan-əl-i/ → [ˈxɾanəl] (M.PL)
   c. Participles: √powən- 'fill'
      CYCLE 1: /ˈpowən-i/ → [ˈpowən]
      CYCLE 2: /ˈpowən-əl-i/ → [ˈpowənli] (M.PL)

d. Participles: u-√mər- 'die'
   CYCLE 1: /u-ˈmər-∅/ → [uˈmər]
   CYCLE 2: /uˈmər-əl-i/ → [uˈmərəl] (M.PL)

Notice that schwa has to be posited within many roots, and to derive the presence of schwa between the root and the participial /-l/ we must say that the UR of the participial suffix is in fact /-əl/. This creates a problem with participial forms where the stress is realized on the theme vowel, as in [powˈnil] 'having filled (M.PL)', where we must assume that there are some higher-ranked constraints that prohibit the hiatus between [i] and [ə] (cf. *[powˈniəl]). The same has to be assumed with all participles that employ other theme vowels than /-i/: for instance, consider *[ˈjokaəl] 'having cried (M.PL)' vs. [ˈjokal]. However, NM Slovenian employs glide-insertion as the hiatus resolution strategy, where the relevant examples may be found in nouns, even in borrowings such as /niˈvo-a/ 'level (GEN.SG.M)' with the surface form [niˈvoja].[28] This would predict the surface form of /ˈjok-a-əl-i/ to be *[ˈjokajəl] and not the correct form [ˈjokal]. This presents a potential problem for the deletion account of schwa.

Another crucial aspect of this analysis that we must consider is the two cycles that we have posited in the computation of the verbal and participial forms. Are these cycles still necessary in the schwa-deletion analysis? Consider [uˈmərəl] 'having died (M.PL)': can the direct mapping from /u-ˈmər-əl-i/ to [uˈmərəl] be achieved? This does not seem possible as the candidate *[uˈmrəl] would win – it has a schwa in a closed syllable and violates none of the phonotactic constraints that are active in NM Slovenian, whereas [uˈmərəl] violates the ban on schwa in open syllables, and *[uˈmərl] violates sonority sequencing in the final coda cluster, while *[uˈmərl̩] creates an illicit consonantal nucleus. This is again impossible to derive without positing two phonological cycles: if /u-ˈmər-∅/ is processed in the first cycle, outputting [uˈmər], then MAX-BASE can protect the schwa processed in the first cycle from deletion in the second cycle, which is very similar to our analysis with epenthesis. It seems that the schwa-deletion analysis also requires two cycles to compute verbs and participles.

So far, the schwa-deletion account does not seem to be in any way simpler than the schwa-epenthesis account. It is even less plausible given the type of hiatus resolution it would employ. But let us also consider the list of 'residual' schwas that we could not explain through phonotactically motivated schwa-epenthesis:

[28] Thanks to Joseph Stemberger and Douglas Pulleyblank for reminding me of this.

(26) Residual schwas under deletion analysis
   a. Schwa in infinitives of ∅-CLASS verbs
   b. Schwa in 1ST.SG and 2ST.SG INDICATIVE of ∅-CLASS verbs
   c. e~ə-alternation in *e*-CLASS verbs

Recall from the previous section that the schwas found in the infinitival forms of ∅-CLASS verbs never occur in an open syllable, which means that the deletion account cannot explain the presence and absence of the schwas in these forms through purely phonotactic motivation either. The same can be said about the schwas in the first and second person singular forms of the indicative – they never occur in an open syllable. But what about the e~ə-alternation in *e*-CLASS verbs? Here we could posit a hiatus, such as [eə], which would be resolved by deleting the [e]. However, all other instances of hiatus are resolved by glide insertion, as noted above, implying that no purely phonological solution is apparent under a deletion account either.

Overall, it seems that the schwa-deletion account explains no more than the schwa-epenthesis account. To a large extent, these two approaches are *notational equivalents*, in the sense that they produce the same outputs for the data that we examined, with the exception of the hiatus resolution where the deletion account fares worse than the epenthesis one. But, in general, there is an an important exception between these accounts: schwa-epenthesis may be explained as a phonotactically motivated repair strategy, which makes it less stipulative than an analysis of lexically specified schwa in certain positions, as the latter is just the result of accidental lexical specification, whereas the former provides explanations about the phonological grammar of NM Slovenian. For this reason, we will maintain the analysis of (the relevant cases of) schwa as the result of epenthesis in this thesis, though nothing particularly crucial seems to hinge on this.[29]

[29]The ultimate analysis that would unify the distribution of all the schwas in NM Slovenian will probably require a combination of (a) phonotactically triggered epenthesis *and* (b) some other mechanism that will explain the schwa in the diminutives, and also in cases like [ˈbəzək-Ø] 'elderberry (NOM.SG.M)' ~ [ˈbəzg-a] (GEN.SG), as given in footnote 20, where the '[s]+[k]' coda cluster is perfectly licit phonotactically. That (a) is needed is argued for by the general absence of 'consonant+sononrant' codas, which seem to contain a schwa – these reflect the general phonotactic requirements of NM Slovenian. (b) cases, on the other hand, are purely lexical; they must be the result of historical *yer*-realization, which seem to play no role in the phonotactic make-up of NM Slovenian. Parallel observations are found in Czech, Slovak (Mellander 1999) and Polish (Chociej 2009), and specific mechanisms are employed in the literature to explain their patterning, consisting of a form of epenthesis for the phonotactically-driven alternations and other mechanisms for the lexical ones (Gussman 2007); see also Scheer (2012).

3.2 On the deletion of the high vowel [i]

In sections 2.2.6 and 3.1, which dealt with topics of stress variability and schwa epenthesis, respectively, we assumed that the phonological component in NM Slovenian contains a process that deletes the theme vowel /-i/ and the masculine plural inflection /-i/, in some but not all unstressed positions. In fact, in 2.2.6 we argued that positing a process of /i/-deletion should be preferred to a purely morphological/lexical analysis of the alternations between schwa, [i] and zero because a phonological analysis does not miss a phonological generalization, and it constitutes a more economical analysis. These arguments presuppose that the phonological grammar can derive the deletion in a plausible way. This section demonstrates that this is the case.

In section 2.2.6, we discussed two phonological generalizations with respect to the alternations of the theme vowel and the masculine plural exponent. First, in *i* ~ ∅-CLASS participles, the absence of any overt theme vowel or masculine plural exponent, and the occurrence of schwa, is crucially correlated with the type of stress-realization the paradigm undergoes: with root stress realization, the theme and the M.PL exponent surface as zero (schwa may occur where necessary), while with theme stress realization, the theme surfaces as [i], but M.PL surfaces as zero. The second phonological generalization pertains to the surfacing of the M.PL as [i] even though it is unstressed; this is crucially correlated with roots that have a 'CVCR' shape and semelfactives, which yield a comparable phonological string of segments.

3.2.1 First generalization: stress and *i* ~ ∅

Let us now discuss the first generalization in greater detail. Observe some examples of the alternation of [i] and [∅] under different realizations of stress:

UR of STEM	M.PL /-i/	N.PL /-a/	F.PL /-e/
/√xɾàn-i-l-/ 'feed'	ˈxɾànəl	ˈxɾànlá	ˈxɾànlé
/√kùɾ-i-l-/ 'burn'	ˈkùɾəl	ˈkùɾlá	ˈkùɾlé

Table 3.31: *i* ~ ∅-CLASS participles: Root stress

UR of STEM	M.PL /-i/	N.PL /-a/	F.PL /-e/
/√xɾàn-i-l-/ 'feed'	xɾaˈnìl	xɾaˈnìlá	xɾaˈnìlé
/√kùɾ-i-l-/ 'burn'	kuˈɾìl	kuˈɾìlá	kuˈɾìlé

Table 3.32: *i* ~ ∅-CLASS participles: Theme stress

With the roots specified here, the M.PL cannot surface as [i] at all. The theme, however, can only surface as [i] when stressed. This is reminiscent

of a process of 'high vowel deletion' where /i/ deletes if it is unstressed. In terms of phonetic plausibility, high vowel deletion can indeed be sufficiently grounded: high vowels ([i], [u]) require 'extreme' articulation involving a 'close jaw position', which 'corresponds to low inherent duration' (Crosswhite 1999: 66), and short duration decreases the perceptibility of vowels, according to Steriade (1994), thus inviting reduction or deletion. The high vowel /i/ deleting in unstressed positions is, therefore, a well grounded phonological process. The crucial question that arises now, is what the precise scope of such a process is. The theme vowel /-i/ as well as the M.PL /-i/ inflection delete; the former occurs word-medially and the latter word-finally. However, there are instances of unstressed [i] that do not undergo deletion in the participles of NM Slovenian: such examples include roots with an unstressed [i], as in [√piˈs-a-l-a] 'having written (F.SG.PTC) or [√iˈgr-a-l-a] 'having played (F.SG.PTC), and also prefixes in which an unstressed [i] never deletes – recall the prefixes [iz-] and [pri-], which were discussed in section 2.2.5. A process that targets any unstressed [i] segment would therefore make incorrect predictions, as it would also delete the [i]-segments in all roots and prefixes. The lack of deletion in roots could be accounted for by a high-ranked positional faithfulness constraint that protects roots (e.g. MAX-ROOT), following Beckman (1998), but no such constraint can account for the lack of deletion in the prefixes, as prefixes cannot be referred to in a way that would exclude suffixes, because only 'root' and 'affix' are normally treated as theoretical primitives. The scope of this process that targets unstressed [i] segments for deletion must thus be defined some other way.

Let us assume that unstressed [i] is only targeted for deletion in absolute word-final position. Can such a process be grounded appropriately? In other words, are there sufficent factors of markedness that would trigger the deletion of [i] in that specific prosodic position? While the high vowel [i] may be prone to deletion due to the phonetic factors discussed above (Crosswhite 1999; Steriade 1994), it is even more likely that it would delete in the word-final position. The absolute final position in the prosodic word is a very marked position: it constitutes an intrinsically 'weak prosodic position' (Coetzee 2004: 128), which is due to the more general 'prosodic weakness of final syllables, which are liable to de-stressing, de-voicing, shortening, truncation, and so on, under purely phonological conditions' (Prince & Smolensky 2004: 137). Coetzee (2004) proposes the following markedness constraint that prohibits vowels in word-final position:

(27) $*\breve{\text{V}}]_{\sigma}]_{Pwd}$ (Coetzee 2004: 128)

Do not allow a vowel in an unstressed prosodic word-final syllable.

This constraint is akin to FREE-V, a constraint prohibiting word-final unstressed vowels, which was proposed by Prince & Smolensky (2004), and it essentially achieves the same effect. For our purposes, we can define it a way that will only prohibit the vowel [i] in word-final position:[30]

(28) *ĭ]$_{\sigma}$]$_{Pwd}$
Do not allow [i] in an unstressed prosodic word-final syllable.

Deleting unstressed [i] only in absolute word-final position can, therefore, be appropriately grounded as a phonological process.

While using such a constraint explains why unstressed [i] vowels may occur in roots and prefixes, it does not independently explain the deletion of the theme vowel /-i/. The theme vowel is never in absolute word-final position in the participles of NM Slovenian. At this point, it becomes important to look back at the section on schwa (3.1), where the behaviour of schwa with certain roots required us to posit cyclic application of phonology; specifically, we spoke of a *verbal cycle* (through which the verb/verbal stem passes) and the *participial cycle* (through which the participle passes). This distinction must now be respected in all analyses of participles in NM Slovenian. As it happens, the distinction between a verbal and a participial cycle actually automatically does away with any problems that we had in connection with *ĭ]$_{\sigma}$]$_{Pwd}$ being able to delete the theme vowel /-i/: the theme vowel is always an inherent part of the verbal stem, which means that the theme /-i/ will always be in absolute word-final position when deriving participles, as /$\sqrt$ROOT-THM/, constituting the verbal stem, will have to pass through the verbal cycle of phonology before it can derive the participle. *ĭ]$_{\sigma}$]$_{Pwd}$ can, therefore, adequately account for the deletion of both the theme /-i/ and the M.PL inflection /-i/.

To reiterate, *ĭ]$_{\sigma}$]$_{Pwd}$ triggers the deletion of any unstressed [i] vowel in the verbal as well as the participial cycle: in the verbal cycle it deletes the theme /-i/, which occurs in word-final position there, and in the participial cycle it deletes the M.PL /-i/, which is also in word-final position. Let us illustrate this with the participle built on $\sqrt$xràn- 'feed', by giving both derivational cycles below:

[30] It might very well be that only *ŭ]$_{\sigma}$]$_{Pwd}$ is high-ranked in NM Slovenian, and that the faithfulness constraints which protect all the vowels from deletion, except [i], are ranked above it. However, in what follows, we will proceed to use *ĭ]$_{\sigma}$]$_{Pwd}$.

/ˈxɾan-i/	*NUC/C	MAX-BASE	*i̯]σ]Pwd	AL-RMwd,Pwd	MAX(i)	DEP	*ə
a. ˈxɾani			*!				
b. ☞ ˈxɾan					*		

Table 3.33: Deriving /ˈxɾàn-i-l-i/ → [ˈxɾànə́l] (M.PL.PTC): verbal stem

/ˈxɾan-l-i/	*NUC/C	MAX-BASE	*i̯]σ]Pwd	AL-RMwd,Pwd	MAX(i)	DEP	*ə
a. ˈxɾanli			*!				
b. ˈxɾanl̩	*!				*		
c. ☞ ˈxɾanəl					*	*	*
d. ˈxɾanlə				*!	*	*	*
e. ˈxɾanələ				*!	*	**	**

Table 3.34: Deriving /ˈxɾàn-i-l-i/ → [ˈxɾànə́l] (M.PL.PTC): participle

The two tableaux above represent the verbal and the participial cycles. In the first cycle, the verbal theme vowel /-i/ occurs in the absolute word-final position and, because of this, must be deleted. In the participial cycle, the M.PL is also in word-final position and must delete for the same reason.

It should be noted that the tableaux presented above should also contain a high-ranked IDENT-constraint (McCarthy & Prince 1995) on the features that make up [i], so that no reduction of [i] is possible and that deletion is promoted instead. Since nothing relevant interacts with this assumption, IDENT-constraints will not be included in any of the tableaux below.

3.2.2 Second generalization: CVCR sequences

Let us now turn to the second generalization, which concerns '√CVCR' and '√CVC-R' sequences of segments (recall that 'R' stands for any sonorant). As discussed in the previous sections, the M.PL inflection does not always

delete, but must surface on some occasions. It surfaces in the semelfactive participles:

UR of STEM	M.PL /-i/	N.PL /-a/	F.PL /-e/
/u-√gàs-n-i-l-/ 'feed'	uˈgàsənlí	uˈgàsənlá	uˈgàsənlé
/√màx-n-i-l-/ 'slap'	ˈmàxənlí	ˈmàxənlá	ˈmàxənlé

Table 3.35: M.PL in semelfactive participles: Root stress

UR of STEM	M.PL /-i/	N.PL /-a/	F.PL /-e/
/u-√gàs-n-i-l-/ 'feed'	ugasˈnìl	ugasˈnìlá	ugasˈnìlé
/√màx-n-i-l-/ 'slap'	maxˈnìl	maxˈnìlé	maxˈnìlé

Table 3.36: M.PL in semelfactive participles: Theme stress

The semelfactive participles respect the generalization of $i \sim \varnothing$-alternation as far as theme vowels are concerned: when the theme vowel cannot be stressed (i.e. with root stress) it deletes. But for the M.PL /-i/, this generalization, which also holds with the $i \sim \varnothing$-CLASS of participles, is not quite surface true for semelfactive participles. When stress occurs on the theme vowel, as in Table (3.36), the M.PL /-i/ does actually delete, but it surfaces with root stress in Table (3.35). This is clearly not predicted by the constraints that we set up in the previous section: the final unstressed /-i/ should delete.

The M.PL /-i/ also surfaces in participles whose root has a '√CVCR' phonotactic shape, as demonstrated below:

UR of STEM	M.PL /-i/	N.PL /-a/	F.PL /-e/
/√pòwn-i-l-/ 'feed'	ˈpòwənlí	ˈpòwənlá	ˈpòwənlé
/√pɾàzn-i-l-/ 'slap'	ˈpɾàzənlí	ˈpɾàzənlá	ˈpɾàzənlé
/√mìsl-i-l-/ 'think'	ˈmìsəllí	ˈmìsəllá	ˈmìsəllé

Table 3.37: M.PL in √CVCR-CLASS participles: Root stress

UR of STEM	M.PL /-i/	N.PL /-a/	F.PL /-e/
/√pòwn-i-l-/ 'feed'	ˈpowˈnìl	powˈnìlá	powˈnìlé
/√pɾàzn-i-l-/ 'slap'	ˈpɾazˈnìl	pɾazˈnìlá	pɾazˈnìlé

Table 3.38: M.PL in √CVCR-CLASS participles: Theme stress

The behaviour of these participles is identical to that of the semelfactves: the theme vowel respects the generalization about deletion, but the M.PL surfaces with root stress. The roots shown above for this class are √pown-, √pɾazn-, and also √misl- (the latter only has a root stress realization).

These participles have a different morphological and semantic structure than the semelfactives, but crucially, the phonotactic structures of their roots seem to form a uniform *phonological* class with the 'root+/-n/' semelfactive structure. The surfacing of the M.PL is crucially correlated with roots that have a '√CVC' structure and are followed by a sonorant ([n] or [l] in the data presented here).[31] While the participles in which the M.PL /-i/ surfaces belong to different morphological classes, they are identical in terms of their phonological structure.

Finally, the M.PL /-i/ also surfaces with participles that are built on single-consonant roots. Below is an example, viz. √ʃ- 'to go':

	SG	DU	PL
MASC	ˈʃ-Ø-ù-Ø	ˈʃ-Ø-l-à	ˈʃ-Ø-l-ì
FEM	ˈʃ-Ø-l-à	ˈʃ-Ø-l-ɛ̀	ˈʃ-Ø-l-ɛ̀
NEUT	ˈʃ-Ø-l-ù	ˈʃ-Ø-l-à	ˈʃ-Ø-l-è

Table 3.39: M.PL in single-consonant roots: √ʃ- 'to go'

With roots that consist of only a single consonant underlyingly, the M.PL /-i/ surfaces, but here it is stressed and not unstressed, which makes its presence on the surface expected. The fact that no other vowel except the inflectional suffixes is present in such participles offers an explanation for why the /-i/ surfaces: it is the only vowel available in the masculine plural and it is therefore stressed. The only other root that consists of a single consonant is √b- 'to be'. We will set √ʃ- and √b- aside for now (they receive further discussion at the end of this subsection); what is crucial for now is that the M.PL surfaces with these two roots because it can be stressed.

The data in which the M.PL surfaces are of utmost importance for the underlying status of /-i/ in the entire participial system of NM Slovenian. Recall that this M.PL /-i/ does not surface at all in the *a*-CLASS, *i*-CLASS, and *i* ~ Ø-CLASS participles. This is why it might be tempting to analyze this /-i/ as a special exponent of M.PL that is specific to some morphological class – and, indeed, the semelfactive participles, which are morphologically and semantically different, seem a likely candidate for this. However, as soon as we acknowledge that this /-i/ also surfaces with completely regular roots that happen to have the same phonological structure as semelfactives, but are not semelfactives at all (viz. √CVCR-CLASS), such an analysis becomes less plausible. The √CVCR-CLASS of participles is identical to the

[31] Not many other roots that would be followed by a sonorant other than [n] or [l] and would take the theme /-i/ exist in NM Slovenian, but see section 2.2.3 for an overview.

i ~ ∅-CLASS morphologically and semantically, the only difference being the phonological shape of their root ('CVCR'): this means that these two seeming morphological classes need to be collapsed into one, as already proposed in section 2.2.6 in Table (2.59); '*i* ~ ∅-CLASS' and '√CVCR-CLASS' are nothing more than descriptive labels, as both types of participles must have the underlying structure /√ROOT-i-l-/, and, when forming masculine plurals, /√ROOT-i-l-i/. This observation is very important because it means that the claim made above, viz. that the M.PL systematically fails to surface in *i* ~ ∅-CLASS participles, is not true: the M.PL actually has a very systematic occurrence on the surface, as it only correlates with '√CVCR' root shapes.

This systematic correlation of the phonotactic shape of the root and the occurrence of M.PL /-i/ is, therefore, phonological in nature, and it crucially cuts across different morphological classes: the /-i/ surfaces with regular *i* ~ ∅-CLASS (√CVCR) participles and semelfactives, and also with single-consonant roots, in which it receives stress. Such a distribution that reveals a clear correlation of purely phonological factors speaks in favour of a universal /-i/ exponent of the M.PL in the participial system, deleting with '√CVC' root shapes, and surfacing with '√CVCR' root shapes (and '√CVC-R' semelfactives, of course). This reaffirms the hypothesis that /-i/ is the universal exponent for M.PL in all participles, which was first advanced in section 2.2.6. This is particularly plausible given the fact that the M.PL exponent in nouns an adjectives is also typically /-i/ (see 3.4 on this).

However, before we can finally confirm the hypothesis of the universal /-i/ for participles in NM Slovenian, we must check if the surfacing of this /-i/ with the phonological structure specified above can be grounded in the phonology. Let us first observe what the current set of constraints that we have been assuming predicts for these forms. Recall that when deriving participles, the verbal stem first passes through one cycle of phonology and the participle passes through another. Let us construct a participle on the root √pown- 'to fill':

/ˈpown-i/		*NUC/C	MAX-BASE	AL-RMwd,Pwd	*i̯]σ]Pwd	MAX(i)	DEP	*ə
a.	ˈpowni				*!			
b.	ˈpown̩	*!				*		
c.	ˈpownə			*!		*	*	*
d. ☞	ˈpowən					*	*	*

Table 3.40: Verbal cycle: /ˈpòwn-i/ → [ˈpòwə́n]

In the verbal cycle, the theme vowel /-i/ deletes because it is unstressed and occurs in the very final position of the prosodic word, as expected. However, we run into problems when attempting to derive the correct surface form of the participle:

/ˈpowən-l-i/		*NUC/C	MAX-BASE	AL-RMwd,Pwd	*i̯]σ]Pwd	MAX(i)	DEP	*ə
a. ☹	ˈpowənli				*!			
b.	ˈpowənl̩	*!				*		
c. ☞	ˈpowənəl					*	**	**
d.	ˈpownəl		*!			*	*	*
e.	ˈpowənlə			*!		*	**	**

Table 3.41: Participial cycle: /ˈpòwə́n-l-i/ → [ˈpòwənlí]

Our current set of constraints predicts that the final /-i/ must delete in any circumstances. This is why the tableau above cannot give adequate predictions: the surface form must be candidate a., viz. [ˈpowənli], and not candidate c., *[ˈpowənəl]. It is therefore a fact that we must change the constraints in some way. The current ranking, as it stands, cannot predict the ungrammaticality of *[ˈpowənəl]. What is curious about this candidate is that it contains two adjacent unstressed syllables in which schwa is in the nucleus. We have not encountered any such forms before; we have encountered sequences of a stressed schwa, followed by an unstressed schwa (recall

/u-√ˈmɾ-∅-l-i/ → [uˈmərəl] ‘having died (M.PL.PTC)’), but no sequence of two unstressed schwa vowels. This could very well be the factor that prohibits the surfacing of candidate c.

Avoidance of sequences of two unstressed syllables that contain schwa can be explained as a plausible phonological process. In Dutch, a similar restriction obtains: under some additional morphological restrictions, a sequence of two syllables whose nuclei are realized by schwas is prohibited (Booij 1995; van Oostendorp 2000, 2010). Van Oostendorp uses a constraint such as *əə, which simply prohibits any adjacent schwa-containing syllables, to derive this effect. There is also considerable evidence from the historical development of Germanic languages for the dispreference of two adjacent unstressed schwa-hosting syllables (Shannon 1986, 1991): Shannon derives this from the more common tendency of avoiding the repetition of adjacent unstressed syllables, which he terms the ‘Syllable Sequence Law’. However, it is also possible such an effect actually stems from a more basic principle of metrical organization of phonology in NM Slovenian. Coetzee (2002: 50) explains the avoidance of two unstressed schwa-bearing syllables in Hebrew through the constraint *Lapse (Elenbaas & Kager 1999), which prohibits any two adjacent unstressed syllables and prefers a steady sequence of ‘stressed+unstressed’ syllables. It is possible that the avoidance of two adjacent unstressed schwas in NM Slovenian stems from such a constraint: if the faithfulness constraints for most vowels are high-ranked (above *Lapse), there should be no concern for *Lapse affecting such vowels, but in principle only epenthetic vowels (schwa) and vowels whose faithfulness constraints are ranked below *Lapse. This means that the avoidance of sequences of unstressed schwas can be grounded phonologically. For the purposes of this analysis, we may use the following constraint:

(29) *ŏŏ (*Lapse-based)
Assign a violation for any sequence of adjacent unstressed syllables that contain schwa in the nucleus.

However, the constraint *ŏŏ is does not seem to be generally surface-true in NM Slovenian. Counter-examples may be found in diminutive constructions in the noun system. Recall the (noun) diminutives [-k]/[-ək] and [-tʃk]/[-tʃək], which were discussed in the section on schwa epenthesis (3.1). With roots that end in a consonantal cluster, where the second consonant is a sonorant, such as √tsukɾ- ‘sugar’, it is possible to attach the diminutive [-tʃk]/[-tʃək] to the noun built on this root, and this creates a sequence of two unstressed schwas: consider the noun [ˈtsùkə́ɾ-∅] (NOM.SG.M) ~ [ˈtsùkɾ-á] (GEN.SG.M) with expected schwa epenthesis, and then the diminutive

[ˈtsùkər-tʃók-∅] (NOM.SG.M). The nominative singular form with the diminutive yields the otherwise prohibited sequence of two unstressed schwas, as stated by *ŏŏ (*LAPSE-based). However, recall that the schwa that occurs in the diminutive forms in the nominative singular of masculines is not phonotactically conditioned in any way. As discussed towards the end of section 3.1, in such diminutive forms, the schwa seems to be specified as part of the suffix in the input. But regardless of that, the fact that the schwa may occur in the nominative forms such as [ˈtsùkər-tʃók-∅] is problematic, and it is not clear if there could be a higher ranked constraint that would protect it. Everything indicates that *ŏŏ is not a *LAPSE constraint after all.

A different constraint is needed. In the following few paragraphs we will explain that the ungrammaticality of sequences of two unstressed schwas actually stems from a more rudimentary restriction on the metrical organization of phonological segments. To do so, we must first introduce some assumptions which are necessary to arrive at that conclusion. A crucial question about metrical constituency in NM Slovenian is whether the language parses segments into trochaic or iambic feet. Based on the data that we have observed so far, stress is not predictable from any phonological factors, and it may only be manipulated by specific morphological constructions (especially in derived environments). This means that stress must be the property of lexical and morphological specification in NM Slovenian. The most typical and, therefore, default type of stress in non-derived environments would be word-initial stress, when the word begins with the exponent of the root, of course (prefixes are generally unstressable). This is also very typically reflected in the system of nouns and adjectives (for some typical paradigms see section 3.4). This points to the conclusion that NM Slovenian parses feet into *trochees*, precisely like Standard Ljubljana Slovenian (Jurgec 2007a). This seems to be a particularly well founded assumption for verbal stems, as cases of [σˈσ]-type stress are only induced by specific morphological constructions there, as already mentioned, or when the word has a prefix.[32] Generally speaking, what is claimed for Standard Ljubljana Slovenian in Jurgec (2007a) in terms of stress patterning, holds true for NM Slovenian. It, therefore, seems appropriate to interpret NM Slovenian as a language that parses metric structure into trochaic feet.

We will also assume that foot construction can be maximally binary, along the lines of Prince (1985), Hyde (2001) and Hyde (2002). In particular, Hyde claims that the grammar can only generate maximally binary feet, by

[32] Note that some bisyllabic roots do show [σˈσ]-stress in non-derived environments, but this again correlates with no phonological factors.

specifying this as a condition on the component $\mathcal{GEN}$, and this is often a tacit assumption of much work on foot structure, as in Elenbaas & Kager (1999); see Rice (2007) for discussion. This implies that our grammar will only produce feet built on up to two constituents; for cases such as [ˈσσσ], we will assume that the final syllable is left unfooted, as in [(ˈσσ)σ]. This seems appropriate given the fact that such syllables seem to receive no secondary stress in NM Slovenian, at least not in verbs and participles, but our analysis below is still compatible with other approaches to such 'redundant' syllables.

In terms of what constituents actually build feet in NM Slovenian, there seems to be no independent evidence to say whether NM Slovenian builds feet on moras or just simply syllables: since NM Slovenian seems to show no contrastive length, such evidence is not all that easy to come by. Other varieties of Slovenian are construed to only *count syllables*, and not moras, when constructing feet (Jurgec 2007a), and we may adopt this same assumption for NM Slovenian as well for the time being.

Above, we only considered the example [ˈpowənli], along with the problematic ungrammatical candidate *[ˈpowənəl]. However, an explanatorily adequate analysis must explain several pieces of data at the same time, which is why we will consider a broader range of examples:

INPUT to 2ND CYCLE		M.SG.PTC	M.PL.PTC
/uˈmər-l-{∅, -i}/	'die'	uˈmɤru	uˈmərəl
/ˈpowən-l-{∅, -i}/	'fill'	ˈpownu	ˈpowənli
/ˈxɤan-l-{∅, -i}/	'feed'	ˈxɤanu	ˈxɤanəl

Table 3.42: Range of data to consider

These data show two forms from the participial paradigms for the three given roots, viz. the masculine singular form, where the participial suffix /-l/ is realized as [u], and the masculine plural form, where the /-i/ undergoes deletion (or fails to do so). Why the /-l/ is realized as [u] is a tangential issue (see the end of this section, and also section 3.3 on this), but the way schwa behaves in these forms is curious: we learned in the previous section on schwa that schwa specified in the first cycle of phonology cannot be deleted in the second since it is protected by MAX-BASE – however, the schwa specified in the previous cycle does delete in the masculine singular forms, but just *not* with roots like √mɤ-. These data offer three points that need to be explained: (i) why the M.PL /-i/ surfaces with /√pown-/, and /CVCR/ forms in general, but not the other forms, (ii) why the schwa may delete in the M.SG, even though it cannot delete in any of the other forms, and (iii) why schwa does *not* delete in the M.SG forms with roots like √mɤ-.

Observe the masculine plural forms first. The three forms given in Table (3.42) could be explained by a constraint that does not allow the final consonant of the 'base' (i.e. the output of the previous cycle) to be re-syllabified outside the foot: with [(ˈpo.wən)li] the base is [(ˈpo.wən)], and in the problematic candidates such as *[(ˈpo.wə).nəl], the final segment of the base is re-syllabified outside the foot. This could be captured by an Alignment constraint (McCarthy & Prince 1993) of the following type:

(30) ALIGN(Base, R; Ft, R)
$\forall x \exists y$ such that x is a Base and y is a Foot, where the rightmost edge of x coincides with y.

This constraint needs to be ranked immediately above MAX-BASE to achieve the desired effect. Consider the second cycle of [(ˈpo.wən)li]:

/(ˈ**po.wən**)-l-i/	*NUC/C	AL-R$_{Mwd,Pwd}$	AL-R$_{Base,Ft}$	MAX-BASE	*i̯]$_{\sigma}$]$_{Pwd}$	MAX(i)	DEP	*ə
a. ☞ (ˈpo.wən).li					*			*
b. (ˈpo.wə).nl̩	*!		*			*		*
c. (ˈpo.wə).nəl			*!			*	*	**
d. (ˈpow.nəl)			*!	*		*	*	*
e. (ˈpo.wən).lə		*!				*	*	**

Table 3.43: Participial cycle: /ˈpòwə́n-l-i/ → [ˈpòwənlí]

The new Alignment constraint successfully rules out the problematic candidate (i.e. candidate d.).[33] Let us check whether this constraint predicts the rest of the data in Table (3.42). Consider the second cycle of [u.(ˈmə.rəl)]:

[33]Notice that candidates such as *[(ˈpo.wən).əl] are not included in the tableau above. Such a candidate would win under just the constraints given above. However, we need to assume that NM Slovenian always syllabifies coda consonants as onsets if a vowel follows. The standard treatment for this is to assume that ONSET is high-ranked. However, since NM Slovenian does contain onsetless syllables in the *initial position* of the PWD, we need to assume that something along the lines of an ANCHOR-LEFT constraint (McCarthy & Prince 1995, 1999), or EDGE-INTEGRITY (Kang 2004), dominates ONSET. This would demand correspondence between the segments of the left edge in the PWD and rule out any unwanted vowel deletion, protecting just the initial onsetless syllables.

/u.(ˈmər)-l-i/		*Nuc/C	Al-R$_{Mwd,Pwd}$	Al-R$_{Base,Ft}$	Max-Base	*i̯]$_{\sigma}$]$_{Pwd}$	Max(i)	Dep	*ə
a.	u.(ˈmər.li)			*		*!			*
b. ☞	u.(ˈmə.ɾəl)			*			*	*	**
c.	u.(ˈmɾəl)			*	*!		*	*	*
d.	u.(ˈmər.lə)		*!	*			*	*	**

Table 3.44: Participial cycle: /u.(ˈmərˠ)-l-i/ → [u.(ˈmə.ɾəl)]

The new Alignment constraint is always violated because the system has no choice but to parse two syllables into a foot where the input only contains a monosyllabic foot (which must be driven by higher-ranked constraint which we do not discuss here). Within this subset of candidates, candidate b. is correctly predicted to emerge as the winner. Let us now move on to discussing the second cycle of [(ˈxɾa.nəl)]:

/(ˈxɾan)-l-i/		*Nuc/C	Al-R$_{Mwd,Pwd}$	Al-R$_{Base,Ft}$	Max-Base	*i̯]$_{\sigma}$]$_{Pwd}$	Max(i)	Dep	*ə
a.	(ˈxɾan.li)			*		*!			
b. ☞	(ˈxɾa.nəl)			*			*	*	*
c.	(ˈxɾan.lə)		*!	*			*	*	*

Table 3.45: Participial cycle: /(ˈxɾan)-l-i/ → [(ˈxɾa.nəl)]

For the same reasons as with [u.(ˈmə.ɾəl)], [(ˈxɾa.nəl)] must surface as the winning candidate. It seems that the new Alignment constraint (Al-R$_{Base,Ft}$) that we have added to our constraint hierarchy might be the appropriate way to proceed. However, recall that we should attempt to construct an analysis where we also explain the curious distribution of schwa in the masculine singular forms in Table (3.42). With these forms, a critical complication arises. Consider the second cycle of [(ˈpow.nu)]:

/(ˈpo.wən)-l-∅/	*Nuc/C	Al-R$_{Mwd,Pwd}$	Al-R$_{Base,Ft}$	Max-Base	*i̯]$_{\sigma}$]$_{Pwd}$	Max(i)	Dep	*ə
a. ☞ (ˈpo.wə).nu			*					*
b. ☹ (ˈpow.nu)			*	*!				

Table 3.46: Participial cycle: /(ˈpo.wən)-l-∅/ → [(ˈpow.nu)]

With the masculine singular forms, the schwa must delete, but the Alignment constraint that we have proposed gives wrong predictions here: since the alignment constraint is violated in the masculine singular form anyway, because of the inclusion of the suffixal [u] in the foot, the candidate that does *not* violate Max-Base is selected, which in this case is candidate a. – an ungrammatical candidate. We could, in principle, attempt to argue that the schwa deletes because this is demanded by an even higher-ranked constraint, but it is not certain what that constraint could be. The schwas that are remnants from the previous cycle must always be preserved in the forms with *overt vowel inflections*, and this seems to be interacting with the constraint that blocks the deletion of the m.pl /-i/. Because the same schwa deletes with *zero inflections* (m.sg forms), this looks very suspiciously like the same interaction effect. One could, in principle, argue that the schwa deletes because the m.sg forms trigger a separate 'cophonology' which licenses schwa deletion of this kind, but no independent evidence that would support this can be mustered.

In light of this, I would like to propose that the pattern witnessed in Table (3.42) is not due to an Alignment constraint, but is in fact due to a more fundamental faithfulness effect on the metrical level of representation; it will be shown that we seem to be dealing with a type of *mora preservation* from the previous cycle. To pursue this analysis, let us assume that NM Slovenian contains moraic constituents within syllables and also that it assigns moras to coda consonants – i.e. that it is a 'Weight-by-Position' language (Hayes 1989, 1995).[34] These assumptions will allow us to tease apart the range of data presented in Table (3.42), and pinpoint the generalization that connects

[34]Note that no aspect of Moraic Theory (Hayes 1995) precludes the possibility of syllable-counting languages also specifying moras as part of their metrical organization, even if foot-construction never 'looks below' the syllable level; in fact Kager (1995) explicitly states that moras are still present in syllable-counting languages.

them. The basic metrical representations are laid out below.

These assumptions on foot structure in NM Slovenian predict that the participial form [ˈxɾàn-l-á] 'having fed (F.SG)' has the following structure:

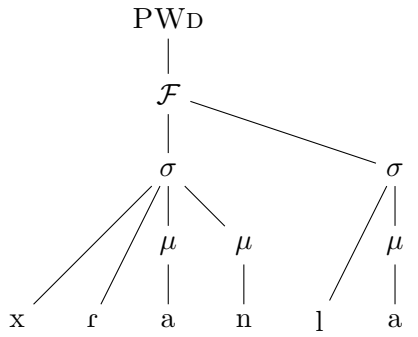

Figure 3.1: Structure of [ˈxɾànlá]

The two syllables form a trochaic foot, which means that they are both dominated by the foot node $\mathcal{F}$. The first syllable contains two moras, and the second one. With the masculine plural form of this participle we predict much the same. Consider [ˈxɾanəl] (M.PL):

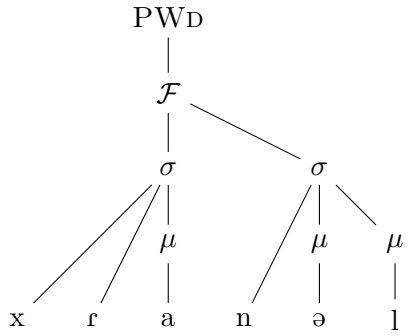

Figure 3.2: Structure of [ˈxɾànə́l]

The first syllable dominates one mora and the second dominates two. We also predict the following structure for M.PL participial forms such as [ˈpòwənlí] 'having filled (M.PL)':

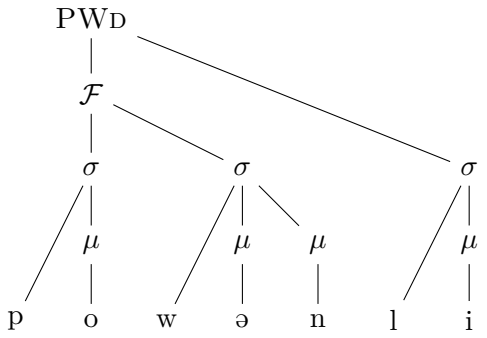

Figure 3.3: Structure of [ˈpòwənlí]

As before, the foot encompasses two syllables, where the first syllable is monomoraic and the second syllable bimoraic. Now recall that participles are constructed in two cycles of phonological application. In the first cycle, the output is the verbal stem [ˈpòwán] and the output of the second (participial) cycle is [ˈpòwənlí]. This is shown below.

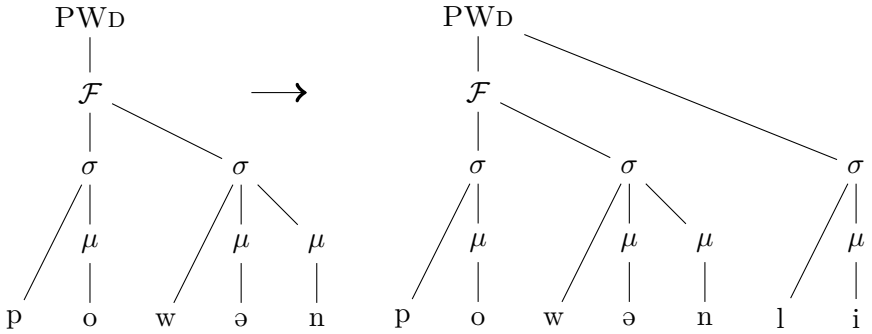

Figure 3.4: Cyclic derivation of [ˈpòwənlí]

The crucial question of this section of course is, why candidates such as *[ˈpòwənól] must be rendered ungrammatical. The foot structure of such a failed derivational outcome is given below.

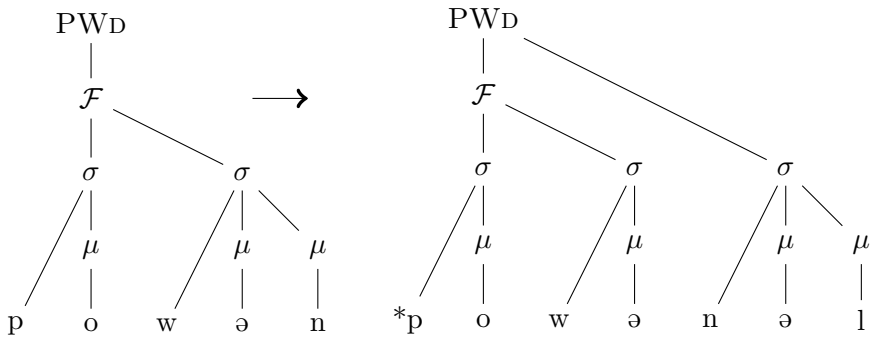

Figure 3.5: Cyclic derivation of *[ˈpòwənə́l]

Notice the apparent difference between [(ˈpò.wən).lí] and *[(ˈpò.wə).nə́l]: while the former completely preserves the foot-internal mora count from the verbal cycle, the latter must inevitably lose a mora by re-syllabifying the coda consonant [n]. It therefore seems that the constraint that we require is actually a faithfulness constraint, crucially one that requires the number of moras specified in the foot in the input to be maintained on the surface. Such a constraint could, of course, be satisfied by producing a candidate such as *[(ˈpòw.nə́l)], which would have four moras in the foot, but *[(ˈpòw.nə́l)] is impossible for independent reasons (viz. because it incurs a violation of MAX-BASE by deleting the schwa in the base).

Such a constraint would make no unexpected predictions for the rest of the cyclic /i/-deletion and schwa epenthesis analysis that we have developed so far. Consider the derivation of [uˈmə́ɾə̀l] 'having died (M.PL)':

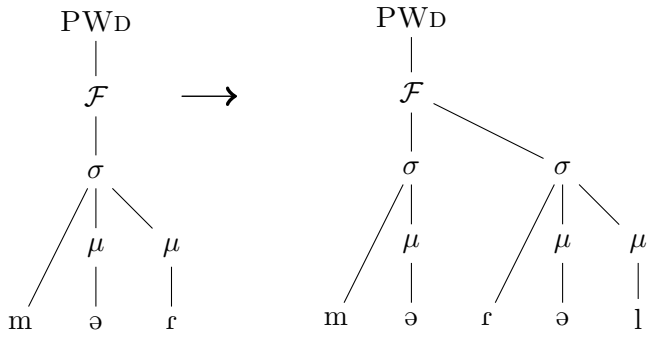

Figure 3.6: Cyclic derivation of [u-ˈmə́ɾə̀l]

Note that the prefix [u-] is excluded from the representation above. The output of the verbal cycle is [u.(ˈmə́ɾ)], which yields exactly two moras in

the foot. The output of the participial cycle, on the other hand, contains three moras in the foot because the participial /-l/ is parsed within the foot as the final coda consonant. It seems that the constraint that we require is satisfied by there being the same (or greater) amount of moras in the input and output foot, which means that the mora that supports the foot can come from different segments – in this case, these are the second schwa and participial [-l] suffix. Notice that *[(ˈpò.wə).nə́l] in Table (3.5) cannot escape the violation of such a metrical constraint, as the final coda [l] occurs outside the foot.

The generalization that we are dealing with is thus quite fundamental: the phonology of NM Slovenian requires the preservation of the amount of moras specified in the input foot. More specifically, it requires that there be a mora specified in the output foot for every mora that occurs in the foot in the input. But crucially, it seems to demand no input-output correspondence between the moras themselves. The task of 'maintaining' mora count can be performed by other moras. Constraints that achieve faithfulness effects within feet have been proposed in the literature: based on the work by Beckman (1998), a Positional Faithfulness constraint that refers to feet, such as MAX-FT, is often used (Itô et al. 1996; Hall 2000; van Oostendorp 2004). However, Positional Faithfulness only refers to positions in the output, but we require a constraint that refers to the foot in the input *and* output. We can capture the generalization discussed above in a MAX-type constraint, but with the following definition:

(31) MAX-$\mathcal{F}(\mu)$
For every input mora μ_I that is associated with a foot $\mathcal{F}_I$, there has to exist an output mora μ_O which is associated with $\mathcal{F}_O$, where $\mathcal{F}_I$ $\mathfrak{R}$ $\mathcal{F}_O$.

As indicated above, this constraint is not a fully typical MAX-constraint: it needs to refer to the *foot-internal* position of a mora in the input and output, which means that it is not a typical Positional Faithfulness constraint (Beckman 1998), as Positional Faithfulness only refers to output positions. Also, MAX-type constraints usually force an input-output correspondence relation between the input and output units that they are evaluating. This does apply to the foot here (hence, the dictum $\mathcal{F}_I$ $\mathfrak{R}$ $\mathcal{F}_O$), but not to the moras. In other words, this constraint does not require that the *same* input mora match the output mora in the foot, but merely that *some* mora corresponds to it in the output foot; in that sense, this constraint is more general than a typical MAX-constraint. The side effect of the constraint MAX-$\mathcal{F}(\mu)$ will therefore be the preservation of 'mora count' within the foot (where the mora count may be increased), which is not necessarily achieved by preserving specific input moras. What the best way of formalizing the required correspondence relation here is I leave for a future study, and for now, resort to using MAX-$\mathcal{F}(\mu)$, as it will be sufficient for the purposes of this analysis.

At this point, we may finally return to the computation of the second (participial) cycle in (3.41), where the constraints that we used produced the ungrammatical output *[ˈpowənəl]. We can now use the constraint MAX-$\mathcal{F}(\mu)$ to derive the correct surface form:

/(ˈ**po**$^{\mu}$**.wə**$^{\mu}$**n**$^{\mu}$**)-l-i/**	*NUC/C	AL-R$_{Mwd,Pwd}$	MAX-$\mathcal{F}(\mu)$	MAX-BASE	*i̯]$_{\sigma}$]$_{Pwd}$	MAX(i)	DEP
a. ☞ (ˈpo$^{\mu}$.wə$^{\mu}$n$^{\mu}$).li					*		
b. (ˈpo$^{\mu}$.wə$^{\mu}$).nl̩	*!		*			*	
c. (ˈpo$^{\mu}$.wə$^{\mu}$).nəl			*!			*	**
d. (ˈpo$^{\mu}$w$^{\mu}$.nə$^{\mu}$l$^{\mu}$)				*!		*	*
e. (ˈpo$^{\mu}$.wə$^{\mu}$n$^{\mu}$).lə		*!				*	**

Table 3.47: Participial cycle: /ˈpòwə́n-l-i/ → [ˈpòwənlí]

The tableau above illustrates that the phonological grammar is forced to prefer the surface realization of the M.PL /-i/, even if this violates *i̯]$_\sigma$]$_{Pwd}$, because deleting a foot-internal mora that corresponds to some mora the input is even less preferred. The /-i/ could still undergo deletion, but then the schwa from the previous cycle would have to be deleted to keep at least three moras in the foot (cf. candidate d.), which is, however, not an option, for which we have independent evidence from the distribution of schwa: schwa specified in the previous cycle must be preserved on the surface. We have only discussed the example with √pown-, but the phonological computation in the two cycles should be precisely the same for the semelfactives, as well.

The example that we discussed above was a case of root stress. Let us also briefly present the computation of the two cycles with stress occurring on the theme vowel. In such cases, the computation is much more straightfoward. Recall that stress is a matter of lexical specification, which is why it is reflected in the UR in the tableaux below (we will discuss stress assignment in greater detail in section 4).

/pown-ˈi/	*NUC/C	AL-R$_{Mwd,Pwd}$	MAX-$\mathcal{F}(\mu)$	MAX-BASE	*i̯]$_\sigma$]$_{Pwd}$	MAX(i)	DEP
a. ☞ pow(ˈni$^\mu$)							
b. po(ˈwə$^\mu$n$^\mu$)						*!	*

Table 3.48: 1ST CYCLE: /pown-ˈi/ → [powˈni]

The stress is realized on the theme vowel and the structure that emerges violates none of the constraints that we have specified in the tableau. More concretely, though the theme [-i] is word-final, it is stressed and therefore cannot undergo the deletion otherwise demanded by *i̯]$_\sigma$]$_{Pwd}$.

/pow(ˈni$^{\mu}$)-l-i/		*Nuc/C	Al-R$_{Mwd,Pwd}$	Max-$\mathcal{F}(\mu)$	Max-Base	*i̯]$_{\sigma}$]$_{Pwd}$	Max(i)	Dep
a.	pow(ˈni$^{\mu}$.li$^{\mu}$)				*!			
b. ☞	pow(ˈni$^{\mu}$l$^{\mu}$)						*	

Table 3.49: 2nd cycle: /pow(ˈni$^{\mu}$)-l-i/ → [pow(ˈni$^{\mu}$l$^{\mu}$)]

In the participial cycle, the m.pl occurs in the word-final position and it is unstressed, which is why it must undergo deletion. This shows that the constraint ranking we have provided is able to generate the forms with both stress patterns in the two cycles of phonology.

Let us now discuss the rest of the data presented in Table (3.42) to demonstrate the predictions of Max-$\mathcal{F}(\mu)$. We start by giving the tableaux for the second cycles of [(ˈxɾa.nəl)] 'having fed (m.pl)' and [u.(ˈmə.ɾəl)] 'having died (m.pl).

/(ˈxɾa$^{\mu}$n$^{\mu}$)-l-i/		*Nuc/C	Al-R$_{Mwd,Pwd}$	Max-$\mathcal{F}(\mu)$	Max-Base	*i̯]$_{\sigma}$]$_{Pwd}$	Max(i)	Dep
a.	(ˈxɾa$^{\mu}$n$^{\mu}$.li$^{\mu}$)					*!		
b. ☞	(ˈxɾa$^{\mu}$.nə$^{\mu}$l$^{\mu}$)						*	*
c.	(ˈxɾa$^{\mu}$n$^{\mu}$.lə$^{\mu}$)		*!				*	*

Table 3.50: 2nd cycle: /(ˈxɾan)-l-i/ → [(ˈxɾa.nəl)]

In the case with [(ˈxɾa.nəl)], the final /-i/ may delete and schwa may epenthesize, as is reflected in candidate b. This is possible because these modifications do not cause the foot in candidate b. to contain fewer moras than the input foot. A similar situation can be observed with [u.(ˈmə.ɾəl)]:

/u.(ˈməᵘɾᵘ)-l-i/		*Nuc/C	Al-R$_{Mwd,Pwd}$	Max-$\mathcal{F}(\mu)$	Max-Base	*i̯]$_{Pwd}$	Max(i)	Dep
a.	u.(ˈməᵘɾᵘ.liᵘ)					*!		
b. ☞	u.(ˈməᵘ.ɾəᵘlᵘ)						*	*
c.	u.(ˈmɾəᵘlᵘ)				*!		*	*
d.	u.(ˈməᵘɾᵘ.ləᵘ)		*!				*	*

Table 3.51: 2nd cycle: /u.(ˈməɾ)-l-i/ → [u.(ˈmə.ɾəl)]

With [u.(ˈmə.ɾəl)], preserving two moras in the output foot is enough because the input foot only contains two moras, as well. This allows the lower-ranked constraints to decide the winner of the derivation: the winner is candidate b., which does not violate *i̯]$_{\sigma}$]$_{Pwd}$, Max-Base, nor Al-R$_{Mwd,Pwd}$.

All the cases that we have presented up to now can also be analyzed by assuming a high-ranked Alignment constraint that requires the right edge of the base and the right edge of the foot to coincide. The crucial piece of data comes from the masculine singular participle form, viz. [(ˈpow.nu)] 'having filled', which could not be successfully analyzed with the previously-mentioned Alignment constraint:

/(ˈpoᵘ.wəᵘnᵘ)-l-∅/		*Nuc/C	Al-R$_{Mwd,Pwd}$	Max-$\mathcal{F}(\mu)$	Max-Base	*i̯]$_{Pwd}$	Max(i)	Dep
a.	(ˈpoᵘ.wəᵘ).nu			*!				
b. ☞	(ˈpoᵘwᵘ.nuᵘ)				*			

Table 3.52: 2nd cycle: /(ˈpo.wən)-l-∅/ → [(ˈpow.nu)]

The constraint Max-$\mathcal{F}(\mu)$ is successful in predicting candidate b. as the most harmonic option, which is precisely where the Alignment constraint (discussed above) failed. Max-$\mathcal{F}(\mu)$ unifies the entire range of data specified in Table (3.42). In particular, it predicts the following: when the system encounters a zero exponent of inflection in the participial paradigm, the

schwa will be forced to delete to preserve at least three moras specified in the foot because the input foot also contains three moras. To repeat what was already stated before in this section, the alternation that forces the participial /-l/ to be realized as [-u] in the M.SG is a completely tangential issue. If the system did not contain this alternation, our analysis would still predict that the schwa from the previous cycle would undergo deletion:

/(ˈ**po**$^{\mu}$**.w**ə$^{\mu}$**n**$^{\mu}$**)-l-**∅/	*NUC/C	AL-R$_{Mwd,Pwd}$	MAX-$\mathcal{F}(\mu)$	MAX-BASE	*i͡]$_{\sigma}$]$_{Pwd}$	MAX(i)	DEP
a. (ˈpo$^{\mu}$.wə$^{\mu}$).nl̩	*!		*				
b. (ˈpo$^{\mu}$.wə$^{\mu}$).nəl			*!				*
c. (ˈpo$^{\mu}$.wə$^{\mu}$n$^{\mu}$).lə		*!					*
d. ☞ (ˈpo$^{\mu}$w$^{\mu}$.nə$^{\mu}$l$^{\mu}$)				*			*

Table 3.53: 2ND CYCLE: /(ˈpo.wən)-l-∅/ → [(ˈpow.nəl)] (no $l \sim u$)

This tableau illustrates that whether the schwa specified in the first cycle deletes or not is crucially tied to whether the infection has an overt or a zero exponent: with zero exponents, as in the masculine singular forms, the schwa deletes so that a sufficient amount of moras remain specified in the output foot. A word-final epenthetic schwa, as in candidate c., does retain the same amount of moras in the foot, but it incurs a crucial violation of AL-R$_{Mwd,Pwd}$, because this epenthesis causes a misalignment between the Prosodic Word and the Morphological Word. The system has no choice but to select candidate d. as the winner. This piece of evidence may be unified with the rest of the data under an analysis that evokes a form of moraic faithfulness, but it cannot under any of the other approaches that were discussed in this section. For this reason, we shall accept this latest analysis, which claims that for any input foot-internal mora, there must be an output foot-internal mora.

With the analysis in this section, we have now explained why the M.PL surfaces with '$\sqrt{}$CVCR' and '$\sqrt{}$CVC-R' structures: it surfaces to avoid creating feet that have fewer moras than the foot produced by the previous cycle of phonology, and also to avoid deleting the schwa which was also epenthesized in that previous cycle. With simple '$\sqrt{}$CVC' roots, on the other hand, there is no danger of failing to maintain the needed mora count: consider

[(ˈxɾàᵘnᵘ)] the output of the verbal cycle of /ˈxɾàn-i/ 'feed', which for the participial input /(ˈxɾàᵘnᵘ)-l-i/ 'having fed (M.PL)' outputs [(ˈxɾàᵘ.nə́ᵘlᵘ)], maintaining minimally the amount of moras specified in the input foot. In such contexts, the M.PL /-i/ may delete. This is a plausible account of the deletion and surface retention of the M.PL /-i/. This confirms that the phonological component can indeed easily predict the distribution of the M.PL /-i/ if it is universally specified as the underlying exponent of masculine plural in the participles of NM Slovenian.

3.2.3 Single consonant roots

Finally, let us turn out attention to the single-consonant roots that are used to form participles. In NM Slovenian, only two such roots exist, viz. √ʃ- 'to go' and √b- 'to be', whose paradigms are given below:

	SG	DU	PL
MASC	ˈʃ-Ø-ù-Ø	ˈʃ-Ø-l-à	ˈʃ-Ø-l-ì
FEM	ˈʃ-Ø-l-à	ˈʃ-Ø-l-ɛ̀	ˈʃ-Ø-l-ɛ̀
NEUT	ˈʃ-Ø-l-ù	ˈʃ-Ø-l-à	ˈʃ-Ø-l-è

Table 3.54: Single-consonant roots: √ʃ- 'to go'

	SG	DU	PL
MASC	ˈb-ì-w-Ø	ˈb-Ø-l-à	ˈb-Ø-l-ì
FEM	ˈb-Ø-l-à	ˈb-Ø-l-ɛ̀	ˈb-Ø-l-ɛ̀
NEUT	ˈb-Ø-l-ù	ˈb-Ø-l-à	ˈb-Ø-l-è

Table 3.55: Single-consonant roots: √b- 'to be'

As was already noted before, these two participles are important because the M.PL /-i/ is allowed to surface, but crucially for different reasons than the '√CVCR/√CVC-R' cases, which we discussed above. The /-i/ seems to be able to surface simply because it bears stress in these two participles: because it is stressed, it is not subject to deletion even though it occurs in the word-final position of the prosodic word.

However, in every other respect, these two participial formations seem to be very unusual when compared to all other participles in NM Slovenian. Firstly, it is curious that stress lands on the inflections in all (but the M.SG) forms. Stress is never allowed to move to the inflection in any of the other participial classes; however, this could probably be connected to the fact that these two participles contain roots which consist of a single consonant.

Secondly, the √b- 'to be' formation seems to show an [i] vowel following the root in the masculine singular form. This is notated as a theme vowel in the table above, viz. [ˈb-ì-w-∅]. Since this root is not used in the corresponding verbal paradigm of 'to be' (√b- is a suppletive root), it is difficult to assess if the [i] vowel in the masculine singular is truly a theme vowel or perhaps just a part of the suppletive root. Thirdly, the occurrence of the [i] in the masculine singular could be taken as evidence that this [i] is also present underlyingly in the remaining forms of the paradigm. However, this would imply a deletion process which could only be motivated by assuming that stress first occurs on the [i], but then shifts away to the inflections, rendering the [i] unstressed and subject to deletion. But recall that no such process of deletion is to be recovered in any other data in NM Slovenian; in fact, unstressed [i] vowels (in pre-stress position) contained in roots and prefixes can never undergo deletion, as shown in section 2.2.5. Positing /i/ uniformly in the paradigm is, therefore, a very stipulative solution.

Fourthly, since positing /i/ in this participial class and assuming its deletion is not a good solution, we would expect schwa epenthesis to occur in the first (verbal) cycle of phonology to render the root phonotactically licit, but no schwa occurs anywhere on the surface. In other words, if the suppletive root here is really √b-, then we expect the following cyclic analysis: /b-∅/ is the verbal stem, constructed with a zero theme suffix, and the first cycle is run on this stem. The output of such a cycle would have to be *[ˈbə], or perhaps *[ˈəb], to render it phonotactically licit. The input to the second cycle would then be /(ˈbə)-l-i/, and our current system of constraints predicts the output for such an input to be *[(ˈbəl)], or *[bə.(ˈli)] if we assume that the stress shifts somehow. The schwa has to remain in the output, unless there is some higher-ranked constraint that demands its deletion, but no such constraint seems to offer itself. This problem could be solved if we could assume that these two roots are not computed in two cycles for some reason.

The two roots discussed here seem very different with respect to all other participial formations in NM Slovenian. However, this is perhaps not too odd given the cross-linguistic exceptionality of verbs/participles such as 'to go' and 'to be'. In section 4.3, where we discuss the morphology-phonology interface, we will illustrate how these two verbs can avoid phonological processing in two cycles.

This section concludes the discussion of the purely phonological aspects of /i/-deletion. We have demonstrated that unstressed /i/ must delete in absolute word-final position, unless this would yield a sequence of two unstressed syllables that both contain schwa, in which case /i/ must surface

unstressed. The surface distribution of the theme vowel /-i/ and the M.PL inflection /-i/ is thus fully predictable by the phonology, on the assumption that verbs and participles are processed in two phonological cycles, for which we saw independent motivation in the previous section on schwa. This confirms the initial hypothesis, which stated that any alternations between [i], zero and schwa are due to the process of /i/-deletion and its interaction with the general phonotactic requirements of NM Slovenian.

3.3 Masculine singular

Throughout the description of the participial system which we gave in section 2.2.3, we constantly had to omit any discussion of the masculine singular form. This section is dedicated to this form of the participial paradigm in NM Slovenian, most notably to the following alternation it exhibits: the participial suffix /-l/ needs to be realized as either [w] or [u] in the M.SG. But this form of the participial paradigm offers another observation: often, stress does not appear on the theme in the M.SG, while it does in the rest of the paradigm. In short, the M.SG form realizes the participial /-l/ in a specific way, and it often disallows theme stress. We start by discussing the latter, which is followed by a discussion of the former. The goal of this section is to determine whether the curious behaviour of the M.SG form has any implications for the analysis of /i/-deletion that we have proposed.

3.3.1 Special stress pattern

The masculine singular form of the participial paradigm may often only display root stress: while stress will occur on the theme vowel in the remaining forms of the paradigm, this will not happen in the M.SG form. Consider the participles formed with the theme /-a/ (only masculine forms are given):

	SG	DU	PL
MASC	ˈ**dìx-ó-w-∅**	ˈdìx-a-l-á	ˈdìx-á-l-∅

	SG	DU	PL
MASC	ˈ**pɛ̀l-ó-w-∅**	peˈl-à-l-á	peˈl-à-l-∅

Table 3.56: *a*-CLASS root and theme stress: $\sqrt{}$dìx- ‘breathe’ and $\sqrt{}$pèl- ‘drive’

	SG	DU	PL
MASC	ˈ**jòk-ó-w-∅**	ˈjòk-a-l-á	ˈjòk-á-l-∅

MASC	ˈ**jòk-ó-w-∅**	joˈk-à-l-á	joˈk-à-l-∅

Table 3.57: *a*-CLASS variable stress: √jòk- 'cry'

The *a*-CLASS participles have a three-way split with regard to stress: with roots, such as √dìx-, stress must occurs on the root, while with others, such as √pèl-, the stress must occur on the theme vowel. With yet others, such as √jòk-, the stress realization is variable, as discussed in 2.2.6. However, notice that in none of these paradigms is the M.SG form affected by this. Even with √pèl-, where the stress must obligatorily occur on the theme vowel in the paradigm, the M.SG has stress on the root. These stress 'shifts' seem to be controlled by morphology, as there is no phonological factor that they could be attributed to; it, therefore, seems that root stress is simply an inherent property of the M.SG category of participles in NM Slovenian.

All the participles that have the theme vowel /-i/ specified underlyingly and undergo /i/-deletion with root stress, but not with theme stress, share this property with the *a*-CLASS: the M.SG can never show theme stress (these are *i* ~ ∅-CLASS and √CVCR-CLASS participles; see section 2.2.3 for a layout of all the paradigms). However, some roots that also form participles with the theme vowel /-i/ and have the theme vowel stressed obligatorily do in fact allow the theme to be stressed in the M.SG form. But this only applies to some roots:

	SG	DU	PL
MASC	kaˈd-ì-w-∅	kaˈd-ì-l-á	kaˈd-ì-l-∅

	SG	DU	PL
MASC	ˈdùb-∅-ú-∅	duˈb-ì-l-á	duˈb-ì-l-∅

Table 3.58: *i*-CLASS participles: √kàd- 'smoke' and √dùb- 'get'

Both the roots above form *i*-CLASS participles and realizing the stress on the theme is obligatory. However, while √kàd- permits the stress to be realized on the theme vowel in the M.SG as well, √dùb- does not permit this as the stress must occur on the root in the M.SG form. In our description of NM Slovenian participles in section 2.2.3, we called participles, like those formed with √kàd-, *i*-CLASSI participles, and those that are built on roots like √dùb- we called *i*-CLASSII participles. These examples show that whether

the M.SG form of the participle will allow the stress to occur on the theme simply depends on what root the participle is built on. This then implies that NM Slovenian must possess a special rule of morphology that controls such stress assignments, one specific to the M.SG form with some roots. Roots that do allow stress modification to the M.SG form can be construed as the result of the 'elsewhere' effect, i.e. they are subject to the stress rules like any other form in the paradigm. While this morphological rule needs to be assumed to derive the paradigms correctly, it has no negative impact on our analysis of /i/-deletion. In fact, some notion of /i/-deletion in the verbal stem cycle is necessary to be able to derive the paradigms above. For instance, take the M.SG [ˈdùbú] in Table (3.58) above: the input for its verbal cycle will be /ˈdùb-i/ with an unstressed [i] in final position, and our account of /i/-deletion precisely predicts that it will output [ˈdùb], as is necessary to construct the participial form [ˈdùbú]. This provides additional evidence for our analysis of /i/-deletion and so further strengthens our claim.

The [l] ~ [w] ~ [u] alternation

As was pointed out previously, the M.SG forms of participles reveal a curious alternation: the participial /-l/ is realized as either [w] or [u]. Looking back at the *a*-CLASS participles, last given in Tables (3.56) and (3.57), we can quickly notice this alternation at work: cf. [ˈjòk-ó-w] (M.SG) ~ [ˈjòk-a-l-á] (M.DU) ~ [ˈjòk-á-l] (M.PL). However, [l] does not alternate with [w] only in the system of participles, but also in the system of nouns and adjectives:

	√stòl- 'chair'	√vòl- 'ox'
NOM.SG.M	ˈstòw-∅	ˈvòw-∅
GEN.SG.M	ˈstòl-á	ˈvòl-á
DAT.SG.M	ˈstòl-ú	ˈvòl-ú

Table 3.59: $l \sim w$ in nouns: presence of alternation

	√preˈdàl 'drawer'	√ʃàl- 'scarf'
NOM.SG.M	preˈdàl-∅	ˈʃàl-∅
GEN.SG.M	preˈdàl-á	ˈʃàl-á
DAT.SG.M	preˈdàl-ú	ˈʃàl-ú

Table 3.60: $l \sim w$ in nouns: absence of alternation

The alternation can be found only in the nominative singular in masculine nouns. Furthermore, only some roots undergo this alternation, while some do not, as illustrated by the distinction between √stòl- and √ʃàl-.

	√bèl- 'white'	√tsèl- 'whole'
NOM.SG.M	ˈbèw-∅	ˈtsèw-∅
GEN.SG.M	ˈbèw-gá	ˈtsèw-gá
DAT.SG.M	ˈbèw-mú	ˈtsèw-mú
INST.SG.M	ˈbèl-ím	ˈtsèl-ím

Table 3.61: $l \sim w$ in adjectives

In the system of adjectives, on the other hand, this alternation is much more general; there do not seem to be any systematic exceptions to it. Notice that the alternation in the adjectives is not limited to any particular grammatical category, but crucially has a phonological correlate: /l/ seems to be realized as [w] if it occurs in coda position, and this is generally how this rule is construed for Slovenian (p.c. Peter Jurgec). We could test the generality of this rule in the system of nouns above if any of the cases (other than the nominative) have a zero exponent, or an exponent that contains no vowel, and so renders /l/ in coda position. But this is unfortunately not the case – all the non-nominative cases of masculine nouns have overt exponents, beginning in vowels. However, feminine and neuter nouns do realize the genitive plural with a zero exponent, which means we could use feminine and neuter roots ending in /l/ to test the phonological status of the $l \sim w$ alternation. Consider √oˈbàl- 'beach' and √vɛ̀sl- 'oar':

	√oˈbàl- 'beach'	√vɛ̀sl- 'oar'
NOM.SG.F	oˈbàl-á	ˈvɛ̀sl-ú
GEN.SG.F	oˈbàl-é	ˈvɛ̀sl-á
DAT.SG.F	oˈbàl-í	ˈvɛ̀sl-ú
GEN.PL.F	oˈbàl-∅	ˈvɛ̀sə́l-∅

Table 3.62: $l \sim w$ alternation in feminine and neuter nouns

Notice that the final /l/ is not realized as [w] in the genitive plural of feminine and neuter nouns, which means that the $l \sim w$ alternations is correlated with more than just phonological factors. It would seem that it is necessarily correlated with morphological factors, as well. This could be dealt with in a number of ways: perhaps, in the noun system, the masculine singular exponent is not zero after all, but is *prespecified* in some way that triggers the $l \sim w$ alternation, for instance through a system of floating features (Wolf 2005, 2007). And perhaps this is true of the adjectival system as well, in that the adjectivizing (derivational) morpheme[35] is not zero, but is

[35]The derivational morphemes are not indicated in the tables above, but nouns and adjectives are assumed to contain a zero derivational morpheme between the root and the

prespecified in this way, which would explain why the $l \sim w$ alternation can be manifested throughout the entire adjectival paradigm. Another way to deal with this would be to assume a system of *cophonologies* (Inkelas & Zoll 2007; Inkelas 2008, 2011), where only the M.SG in the nouns would trigger a special cophonology that endorses the $l \sim w$ alternation, and the entire adjectival paradigm would do the same. How precisely this is dealt with is not too relevant for the present thesis; we leave the exact details of such an account to future studies.

How this could connect to the participial system is quite obvious. In the participial paradigm, we have a problem similar to that found in nouns: while the M.SG form does realize the /-l/ as [w] in coda position, the M.PL also often realizes the participial /-l/ in coda position, but there it must always surface as [l] and never as [w], which is much like comparing the NOM.SG.M with GEN.PL.F/N above. If it were possible to analyze this alternation in the participial M.SG form as the consequence of the same M.SG inflection as that found in nouns, this would be a very welcome result (in fact, in section 3.4 we will show that the participial exponents of inflection are shared by noun forms in the nominative case). In that way, the mapping of /-l/ to [w] in the M.SG form of participles could also be either due to some sort of prespecification of the M.SG inflection, or due to a pass through the cophonology that would trigger the alternation in question.

The segment /l/, however, does not only alternate with [w], but also with [u]. It seems that a coda /l/ (in the right morphological contexts) is realized as [w] if it is immediately preceded by a vowel on the surface, but as [u] if it is immediately preceded by a consonant on the surface. For instance, compare the M.SG [ˈjòko**w**] 'having cried' from (3.57) with M.SG [ˈdùb**ú**] 'having got' from Table (3.58). Independent evidence is also available from nouns, which shows that this observation holds true. Consider the nominal paradigms of constructed on the roots √kɔ̀tl- 'vat' and √ɔ̀sl- 'donkey':

	√kɔ̀tl- 'vat'	√ɔ̀sl- 'donkey'
NOM.SG.M	ˈkɔ̀tú-∅	ˈɔ̀sú-∅
GEN.SG.M	ˈkɔ̀tl-á	ˈɔ̀sl-á
DAT.SG.M	ˈkɔ̀tl-ú	ˈɔ̀sl-ú

Table 3.63: $l \sim u$ alternation in nouns

inflection. Most versions of Distributed Morphology (Halle & Marantz 1993) would make this assumption, since roots are treated as 'acategorial' morphemes that always need to be categorized by a categorizing morpheme – see section 1.1.

These data from the system of nouns confirm that /l/ which would occur in a coda position after a consonant is realized as [u]. If we incorporate this observation into our analysis of cyclic /i/-deletion, the state of affairs is directly predicted. As mentioned before, the realization of the participial /-l/ as [u] in cases like M.SG [ˈdùb**ú**] 'having got' follows naturally from our previous analysis because the verbal stem /dùb-i/ must first pass through the verbal cycle of phonology, where the theme vowel /-i/ is deleted, which implies that the input to the participial cycle for the M.SG form will be /ˈdùb-l-∅/; this way, the participial /-l/ will occur directly after a consonant. This unifies the distribution of [w] and [u], which are derived from /l/, in the system of nouns and participles.

What remains to be discussed is the compatibility of the alternation in question with the cyclic analysis of schwa-epenthesis and /i/-deletion that we advanced in the previous section. In connection with that analysis, we will indicate a possible way of treating the alternation in question, but no detailed analysis will be given, as that would take us too far outside the scope of the present thesis. Recall examples such as M.PL [ˈpòwən-l-í] 'having filled' with its corresponding UR /ˈpòwn-i-l-i/, which is computed in two cycles: the verbal cycle inputs /ˈpòwn-i/ and outputs [(ˈpò.wə́n)], while the input to the participial cycle is /(ˈpò.wə́n)-l-i/, with the output [(ˈpò.wən).lí] (see sections 3.1 and 3.2 for details). The M.SG form of this paradigm is [(ˈpòw.nu)] with the UR /ˈpòwn-i-l-∅/. According to our analysis of cyclic /i/-deletion and epenthesis, this form should be computed in two steps, as well: the verbal cycle would receive /ˈpòwn-i/ as input and would output [(ˈpò.wə́n)]. The input for the participial cycle then has to be /(ˈpò.wə́n)-l-∅/. Since the final surface form is [(ˈpòw.nú)], the schwa inserted in the first cycle needs to delete. We explained the deletion of this schwa as the expected consequence of our analysis of *mora preservation* within the foot. We also indicate that the reason why this schwa needs to delete is completely divorced from the $l-w-u$-alternation. The two tableaux that illustrate this are repeated here:

/(ˈ**po**$^{\mu}$**.w**ə$^{\mu}$**n**$^{\mu}$**)-l-**∅/	*Nuc/C	Al-R$_{Mwd,Pwd}$	Max-$\mathcal{F}(\mu)$	Max-Base	*i̯]$_{\sigma}$]$_{Pwd}$	Max(i)	Dep
a. (ˈpo$^{\mu}$.wə$^{\mu}$).nu			*!				
b. ☞ (ˈpo$^{\mu}$w$^{\mu}$.nu$^{\mu}$)				*			

Table 3.64: 2nd cycle: /(ˈpo.wən)-l-∅/ → [(ˈpow.nu)]

/(ˈ**po**$^{\mu}$**.w**ə$^{\mu}$**n**$^{\mu}$**)-l-**∅/	*Nuc/C	Al-R$_{Mwd,Pwd}$	Max-$\mathcal{F}(\mu)$	Max-Base	*i̯]$_{\sigma}$]$_{Pwd}$	Max(i)	Dep
a. (ˈpo$^{\mu}$.wə$^{\mu}$).nl̩	*!		*				
b. (ˈpo$^{\mu}$.wə$^{\mu}$).nəl			*!				*
c. (ˈpo$^{\mu}$.wə$^{\mu}$n$^{\mu}$).lə		*!					*
d. ☞ (ˈpo$^{\mu}$w$^{\mu}$.nə$^{\mu}$l$^{\mu}$)				*			*

Table 3.65: 2nd cycle: /(ˈpo.wən)-l-∅/ → [(ˈpow.nəl)] (no $l \sim u$)

The deletion of the schwa is crucially correlated with the presence of the zero inflection: if the exponent of the inflection is not overt, which is the case with the m.sg, then the grammar has no choice but to select a candidate with a deleted schwa to satisfy Max-$\mathcal{F}(\mu)$, so that the output foot contains enough moras to match those in the input foot.

Now recall that there are, in principle, two possible ways of dealing with the $l \sim w \sim u$-alternation, as discussed a few paragraphs up: we could resort to presepecification of the m.sg exponent to induce the alternation (e.g. a floating feature that docks onto [-l]), or we could claim that the m.sg subscribes to a cophonology that triggers the alternation. Under such a *cophonology* analysis, we could claim that the m.sg demands a pass through the cophonology that enforces the $l \sim w \sim u$-alternation, but crucially after the participial cycle of phonology has applied. The output of the participial cycle would be [ˈpòwnə́l] as shown in Table (3.65) and the cophonology triggered by the m.sg category would require the coda /l/ to turn to [w], which would yield *[ˈpòwnə́w]. The question that would then become important is why this candidate is not the grammatical outcome. The answer very likely

lies in the fact that a '[əw]' sequence, as it occurs in *[ˈpòwnə́w], is not a licit configuration in NM Slovenian; this is not an unreasonable assumption because no such sequences seem to exist in any surface form in NM Slovenian. If this led to the deletion of the schwa, in order to satisfy the constraint that prohibits [əw], then [l] would directly follow a consonant in the coda and would be replaced by [u], as expected.

A very similar scenario can be envisioned under a *prespecification* analysis: the prespecified material (e.g. a floating feature) would need to dock on the participial /-l/. Again, it is conceivable that a candidate such as *[ˈpòwnə́w] would be produced, which means that a '[əw]' sequence would again be created. If '[əw]' sequences are illicit, as suggested above, then the schwa would delete and /-l/ would again occur in a position directly following a consonant. This would mean that it would have to surface as [u], yielding [(ˈpò$^{\mu}$w$^{\mu}$.nú$^{\mu}$)]. The details of any of the two analysis sketched out here will need to be investigated in a future study, but we can at least demonstrate that they are unrelated to the crucial aspects of our analysis of ə-epenthesis and /i/-deletion.

Whatever the most appropriate analysis is, we have demonstrated that our analysis of cyclic /i/-deletion and schwa-epenthesis is compatible with several different approaches to realizing /l/ as [w] or [u] under specific morphological conditions. Choosing the most appropriate approach is a relatively independent topic that should be taken up in future work.

3.4 Nouns and adjectives

In sections 2.2.2, 2.2.3 and 3.2, we established that the phonological grammar of NM Slovenian promotes a process of vowel deletion. Specifically, any unstressed high vowel /i/ that occurs in the word-final position of the prosodic word undergoes deletion. There are several alternations that attest to this process, all discussed in the sections specified above. However, those sections only examine the status of the high vowel /i/ in the verbal and participial paradigms of NM Slovenian. Because of this, the goal of the present section is to outline the most prominent paradigms of nouns and adjectives in NM Slovenian, to determine whether /i/ has the same distribution as in the paradigms of verbs and participles. A crucial discovery of this section will be that the high vowel /i/ is not restricted in the same way in nouns or adjectives: in other words, we will show that /i/ may always surface unstressed in the word-final position of the prosodic word.

Let us begin with nouns. The nominal system of NM Slovenian is very similar to that of Standard Slovenian (Toporišič 2000; Herrity 2000): nouns code gender, number and case. The following masculine, feminine and neuter paradigms represent the biggest and most productive nominal paradigms for their gender in NM Slovenian:

	SG	DU	PL
NOM	ˈvlàk-∅	ˈvlàk-á	ˈvlàk-í
GEN	ˈvlàk-á	ˈvlàk-ów	ˈvlàk-ów
DAT	ˈvlàk-ú	ˈvlàk-omá	ˈvlàk-óm
ACC	ˈvlàk-∅	ˈvlàk-á	ˈvlàk-é
LOC	ˈvlàk-ú	ˈvlàk-íx	ˈvlàk-íx
INST	ˈvlàk-óm	ˈvlàk-omá	ˈvlàk-í

Roots: √stòl- 'chair', √kòl- 'pole', √kɾùx- 'bread', etc.

Table 3.66: Noun system: masculine nouns

	SG	DU	PL
NOM	ˈmèst-ú	ˈmèst-á	ˈmèst-á
GEN	ˈmèst-á	ˈmèst-∅	ˈmèst-∅
DAT	ˈmèst-ú	ˈmèst-omá	ˈmèst-óm
ACC	ˈmèst-ú	ˈmèst-á	ˈmèst-á
LOC	ˈmèst-ú	ˈmèst-íx	ˈmèst-íx
INST	ˈmèst-óm	ˈmèst-omá	ˈmèst-í

Roots: √màsl- 'butter', √vɛ̀sl- 'oar', √ɔ̀kn- 'window', etc.

Table 3.67: Noun system: neuter nouns

	SG	DU	PL
NOM	ˈxìʃ-á	ˈxìʃ-é	ˈxìʃ-é
GEN	ˈxìʃ-é	ˈxìʃ-∅	ˈxìʃ-∅
DAT	ˈxìʃ-í	ˈxìʃ-amá	ˈxìʃ-amá
ACC	ˈxìʃ-ó	ˈxìʃ-é	ˈxìʃ-é
LOC	ˈxìʃ-í	ˈxìʃ-áx	ˈxìʃ-áx
INST	ˈxìʃ-ó	ˈxìʃ-amá	ˈxìʃ-amí

Roots: √ʒènsk- 'woman', √tsɛ̀st- 'road', √mòk- 'flour', etc.

Table 3.68: Noun system: feminine nouns

Let us first determine the distribution of /i/ in these paradigms.[36] In the masculine paradigm, /i/ may surface as a stressed vowel, but it may also

[36] Some cases in the paradigms might require a different tonal pattern than others, but I

surface as unstressed, and this may occur in the word-final position of the prosodic word. Consider the masculine plural and the instrumental plural exponents, both of which are realized as unstressed [i] in such a position. The same distributional properties of /i/ also carry over to the neuter and feminine paradigms: in the neuter paradigm the instrumental plural is also realized as unstressed [i], while in the feminine paradigm this is the realization of the dative singular suffix. What is curious is that these are positions (unstressed word-final positions) in which any /i/ would delete in verbs and participles. The only time the M.PL /-i/ fails to delete in word-final unstressed position in the participles is when this would create phonotactically illicit configurations that could not be repaired by schwa-epenthesis. But we have no such cases here: the /-i/ in the M.PL [ˈvlàk-í] could delete without fear of violating any phonotactic constraints.

These observations suggest that the distribution of /i/ is very different in the system of nouns when compared to the system of verbs and participles.[37] What is even more striking is that the suffixal exponents of the number, gender and case in the nominative forms (written in bold font) are exactly the same as in the system of participles. Consider the participial paradigm again, and below it the nominal paradigm in the nominative case:

	SG	DU	PL
MASC	ˈpòwn-Ø-ú-Ø	ˈpòwən-Ø-l-**á**	ˈpòwən-Ø-l-**í**
FEM	ˈpòwən-Ø-l-**á**	ˈpòwən-Ø-l-**é**	ˈpòwən-Ø-l-**é**
NEUT	ˈpòwən-Ø-l-**ú**	ˈpòwən-Ø-l-**á**	ˈpòwən-Ø-l-**á**

Table 3.69: Participle √pòwn-í-l- ‘to fill’: gender-number exponents

uniformly give paradigms with a single tonal pattern here, which are also possible. Either way, tonal specification plays no role in our analysis, so it need not be a matter of concern.

[37] It should be noted that with more complex suffixal morphology in nouns, some suffixes display a possible alternation between zero and [i], however, this is highly variable. Consider the diminutive [-(i)ts]: [ˈslik-a] ‘picture (.F.SG) → [ˈslik-ts-a] ‘small picture (F.SG)’ vs. [ˈgred-a] ‘garden patch (F.SG)’ → [greˈd-its-a] ‘small garden patch (F.SG)’, though clear cases with a stressed [-ˈits] as this one are quite rare. There are also productive exceptions which are very numerous and common: [ˈrok-a] ‘hand (F.SG)’ → [ˈrok-its-a] ‘small hand (F.SG)’, [ˈtorb-a] ‘bag (F.SG)’ → [ˈtorb-its-a] ‘small bag (F.SG)’, etc. Furthermore, no surrounding [i] vowel participates in this seeming alternation: [ˈslik-ts-i] (DAT.F.SG), [greˈd-its-i] (DAT.F.SG), [ˈtorb-its-i] (F.SG), etc. It is not so convincing that this is a phonological process ‘proper’ – it is likely a case of morphologically fixed allomorphy, which is expected as these cases were historically derived by a process of high vowel deletion.

	SG	DU	PL
MASC	ˈvlàk-∅	ˈvlàk-**á**	ˈvlàk-**í**
FEM	ˈxìʃ-**á**	ˈxìʃ-**é**	ˈxìʃ-**é**
NEUT	ˈmèst-**ú**	ˈmèst-**á**	ˈmèst-**á**

Table 3.70: Nouns in nominative case: gender-number exponents

Notice that exactly the same exponents are used so that even the syncretisms between the different forms in the paradigm are the same. Recall that participles do not code case, but only gender and number, while nouns in addition also code case. It would seem that the exponents presented in bold above are the default exponents for gender and number and are used in the nominative case forms of nouns as such, viz. as default exponents.[38] On the other hand, one could claim that the exponents of gender and number in the participial paradigm are just 'accidentally' homophonous exponents, but this would be a grave stipulation, one that is avoided by assuming that they constitute the default set of exponents.

The assumption that we are dealing with a set of default number and gender exponents is further confirmed by the paradigms of adjectives. Adjectives in NM Slovenian, much like nouns, code gender, number and case. They follow the following paradigm, for which only the nominative case forms are given:

	SG	DU	PL
M	ˈlèp-∅	ˈlèp-**á**	ˈlèp-**í**
F	ˈlèp-**á**	ˈlèp-**é**	ˈlèp-**é**
N	ˈlèp-**ú**	ˈlèp-**á**	ˈlèp-**á**

Table 3.71: Adjectives in NM Slovenian (nominative case)

Notice that what was said about nouns above can also be applied to adjectives: they seem to use the same exponents as participles and nouns, which confirms that these exponents must be the defaults used for expressing gender and number in NM Slovenian. Now that we have also introduced the adjectival paradigms, observe that /i/ in the masculine plural form may surface unstressed without any consequence.

[38] This idea follows naturally from frameworks of morphology that permit exponent underspecification for morphosyntactic features. In short, the framework Distributed Morphology, which is taken up in this thesis (see sections 1.1 and chapter 4), would analyze such 'default' exponents by positing a rule that inserts them for any specific combination of gender and number features, without making reference to case features.

Since it seems that we are dealing with a constant set of 'default' exponents expressing gender and number, we face quite a curious situation: the M.PL exponent /-i/ undergoes deletion in the participles of NM Slovenian, but this same exponent fails to delete in nouns and adjectives, in phonological positions where it is predicted to delete in the participles, viz. in the word-final position of the prosodic word.

Chapter 4

At the PF-Interface

This chapter discusses the data from NM Slovenian from the standpoint of the PF-interface. Section 4.1 is concerned with the morphosyntactic aspects of NM Slovenian. In particular, it examines the morphosyntactic structure of verbs and participles; special emphasis is paid to the spell-outs of the aspectual head Asp^0. Section 4.2 offers a discussion on the spell-out of phonological domains at PF. Several approaches to the spell-out of phonology are discussed with emphasis on how phonological cyclicity is formally implemented. In section 4.3, we discuss how the phonological cycle that encompasses the verbal stem (the root and theme vowel, or aspectual suffix) can be derived in NM Slovenian. Section 4.4 discusses the process of /i/-deletion that occurs in NM Slovenian verbs and participles but not nouns or adjectives, revealing that it cannot be modelled by the existing approaches to 'construction-specific' phonology. Section 4.5 discusses a tentative proposal that attempts to appropriately limit the construction-specific process of /i/-deletion in NM Slovenian.

4.1 Morphosyntax of NM Slovenian

The goal of this section is to present a brief analysis of the morphosyntax of NM Slovenian, to the extent that is relevant for the data which we have been discussing so far. As was already explained in chapter 1, the general outlook on morphosyntax taken up here is that of Distributed Morphology (Halle & Marantz 1993; Embick 2010), coupled with Minimalist assumptions on syntactic computation (Chomsky 1993, 1995, 2001); see chapter 1 for a brief introduction to the crucial concepts. Below, we first start by analyzing the structure of verbs and participles, specifically the syntactic position of the theme vowels and aspectual suffixes.

Our analysis of the morphosyntactic formation of verbs and participles will be largely based on that proposed by Marvin (2002) for Standard Slovenian, which is appropriate, given that the relevant morphosyntactic details specified below are identical for NM Slovenian. According to Marvin (2002: 83-90), verb formation is derived by successive cyclic head-movement of the

root to the tense head T^0. We represent this with the following structures for verbs in NM Slovenian:

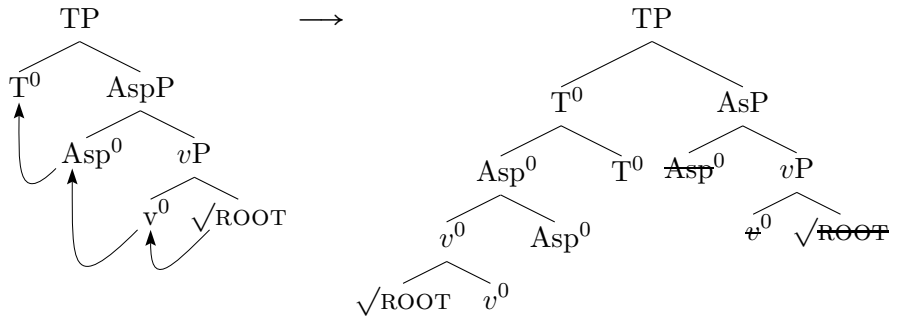

Figure 4.1: Verb formation: [[[[$\sqrt{\text{ROOT}}$] v^0] Asp^0] T^0]

The structure illustrated here fits the categories that we have found in the verbs in NM Slovenian so far: they must encode different aspectual properties and also tense. Verbs alone express present tense in NM Slovenian, precisely as in Standard Slovenian – see Marvin (2002) for details. Participles, however, cannot occur independently, but require a slightly different syntactic configuration: they must always be accompanied by an auxiliary verb. Marvin (2002: 83-90) proposes that participles in Slovenian do not undergo head-movement to T^0, and that T^0 has an independent spell-out, viz. the auxiliary verb. Following Marvin's analysis, we may represent the structure of participles in NM Slovenian in the following way:

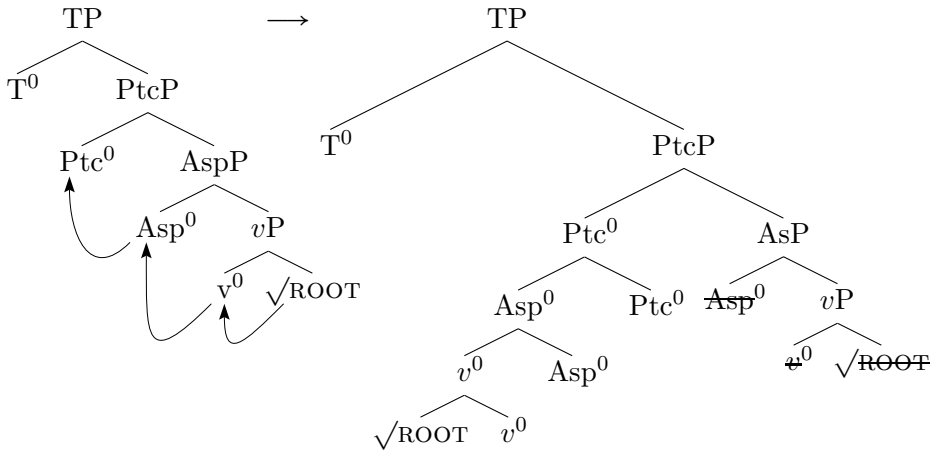

Figure 4.2: Participial formation: [[[[$\sqrt{\text{ROOT}}$] v^0] Asp^0] Ptc^0]

The root undergoes successive cyclic head-movement up to Ptc^0, but not to T^0. Notice that this reflects the observation that (NM) Slovenian participles code no tense on their own, whereas the verbs do. Notice, also, that there is no syntactic head in the verbal and participial structures above that would correspond to an agreement suffix: we will follow the proposal by Halle & Marantz (1994), which assumes that the agreement suffix on verbs and participles is the spell-out of the agreement head Agr^0 adjoined to the pre-existing verbal/participial complex at PF.

An important question that we must ask is which head spells out the theme vowels.[39] This is relatively straightforward for the aspectual suffixes: we may assume that those are spell-outs of Asp^0. To determine the syntactic position of these verbal theme vowels, we must consider their distribution, particularly in relation to the aspectual suffixes. For this reason, let us first spend a few paragraphs discussing aspectual suffixes.

As is typical of Slavic in general, imperfective aspect is the default aspect encoded by 'bare' verbal stems (Slabakova 2001), but different aspectual readings may be triggered by prefixation and suffixation. This is true of Standard Slovenian, as discussed in Toporišič (2000: 348) and Žaucer (2002: 1), and it is also true of NM Slovenian.The only aspectual suffix that we have discussed so far is the *semelfactive*, /-n-i/ for participles and /-n-e/ for verbs. In the previous two chapters, we treated these two allomorphs of the semelfactive as bi-morphemic, viz. as 'semelfactive+theme', but in this section we will actually treat them as monomorphemic, viz. as /-ni/ and /-ne/, which is how Dickey (2003) analyzes the two semelfactive allomorphs in Slovenian, and Svenonius (2004a: 183) offers a similar analysis of the Russian semelfactive. Below we will briefly sketch the alternative (bi-morphemic) analysis and explain that it makes no crucially different predictions for our analysis. Recall that the semelfactive reading reflects a perfective and 'punctual' event. However, Slovenian makes use of other aspectual suffixes, as well: these would be /-eva/ and /-uje~ova/ (Dickey 2003), which are usually termed *secondary imperfectives* in most literature on Slavic languages and they trigger an 'iterative reading' (Slabakova 2001: 84). In NM Slovenian, the two secondary imperfectives are /-eva/ and /-uje~(u)va/. While /-eva/ may be used in verbs and participles, /-uje/ is the allomorph used in verbs, while /-(u)va/ the one used in participles. The [u] in /-(u)va/ occurs in this exponent variably. A typical property of secondary

[39] Marvin (2002) offers a different treatment of theme vowels than that proposed here, but she does not discuss the relation between theme vowels and aspectual suffixes at all, which is crucial for our proposal above.

imperfectives in Slavic is that they may only attach to verbal stems that are *telic*, which means that they imply a semantic event 'end-point' (Slabakova 2001: 84). Since bare verbal stems in Slavic are typically imperfective, as mentioned above, they are rendered telic by the addition of a prefix. Observe the following table which illustrates that this is precisely the case in NM Slovenian, as well:

IMPERF$_{\text{INF}}$	TELIC$_{\text{INF}}$	SCND.IMP$_{\text{INF}}$		
√ris-a-t	iz-ɾis-a-t	iz-ɾis-u'va-t	*ɾis-uva-t	'draw'
√pix-a-t	na-pix-a-t	na-pix-u'va-t	*pix-uva-t	'blow'
√jok-a-t	ob-jok-a-t	ob-jok-u'va-t	*jok-uva-t	'cry'
√rez-a-t	iz-ɾez-a-t	iz-ɾez-u'va-t	*ɾez-uva-t	'cut'
√goɾ-e-t	do-goɾ-e-t	do-go'ɾ-eva-t	*goɾ-eva-t	'burn'
√xlap-e-t	iz-xlap-e-t	iz-xla'p-eva-t	*xlap-eva-t	'evaporate'

Table 4.1: *-uje~(u)va* and *-eva* as SCND.IMPERF in NM Slovenian

The prefixes /iz-/, /na-/ and /do-/ are telic because they imply an end-point of the (verbal) event that they scope over. Notice that the secondary imperfectives may only attach to telic verbal stems, and never to bare, imperfective verbal stems, hence the ungrammaticality of all the forms in the fourth column. Their semantic contribution is also that of 'iteration': [√ris-a-t] denotes an imperfective event of 'drawing', while [iz-√ris-a-t] denotes a complete event of 'drawing', but [iz-√ris-uva-t] denotes an iteration of several completed events of 'drawing'. These data also enable us to pinpoint the syntactic position of the secondary imperfectives, specifically, we can now claim that they are generated above the telic prefixes because they must scope over any such prefix. Since these secondary imperfectives may never stack with the semelfactive suffixes, we may assume that they are both spell-outs of Asp^0, the aspectual head above the v^0. This is quite a typical assumption on Slavic: Gribanova (2015) assumes this too for Russian.[40]

Now that we have introduced the crucial distributional facts of the aspectual suffixes (the semelfactives and the secondary imperfectives), we may turn to theme vowels. It is interesting that the theme vowels never seem to coincide with any of the aspectual suffixes. Consider the following table, which shows that it is impossible to stack the theme vowel /-a/ and the semelfactive suffixes:

[40] Slabakova (2001: 86) positions the Slavic telic prefixes in a head below Asp^0 and analyzes the secondary imperfectives as spell-outs of an Event head, E^0, directly below Asp^0 (Travis 1994, 2010), which is also an option for Slovenian, but one that shall not be explored here.

IMPERF$_{[a]}$	SEMELF	3P.SG.V	F.PL.PTC
√but-a-	×	ˈbut-a-∅	ˈbut-a-l-a
√pix-a	×	ˈpix-a-∅	ˈpix-a-l-a
×	√but-ne/ni	ˈbut-ne-∅	ˈbut-ni-l-a
×	√pix-ne/ni	ˈpix-ne-∅	ˈpix-ni-l-a

Table 4.2: Imperfective (default: -*a*) vs. semelfactive -*ni*~*ne*

The theme vowel [-a] can never co-occur with a semelfactive, which suggests that theme vowels occupy the same position as the semelfactive, viz. Asp^0.[41] We can gather more support for this in the distribution of theme vowels in relation to the secondary imperfectives:

IMPERF$_{[a,e]}$	SCD.IMP	3P.SG.V	F.PL.PTC
√pix-a	×	ˈpix-a-∅	ˈpix-a-l-a
√ɾis-e	×	ˈɾiʃ-e-∅	ˈris-a-l-a
×	√pix-uje/-uva	na-piˈx-uje-∅	na-pix-uˈva-l-a
×	√ɾis-uje/-uva	iz-ɾiˈs-uje-∅	iz-ɾis-uˈva-l-a

Table 4.3: Imperfective (default: -*a*,-*e*) vs. SCND.IMPERF -*uje*~(*u*)*va*

Notice that regardless of whether the theme vowel in the imperfective verbal stem is [-a] or [-e], the stem will simply contain [-uje] in verbs and [-uva] in participles when a secondary imperfective is constructed. A similar situation occurs with the /-eva/ secondary imperfective:[42]

IMPERF$_{[i,e]}$	SCD.IMP	3P.SG.V	F.PL.PTC
√goɾ-i	×	goˈɾ-i-∅	goˈɾ-e-l-a
√xlap-i	×	xlaˈp-i-∅	xlaˈp-e-l-a
×	do-√goɾ-eva-	do-goˈɾ-eva-∅	do-goˈɾ-eva-la
×	do-√xlap-eva-	iz-xlaˈp-eva-∅	iz-xlaˈp-eva-l-a

Table 4.4: Imperfective (default: -*i*,-*e*) vs. SCND.IMPERF −*eva*

With the /-eva/ suffix, many of the imperfective verbal stems to which it attaches have the [-i] theme vowel in verbs, and [-e] in participles. When a secondary imperfective is constructed, the [-i] and [-e] are replaced by [-eva].

[41] Note that the forms listed here are all underlying phonological representations: /ˈbut-ni-l-a/ must, of course, surface as [ˈbut-ən-l-a].

[42] With the secondary imperfective exponent /-eva/, the allomorph /-uje/ may also occur in the verbal forms with some roots.

It, again, seems to be the case that the suffix /-eva/ cuts across the theme vowel specification in the imperfective verbal stem.

It seems that theme vowels are generally in complementary distribution with the aspectual suffixes; this is especially clear with the semelfactives and the /-uje~(u)va/ secondary imperfective. For this reason, we will assume that theme vowels are also spell-outs of Asp^0. This does not seem to be unique to Slovenian, as Gribanova (2015) and Gribanova & Harizanov (2015) also note that theme vowels are tied to Asp^0 in Russian.

We must also mention two alternatives to this analysis. It may be possible to treat the secondary imperfectives and semelfactives as /-uv-a/, /-uj-e/, /-ev-a/ and /-n-i/, /-n-e/, where the additional vowel is actually a *theme* suffix. If we assume, together with Oltra-Massuet (1999) and Embick (2010), that theme vowels are actual THM^0 heads adjoined to the relevant head at PF, we could say that /-uv/, /-uj/ and /-ej/ are the exponents of Asp^0 and that the following vowels are the exponents of THM^0 adjoined to Asp^0 – this is what Gribanova (2015) proposes for Russian. The second alternative is to say that the 'extra' vowels are actually the exponents of Asp^0 themselves, but that the secondary imperfectives (viz. /-uv/, /-uj/ and /-ev/) are the exponents of an Event head (E^0), hosted in an Event Phrase (Travis 1994, 2010), located directly below Asp^0, which is what Slabakova (2001: 86) proposes for the secondary imperfectives. Notice that what these two analyses share with the one suggested above is the generalization that the 'theme vowels' must occur in a projection above the verbalizer v^0, either in Asp^0 or directly above Asp^0, and that they are tied to aspect in some way. However, our original analysis will be sufficient for our purposes. The remaining two analyses described here could very well be adopted, though we would not benefit from this here in any way, which is why the simpler option is selected.

An additional example can also be given: 'bare' verbal stems indeed typically encode imperfective aspect, but this is not necessarily always the case. With some verbal roots, a difference in the selection of the theme vowel is sufficient to express a a contrast between perfect and imperfect aspect: Žaucer (2002: 1) cites an example from Toporišič (2000: 348-350), who shows that, in Standard Slovenian, [$\sqrt{}$pik-a-ti] 'stab (INF)', with an imperfective reading, is contrasted by [$\sqrt{}$pitʃ-i-ti] 'stab (INF)',[43] which has a perfective reading. A very similar scenario obtains in NM Slovenian: consider ['pik-a-t] 'stab (INF)', which has an imperfective reading, and ['pitʃ-ət] ('stab INF)', which has a perfective reading. This actually provides further

[43] It is assumed that the root-final /k/ palatalizes to [tʃ].

evidence for the idea that theme vowels are in fact exponents of Asp^0, as they seem to be closely connected with the interpretation of aspect.

According to the assumptions on morphosyntax that we have specified so far, a participle would have the following structure prior to any linearization procedure at PF, but after Agr^0 is adjoined to Ptc^0:

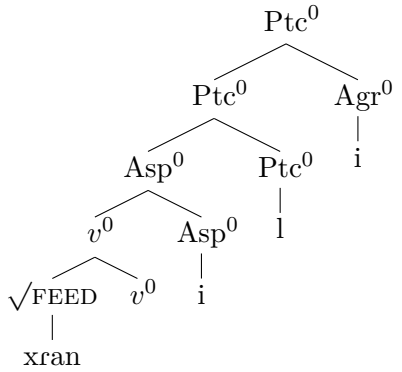

Figure 4.3: Participle /√xran-i-l-i/ 'having fed (PTC.M.PL)'

The exponents specified in the tree above are, of course, not present prior to the linearization of this structure, and are only given for reasons of clear exposition. We can now list some of the basic Vocabulary Insertion rules that insert exponents for the given syntactic heads. We will not attempt to account for any of specific exceptions with this brief analysis, but rather try to account for the most general patterns of verbal and participial exponence in NM Slovenian since the focus of this thesis is not on segmental exponence as such. Starting with the 'theme' vowels, these are inserted as the default exponents of Asp^0 for specifics lists of roots:

(32) Theme vowels inserted for Asp^0 in verbs

$[Asp^0]$ ↔ a / ⟨{√jok-, √pix-, ...}, v^0 ⟩ __

$[Asp^0]$ ↔ i / ⟨{√xran-, √del-, ...}, v^0 ⟩ __

$[Asp^0]$ ↔ e / ⟨{√pel-, √mr-, ...}, v^0 ⟩ __

(33) Theme vowels inserted for Asp^0 in participles

$[Asp^0]$ ↔ a / ⟨{√pel-, ...}, v^0 ⟩ __ ⟨ Ptc^0 ⟩

$[Asp^0]$ ↔ ∅ / ⟨{√mr, ...}, v^0 ⟩ __ ⟨ Ptc^0 ⟩

The list of Vocabulary Insertion (VI) rules in (32) shows that the three basic theme vowels are inserted for Asp^0 in the presence of different roots when constructing verbs. Some of the VI-rules in (32) also apply when

constructing a verbal stem that is used to build a participle: this is the case with the rule that inserts /-a/ and /-i/. But for most roots that are assigned /-e/ in verbs, we need a special rule that inserts /-a/ when building a verbal stem which is used to construct a participle, which is given in (33). Since the roots that take the theme /-e/ actually further bifurcate in participles, we also need a special rule for roots such as √mr-, which are assigned zero themes in participles; this is captured in the second rule in (33). That the rules in (33) will block the third rule in (32) is ensured by the Subset Principle (see section 1.1), since the rules in (33) require a more specific context, viz. the presence of the Ptc^0 head.

(34) Semelfactives and secondary imperfectives in verbs

$[\text{Asp}^0{}_{[\text{SEMELF}]}]$ ↔ ne / ⟨ v^0 ⟩ __

$[\text{Asp}^0{}_{[\text{SCD.IMP}]}]$ ↔ uje / ⟨{√pix-, √ris-, ...}, v^0 ⟩ __

$[\text{Asp}^0{}_{[\text{SCD.IMP}]}]$ ↔ eva / ⟨{√gor-, √xlap-, ...}, v^0 ⟩ __

(35) Semelfactives and secondary imperfectives in participles

$[\text{Asp}^0{}_{[\text{SEMELF}]}]$ ↔ ni / ⟨ v^0 ⟩ __ ⟨ Ptc^0 ⟩

$[\text{Asp}^0{}_{[\text{SCD.IMP}]}]$ ↔ uva / ⟨{√pix-, √ris-, ...}, v^0 ⟩ __ ⟨ Ptc^0 ⟩

The rules in (34) and (35) account for the exponence of the semelfactive and secondary imperfective suffixes. As before, all the suffixes have allomorphs specific to the participle, except for /-eva/, which is accounted for by positing the third rule in (34) alone.

Notice that the contexts of all the rules above specify actual exponents of roots; all the rules are assumed to actually specify no exponents, so that instead of √mr- 'die' the list in reality specifies √DIE. The exponents are only used for reasons of clearer exposition.

4.2 On the nature of Spell-Out at PF

Up to now, we have only considered the spell-out of syntactic structure – this was done in section 1.1. There, we explained that in a *phasal* approach to syntax (Chomsky 2000, 2008), the syntactic component produces syntactic cycles by spelling out syntactic structure to the interfaces 'phase by phase'. This section, on the other hand, is dedicated to discussing how the spell-out of phonological structure proceeds at the PF-interface: this level of spell-out refers to structure made up by exponents, which is the result of linearization and Vocabulary Insertion (see section 1.1 for details). We will particularly be concerned with how the *domains* of phonological spell-out are defined.

Some theories of phonology, most prominently many instantiations of Optimality Theory (Prince & Smolensky 2004), advocate a purely global approach to phonological spell-out: entire words must be spelled out simultaneously, under such a view, without any mechanism of cyclic application. On the other hand, frameworks such as that of Cophonology Theory (Orgun 1996; Inkelas & Zoll 2007; Inkelas 2008, 2011) make use of cyclic application of phonology that is determined by the morphological structure of the word. Consider the word [[[[$\sqrt{}$ROOT] x] y] z]:

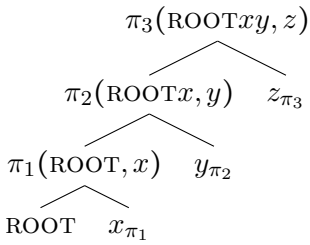

Figure 4.4: Cyclic application in Cophonology Theory

Cophonology Theory allows the grammar to contain several 'cophonologies': if one part of the grammar exhibits productive phonology that is not compatible with productive phonology in another part of grammar, then we may say that this grammar contains two cophonologies. In Cophonology Theory, cophonologies are tied to specific morphological constructions: a morpheme may bear a diacritic that triggers a phonological cycle, in other words, it triggers a pass through the phonology. The diacritics that trigger these cophonologies are represented with π above in Figure (4.4). Every cophonology π triggered by a morpheme is construed as a function that concatenates two (exponents of) morphemes and produces a phonological output. Note that each of the morphemes may be specified with a different cophonology, essentially π_1, π_2 and π_3: Inkelas (2008: 8) explains that the application of the phonological cycles represented in Figure (4.4) proceeds from the bottom up: π_1(ROOT$, x$) must take place first, whereby π_1 processes /ROOT-x/, then π_2(ROOTx, y) applies, with π_2 processing /ROOTx-y/, and finally π_3(ROOTxy, z) applies, with π_3 processing /ROOTxy-z/. Inkelas & Zoll (2007) term this rigid course of application the *Stem Scope* property:

(36) *Stem Scope* (Inkelas & Zoll 2007: 144)
The scope of morphologically conditioned phonology is the stem formed by the word-formation construction in question.

The Stem Scope property predicts that no morpheme in a structurally higher position can be influenced by a cophonology specified in a structurally lower position: in Figure (4.4), π_2 can only affect the morphological constituents that it scopes over, but crucially not morphemes 'up the tree'.

In Lexical Phonology (Kiparsky 1982a,b; Mohanan 1986) and Stratal OT (Kiparsky 2000; Bermúdez-Otero 2011), phonology is spelled out in several strata: the stem once, it is built, passes through the Stem-level phonology and when the entire word is constructed, it passes through the Word-level phonology. Several words together then pass through the Postlexical, or Phrasal-level of phonology. These levels may all endorse different phonologies, much akin to different cophonologies in Cophonology Theory, just that these are fixed for the entire language and cannot vary from one morphological construction to another. However, at the Stem-level phonology (and the Word-level, in some versions of these theories), morphemes making up the stem may be specified to trigger a pass through this level's phonology before the structure is sent to the next level. These are essentially phonological cycles, again like in Cophonology Theory, but with a difference: these cycles may only represent a reiteration of the Stem-level's phonology and cannot trigger different, 'construction-specific' phonological effects.

The system of phonology that Embick (2010, 2013) assumes is crucially rooted in the framework proposed by Halle & Vergnaud (1987). Along their lines, Embick assumes the following three components:

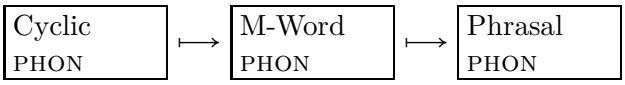

Figure 4.5: Embick's phonological grammar

This division of labour between the different phonological components directly reflects that in Lexical Phonology and Stratal OT, where the 'Cyclic phonology' corresponds to the Stem-level, the 'M-word phonology' to the Word-level, and the 'Phrasal phonology' to the Postlexical level. For completeness, we should mention that in conjunction with Halle & Vergnaud (1987), this system is driven by phonological re-write rules and not OT-style computation. Consider the morphological construction [[[[$\sqrt{}$ROOT] x] y] z] again: after the linearization procedure has taken place with the output [$\sqrt{}$ROOT$\oplus x$, $x \oplus y$, $y \oplus z$], Vocabulary Insertion takes place. Imagine that Vocabulary Insertion inserts the exponent /β/ for y. This exponent may bear a diacritic which triggers phonological effects that are specific to formations that include this morpheme. Notice that this precisely mirrors

the phonological cycles triggered by diacritic specification in Cophonology Theory. Let us construct a sample derivation in Embick's system, where the exponent of y, $/\beta/$, bears a diacritic (let us call it 'π') which triggers a phonological cycle ('π-cycle'):

(37) Spelling out $[\sqrt{\text{ROOT}} \oplus x,\ x \oplus y,\ y \oplus z]$ in the phonology

a. Step # 1: VI inserts $/\alpha/$ for x

b. Step # 2: VI inserts $/\beta/_{\pi}$ for y
→ Phonological cycle π triggered on $/\sqrt{\text{ROOT}}\text{-}\alpha\text{-}\beta/$
→ Output of π-cycle: $[\sqrt{\text{ROOT}}\alpha\beta]$

c. Step # 3: VI inserts $/\gamma/$ for z

d. Step # 4: Ship off $/\sqrt{\text{ROOT}}\alpha\beta\text{-}\gamma/$ to the M-Word phonology

Note that all the exponents could potentially be specified for a diacritic, which would imply three phonological cycles throughout the word before the derivation reached the M-Word phonology. These cycles directly reflect the cyclic application of cophonologies in Cophonology Theory. The only difference lies in the fact that Embick's π-cycles trigger phonological re-write rules of the SPE fashion (Chomsky & Halle 1968), whereas cophonologies involve whole rankings of OT-style constraints. It is equally possible that no exponent would bear a diacritic in (37), which would mean that the string of exponents would be directly shipped off to the M-Word phonology, without triggering any phonological cycles.

In (37), we stated that a π-cycle is triggered by a diacritic π on the *exponents* of morphemes and not on the morphemes (i.e. linearized syntactic heads) themselves. We adopt this rationale by following Embick (2013) who offers a brief discussion on this topic. Embick (2013: 12) points to an observation made by Halle & Vergnaud (1987): Halle & Vergnaud make the observation that the English suffix *-ity* triggers a phonological (π) cycle, but the suffix *-ness* does not.[44] Embick explains that both these suffixes seem to be exponents of the nominalizing head n^0, which implies that two exponents of the same morpheme may or may not trigger a cycle. This implies that π-cycles are triggered on the exponents of morphemes and are, in that sense, a 'by-product' of the PF-interface. We will require this assumption in our analysis of phonological cyclicity, as discussed in the following section, 4.3.

[44] Halle & Vergnaud (1987) analyze this as a property that follows from the distinction between 'Level 1' and 'Level 2' affixes, which, in turn, reflects the Stem vs. Word level distinction in Lexical Phonology and stems from the earlier work on this by Kiparsky (1982a,b).

In section 1.1, we subscribed to the idea that syntactic computation proceeds in *phases* (Chomsky 2001, 2008), which implies that the PF-interface receives 'chunks' of structure in a manner that is fully regulated by the syntax itself. The inevitable consequence of this is that a phase-cycle is not only a syntactic cycle, but also a phonological cycle. Works such as Marvin (2002), Marantz (2007), Samuels (2009), Piggott & Travis (2013) and Newell & Piggott (2014) argue that phase-cycles indeed form phonological cycles. This is the over-reaching proposal that we will ultimately subscribe to in section 4.5. However, Embick (2013) notes that π-cycles, which we have explained as a by-product of the PF-interface, cannot overlap with phase-cycles: Embick shows that π-cycles are sometimes triggered by exponents of non-phase heads and that phase-heads themselves need not trigger a π-cycle at all. This implies that two types of cyclicity exist:

(38) Two types of cycles[45]
   a. *Phase-cycles*: they are determined by syntax, and are realized as a 'piece of structure' that the PF-interface receives
   b. *π-cycles*: within the piece of structure (a phase) sent to the PF-interface, exponents of heads may trigger phonological cycles – these are π-cycles

In this sense, a phase-cycle is a 'hard' cycle that cannot be manipulated at PF, but π-cycles are an optional by-product of the interface. This is why π-cycles are used to encode 'construction-specific' and exceptional phonological effects in the way that we discussed at the beginning of this section.

4.3 Phonological cyclicity in NM Slovenian

Now that the relevant basics of NM Slovenian morphosyntax were discussed in section 4.1 and the assumptions on cyclicity in 4.2, it is crucial that we discuss how the phonological cyclicity in the phonological computation of verbs and participles is formally implemented at the interface. In particular, we will explain how the morphosyntactic observations on theme vowels and aspectual suffixes tie in with the issue of cyclicity.

[45] Embick (2013) discusses this same distinction and he calls π-cycles 'ϕ-cycles', but that term is avoided in the present thesis so as not to be confused with morphosyntactic 'ϕ-features', even though the symbol π does not correspond to a letter representing the segment [f] in Greek.

4.3.1 Phase status of verbal stems

Recall from section 4.2 that we made the distinction between *syntactic cycles* on the one hand, and *phonological cycles* on the other. Syntactic cycles, also known as *phases* (Chomsky 2001, 2008), send a 'chunk' of syntactic structure to the PF-interface, where it is linearized, replaced by phonological exponents (through Vocabulary Insertion), and also processed phonologically. A phase-cycle, therefore, inevitably forms a domain for phonological computation – essentially a phonological cycle. In 4.2, we subscribed to the definition of a *phase domain* where a phase head triggers spell-out of domains that already contain a phase-cyclic head, following Embick (2010, 2013) and Marantz (2013). This means that the root will always be processed in the same phase-cycle as the first categorial head that categorizes it. For our verbal and participial structures discussed above, this means that entire verbs and participles will be computed in the same phase-cycle, as they only contain one phase head, the verbalizer v^0.

Notice that it is actually crucial, for our phonological analysis, that the root be computed together with the exponents of Asp^0. For instance, if the root √pown- 'fill' were first processed in a phase, separated from the theme /-i/, then we would expect the input to the verbal cycle to be /(ˈpo.wən)-i/ with an epenthesized schwa in the root. This is unproblematic if the stress is on the root throughout the derivation, as the final /-i/ is predicted to delete and the output would be the predicted [(ˈpo.wən)]. But if the stress has to occur on the theme /-i/, we predict that /(ˈpo.wən)-i/ would surface as *[po.wə.(ˈni)], and not as the correct form [pow.(ˈni)] because the schwa epenthesized in a previous cycle would be retained (see sections 3.1 and 3.2 for details). Our analysis, so far, seems compatible with a phasal approach to syntax, since a phase will include both the root and the Asp^0 head in the same phase-cycle.

Before we continue discussing phonological cyclicity, let us turn to a potential morphosyntactic issue that roots such as √pown- present. As stated, it is crucial that the roots and the theme vowels are computed in the same phonological cycle and, therefore, also in the same phase-cycle. This is especially crucial for roots such as √pown- 'fill' and √dərgn- 'rub'. In section 2.2.3 on page 42 we noted that √pown-, √dərgn- and other such formations must be roots and not cases of roots suffixed with some [-n] suffix. We have also been assuming that these roots form verbal stems directly, with no intervening categorial heads between √ROOT and v^0. This assumption is trivial for √dərgn- because it cannot exist as a noun or adjective as *[ˈdərgən], but this is not trivial at all for √pown-, which does exist independently as

an adjective, viz. [ˈpowən] 'full (M.SG)'. At first glance, it seems that we may be forced to claim that √pown- must first build an adjectival stem which is then used to construct the verbal stem, ultimately constituting a de-adjectival verb or participle. This would imply the structure [[[[√pown] a^0] v^0] ...], which would mean that [[√pown] a^0] would constitute the first phase-cycle, and this would inevitably trigger schwa-epenthesis and cause grave problems for our account of cyclic deletion and epenthesis, as indicated above. However, we will maintain that √pown- does actually build a verbal stem directly, viz. [[[√pown] v^0] ...], as there is independent semantic evidence to support this claim.

Adjectives such as [ˈpowən] 'full (M.SG)', [ˈpɾazən] 'empty (M.SG)' and [(ə)ɾˈdetʃ] 'red (M.SG)' share a common property: they may be construed as *gradable adjectives* (Kennedy 1997). A typical property of gradable adjectives is that they can be modified by degree adverbials such as 'very' or 'quite' Kennedy (1997: 1). This is true of [ˈpowən-∅] and [(ə)ɾˈdetʃ-∅]:

(39) Adjectival modification by degree adverbial *zelu*

a. Tele sodi so **zelu** *powni*
these:M.PL barrels:M.PL be:3P.PL very full:ADJ.M.PL
These barrels are very full.

b. Tale slika je **zelu** *(ə)ɾdetʃa*
this:F.SG photo:F.SG be:3P.SG very red:ADJ.F.SG
This photo is very red.

In (39) above, the two adjectives are modified by the degree adverbial *zelu* 'very', which shows that the two adjectives are gradable. Kennedy & Levin (2008) demonstrate that de-adjectival verbs, if constructed on the base of a gradable adjective, reflect the semantic properties of gradable adjectives. This implies that de-adjectival verbs (and participles) constructed on an adjectival base should exhibit the same gradability properties as their adjectival counterparts. However, the de-adjectival participles that √pown- and √ɾdetʃ- supposedly construct are very different:

(40) Adjectival modification by degree adverbial *zelu* in verbal stems

a. *Janez je zelu na-pownu tele sode
John aux:3P.SG very fill:PTC.M.SG these:M.PL barrels:M.PL
John filled these barrels very much.

b. Janez je zelu po-ɾdetʃiw tole sliko
John aux:3P.SG very redden:PTC.M.SG this:F.SG photo:F.SG
John reddened this photo very much.

In (40a), we can see that the participle built on √pown- cannot be modified by the degree adverbial *zelu*, but this is in fact possible for the participle built on √ɾdetʃ-. These data imply that √pown- truly does not have the structure [[[[√pown] a^0] v^0] ...], but rather [[[√pown] v^0] ...], as no degree modification is possible in the verbs and participles it builds – there is no adjectival head for the adverbial to scope over. The root √ɾdetʃ-, on the other hand, does seem to first construct an adjective, so that its verbal stem has the structure [[[[√ɾdetʃ-] a^0] v^0] ...], precisely because it allows degree modification. This is a direct confirmation of the morphosyntactic assumptions that we have been making so far.[46]

4.3.2 π-cycles in the verbal stem

Let us now turn back to the topic of phonological cyclicity. Recall that a phase-cycle is always also a phonological cycle, but, as was discussed in section 4.2, 'smaller cycles' triggered by specific morphemes may occur within the larger phase-cycle. We termed these cycles *π-cycles* – 'π' implying that they are a by-product of the PF-interface and are not correlated with the syntactic component in any way. It is important to ask if a theory of the PF-interface truly requires such cycles, as a more parsimonious solution would be one that could derive all cyclicity effects in phonology through phase-cycles, which have independent syntactic motivation. But as Embick (2013) points out, π-cycles seem necessary for empirical reasons. This is also the case with our data. In our analysis of the verbal and participial system, we had to posit two cycles of phonological computation in sections 3.1 and 3.2. For our analysis, it was crucial that the root is computed together with the exponents of Asp^0 (theme vowels, aspectual suffixes), but crucially not with the participial exponent or the exponents of the agreement head. It is not possible for there to be two phase-cycles in these structures because only one categorial head is present (viz. v^0), which means that we must posit a π-cycle somewhere in the verbal stem. The appropriate candidate seems to be the Asp^0 head, as all the theme vowels and aspectual suffixes are its exponents. If Asp^0 triggers a π-cycle, this means that [[[√ROOT] v^0] Asp^0] are computed first, and the output of this cycle is then computed with [[Ptc^0] Agr^0] for participles and [[T^0] Agr^0] for verbs, all of which is contained in one phase. And this is precisely what we require.

Recall, from section 4.2, that the π-cycles are indicated on morphemes by

[46] Please note that the phase-cyclic status and properties of adjective formations will not be examined in any other way in this thesis. Such research should be conducted in future studies.

diacritic indices, and that these diacritics are specified on the *exponents* of morphemes (i.e. exponents of syntactic heads) rather than on the morphemes themselves, as discussed in Embick (2013: 12). In this sense, whether a specific morphosyntactic construction undergoes a π-cycle or not is a completely arbitrary matter of lexical specification. This is an assumption that is very much needed for our data. Recall from section 3.1 that the two cases of single consonant roots $\sqrt{}$b-/$\sqrt{}$bi- 'be' and $\sqrt{}$ʃ- 'go' do not undergo two cycles, whereas all roots such as $\sqrt{}$mɾ- 'die' must undergo two cycles, and this is also the case with all constructions that take the theme /-i/ and all semelfactives built with /-ni/.

For the $\sqrt{}$mɾ-type cases, we found the evidence for a cycle in the overapplication of schwa-epenthesis on the surface, as in [uˈmərəl] 'having died (M.PL)' – the exponent of Asp^0 here is a zero theme. The cases that involve the theme /-i/ and the semelfactive /-ni/ require two cycles so that the unstressed [i]-vowels in these two suffixes can be computed in the word-final position and, therefore, can undergo word-final vowel deletion. Another piece of evidence is also found with $\sqrt{}$CVCR roots (R represents any sonorant), where an epenthesized schwa must remain in a position before the sonorant and not in a different position on the surface, as in [$\sqrt{}$powən-l-i] 'having filled (M.PL)'. This suggests that the exponents of Asp^0, /-∅/, /-i/ and /-ni/, are the triggers of π-cycles. They must, therefore, bear a diacritic, viz. /-∅/$_\pi$, /-i/$_\pi$ and /-ni/$_\pi$, which triggers a π-cycle as soon as Vocabulary Insertion inserts one of these two exponents for Asp^0.[47]

The cases with $\sqrt{}$b-/$\sqrt{}$bi- and $\sqrt{}$ʃ-, on the other hand, cannot be computed in two cycles: recall that the participles constructed from these two roots also involve a zero theme; the $\sqrt{}$bi- form occurring in the masculine singular only must be a suppletive form of the root, as we discussed in section 3.1 on page 108. A pass through the first π-cycle would inevitably lead to schwa epenthesis, yielding *[ˈbə] and *[ˈʃə], and the second cycle would then have to output *[ˈbəl] and *[ˈʃəl]:

INPUT	1ST CYCLE	INPUT	2ND CYCLE
/$\sqrt{}$b-∅-/	*(ˈbə)	/(ˈbə)-l-i/	*(ˈbəl)
/$\sqrt{}$ʃ-∅-/	*(ˈʃə)	/(ˈʃə)-l-i/	*(ˈʃəl)

Table 4.5: $\sqrt{}$b- 'be' and $\sqrt{}$ʃ- 'go' under two cycles (M.PL)

[47] In the case with the theme /-∅/, nothing seems to preclude zero exponents also introducing π-diacritics into the computation. In terms of Distributed Morphology, this means that no segmental exponent is inserted, but only the diacritic is.

The correct outputs here are ['bli] and ['ʃli] with no schwa-epenthesis. Notice that the final M.PL /-i/ is stressed, which in itself is problematic for a cyclic treatment: the final inflections, such as the /-i/ above, are *never* stressed in any of the other participial forms. The roots √b- and √ʃ- are truly exceptional in this respect, as well. In all the other participles and verbs in NM Slovenian, the stress is either on the root, which is probably the default option, or it may also occur on the theme, but never beyond it. This observation suggests that stress is typically assigned in the first π-cycle, where it either occurs on the root or the theme, but in the second, participle cycle, the stress remains fixed on the theme. However, if no cycle is triggered by the exponent of Asp^0 for the roots √b-/√bi- and √ʃ-, it is directly predicted that the final inflections will receive stress and that no schwa-epenthesis will occur, simply because the roots (in all but the M.SG) contain no vowel. Since the Asp^0 spells out a zero theme with these two roots, this cannot be the same zero theme that is spelt out with roots such as √mɾ-. Let us call this new zero theme /-$\varnothing_2$/, and the one occurring with √mɾ- /-$\varnothing_1$/. /-$\varnothing_2$/ must not be specified for a π-cycle, but /$\varnothing_1$/ must be.

The crucial list of exponents that must or must not be specified to undergo a π-cycle is the following:

(41) Asp^0 exponents

π-specified
/-i/$_\pi$, /-ni/$_\pi$, /-$\varnothing_1$/$_\pi$

π-unspecified
/-$\varnothing_2$/

This formalizes the observation that /-i/, /-ni/ and /-$\varnothing_1$/ will trigger a π-cycle, but /-$\varnothing_2$/, which occurs only with √bi-/√b- 'be' and √ʃ- 'go', will not. Other exponents of Asp^0 may or may not be specified for a π-cycle; it is irrelevant for our phonological analysis if they are or are not specified. However, it is likely that all the other theme vowels, /-a/ and /-e/, and aspectual suffixes which attract stress are also specified for a π-cycle: this may be the case because the theme and aspectual suffixes are in the word-final position in the first cycle, where an Alignment constraint (McCarthy & Prince 1993) could trigger alignment of stress with that edge. This would explain why stress may never occur to the right of Asp^0-exponents, but we leave a formal investigation of this for a future study.[48]

[48] Because all Asp^0-exponents seem to trigger a π-cycle, it seem fruitful to explore, in the future, if the lack of cyclicity with √b- and √ʃ- could be derived from independent factors – for instance, a different position in the syntactic tree.

The analysis of π-cyclicity that is advanced above may appear somewhat stipulative. However, positing π-cycles is a mechanism used to formalize exceptional patterns which must be specified lexically and are, therefore, unpredictable. This is the same stance that Cophonology Theory (Orgun 1996; Inkelas et al. 1997; Inkelas & Zoll 2007; Inkelas 2008, 2011) and Stratal OT (Kiparsky 2000; Bermúdez-Otero 2011) would need to take to explain the presence or absence of phonological cycles in different morphological constructions. The √b-/√bi- and √ʃ- roots form a specific morphological construction that behaves differently in terms of cyclicity than the other participles in NM Slovenian, and positing a zero theme specific to these two roots is a way of formalizing a 'construction-specific' effect – or, in this case, rather a lack of it.

4.4 /i/-deletion at the interface

In the previous sections of this chapter, we provided a basic description of NM Slovenian morphosyntax and we also gave a brief analysis of the phonological cyclicity that is found in the verbs and participles. All our analyses, phonological and morphosyntactic, have been successfully captured by the approach of Distributed Morphology (Halle & Marantz 1993) coupled with a cyclic OT-style grammar (Prince & Smolensky 2004). However, the goal of this section is to address a problem that cannot be so readily dealt with by the existing theories of the PF-interface. In the paragraphs below, we will explain that the /i/-deletion process that we found in the verbs and participles of NM Slovenian is a 'construction-specific' phonological effect whose domain of application requires a very specific view on spell-out domains.

In section 3.2, we explained that the verbs and participles in NM Slovenian are processed by a phonological grammar that productively licenses /i/-deletion in the word-final position of the Prosodic Word. Some typical examples include the following:

INPUT	1ST CYCLE	INPUT	2ND CYCLE
/√xɾan-i/ 'feed'	ˈxɾan	/ˈxɾan-l-i/	ˈxɾa.nəl
/√pix-ni/ 'blow (SEMELF)'	ˈpi.xən	/ˈpi.xən-l-i/	ˈpi.xən.li
/√pown-i/ 'fill'	ˈpo.wən	/ˈpo.wən-l-i/	ˈpo.wən.li

Table 4.6: /i/-deletion in word-final position (M.PL participles)

The table above represents three typical participial formations: a simple $\surd$CVC root ($\surd$xran-), a semelfactive ($\surd$pix-ni-) and a $\surd$CVCR root ($\surd$pown-). In the first cycle, only the verbal stem is processed: here the word-final theme /-i/, or the /i/ vowel in the semelfactive suffix /-ni/ are deleted. In the second cycle, the whole participle is processed, and here the word-final /-i/ deletes with simple $\surd$CVC roots, but not with semelfactives or $\surd$ CVCR roots, for independent phonotactic reasons (see section 3.2 for a formal phonological analysis). The crucial observation is that verbs and participles are processed by phonology that promotes /i/-deletion in word-final position. The constraint ranking that this phonology subscribes to is the following (again, see section 3.2 for details):

$$\left\{ \begin{array}{c} *\textsc{Nuc}/\textsc{C} \\ \textsc{SonSeq} \\ \textsc{Al-R}_{Mwd,Pwd} \\ \textsc{Max-}\mathcal{F}(\mu) \end{array} \right\} \gg \left\{ \textsc{Max-Base} \right\} \gg \left\{ *\breve{\text{i}}]_{Pwd} \right\} \gg \left\{ \begin{array}{c} \textsc{Max}(\text{i}) \\ \textsc{Dep} \\ *\text{ə} \end{array} \right\}$$

Figure 4.6: Constraint ranking (/i/-deleting phonology)

The crucial aspect of this constraint hierarchy that licenses /i/-deletion in verbs and participles is the $*\breve{\text{i}}]_{Pwd} \gg$ MAX(i) ranking.

However, in section 3.4, we showed that this process of /i/-deletion must in fact be limited to verbs and participles, as no /i/-deletion takes place in the systems of nouns and adjectives. Consider the following examples:

INPUT		
/$\surd$kol-i/	ˈko.li	'poles (N)'
/$\surd$vlak-i/	ˈvla.ki	'trains (N)'
/$\surd$gɔvoɾ-i/	ˈgɔ.vo.ɾi	'speeches (N)'
/$\surd$lep-i/	ˈle.pi	'nice (ADJ)'
/$\surd$bel-i/	ˈbe.li	'white (ADJ)'

Table 4.7: No /i/-deletion (NOM.M.PL nouns/adjectives)

In the nouns and adjectives of NM Slovenian, no /i/-deletion takes place. Notice that with simple $\surd$CVC roots, the word-final /-i/ is allowed to surface, which is the exact position where it has to delete in verbal and participial formations.[49] Recall from section 3.4 that the M.PL /-i/ in the nouns

[49] Nothing like a word 'minimality effect', in the sense of Orie & Pulleyblank (2002), that would require the word to be bisyllabic is blocking /i/-deletion, because /i/-deletion still fails to occur with polysyllabic roots (cf. $\surd$gɔvor- above) where minimality effects would not apply, as the structure resulting from deletion would still be bisyllabic.

and adjectives is the same exponent that codes M.PL in the participles.

We are dealing with a case of 'construction-specific' phonology: verbs and participles subscribe to an /i/-deleting phonology, but nouns and adjectives do not. In the system of phonology advocated by Embick (2013), which was discussed in section 4.2, this can be formalized by claiming that a morpheme specific to verbal and participial constructions triggers a set of re-write rules that include an /i/-deleting rule. In Cophonology Theory (Inkelas & Zoll 2007; Inkelas 2008, 2011), which was also discussed in section 4.2, this would be formalized in a very similar way: we would need to say that verbs and participles subscribe to an /i/-deleting cophonology, whereas nouns and adjectives subscribe to an /i/-preserving cophonology. The /i/-preserving cophonology must thus involve a re-ranking of MAX(i) so that it comes to dominate *i̯]$_{Pwd}$:

$$\left\{ \begin{array}{c} *\text{NUC/C} \\ \text{SONSEQ} \\ \text{MAX(i)} \\ \text{AL-R}_{Mwd,Pwd} \\ \text{MAX-}\mathcal{F}(\mu) \end{array} \right\} \gg \left\{ \text{MAX-BASE} \right\} \gg \left\{ *\text{i̯}]_{Pwd} \right\} \gg \left\{ \begin{array}{c} \text{DEP} \\ *\text{ə} \end{array} \right\}$$

Figure 4.7: Constraint ranking (/i/-preserving phonology)

MAX(i) needs to be high-ranked in the /i/-preserving cophonology, where the MAX-constraints on other segments in NM Slovenian are presumably positioned (since no other deletion seems apparent). Other re-rankings of the lower-ranked constraints might be necessary in this cophonology, but, if this is the case, it stems from independent reasons that we will not pursue here. The important thing to observe is that a minimal re-ranking derives the difference between the cophonology in which verbs and participles are processed and the one which derives nouns and adjectives.

Let us now discuss how the phonological grammar assumed by Embick (2010, 2013) would formally implement this construction-specific phonological effect of /i/-deletion. Recall from 4.2, that Embick's phonology consists of a Cyclic level, which feeds the 'M-Word' level, and the latter feeds a Phrase level phonology. Any construction-specific phonological effects have to be triggered by diacritics specified on the exponents of affixes. This means construction-specific effects will only be possible on the Cyclic level of phonology, as the M-Word level phonology is fixed for the entire grammar. Given our discussion of participles in 4.1, a linearized string of morphosyntactic heads that make up a participle would be the following:

(42) Linearized participles in NM Slovenian
[$\sqrt{}$ROOT⊕v^0, v^0⊕Asp^0, Asp^0⊕Ptc^0, Ptc^0⊕Agr^0]

One of the exponents of the heads in this string will need to bear a diacritic that will bring about an /i/-deleting phonological effect. In section 4.3, we explained that some exponents of Asp^0 are the ones responsible for triggering a π-cycle in the verbal stem; recall that, in this cycle, any word-final exponent of Asp^0 that ends in /i/ undergoes /i/-deletion, which suggests that the diacritic 'π' specified on the exponents of Asp^0 is responsible for bringing about /i/-deletion as well as triggering a cycle.

Before we proceed with formalizing this construction-specific /i/-deletion process, a brief caveat is needed. As mentioned before, Embick's system employs phonological re-write rules. Since we have been using an OT-style grammar, as discussed in section 1.1, we need to assumed that π-diacritics do not trigger the application of phonological *rules*, but rather trigger a pass through a specific *cophonology*, in the spirit of Cophonology Theory (Inkelas & Zoll 2007; Inkelas 2008, 2011). This assumption is a necessary consequence of assuming an OT-based phonological grammar with cyclic application. However, the discussion of the observations in this section should be just as relevant for rule-based approaches to phonology.

Since it is the exponents of Asp^0 that trigger a cophonology π that has the constraint ranking that promotes /i/-deletion, we can construct the following derivation:

(43) Spelling out [$\sqrt{}$FEED⊕v^0, v^0⊕Asp^0, Asp^0⊕Ptc^0, Ptc^0⊕Agr$^0_{[\text{M.PL}]}$]

a. Step # 1: VI inserts /xɾan/ for $\sqrt{}$FEED
b. Step # 2: VI inserts /∅/ for v^0
c. Step # 3: VI inserts /i/$_\pi$ for Asp^0
→ Phonological cycle π triggered on /xɾan-∅-i/
→ Output of π-cycle: [ˈxɾan]
d. Step # 4: VI inserts /l/ for Ptc^0
e. Step # 5: VI inserts /i/ for Agr$^0_{[\text{M.PL}]}$
→ Ship off /ˈxɾan-l-i/ to the M-Word phonology

In (43) above, it is the theme vowel /-i/ that triggers the π-cycle as an exponent of Asp^0. This appropriately triggers deletion of the theme /-i/, which is in word-final position in the first cycle. However, no additional cycles are triggered after that and /ˈxɾan-l-i/ is sent off to the M-Word level phonology. Since the M-Word level phonology should be fixed for the entire

grammar, it is not clear how the derivation in (43) could delete the final M.PL /-i/. We could assume that the M-Word level phonology also triggers /i/-deletion, which would then produce the correct output ['xɾa.nəl]. However, this would give entirely incorrect predictions for nouns and adjectives, predicting /i/-deletion where /i/ must in fact be preserved on the surface. If the M-Word level phonology does not trigger /i/-deletion, the derivation in (43) predicts that word-final unstressed /i/ would be preserved in nouns and adjectives, but also in verbs and participles, outputting *['xɾan.li].

We could also try to argue that the M.PL /-i/ triggers an additional π-cycle before the whole word is sent to the M-Word level phonology. This would output the correct participial form in (43), viz. ['xɾa.nəl]. However, this assumption also causes a critical complication: recall, from our discussion in section 3.4, that the M.PL /-i/ used in the participles should be treated as the same exponent that also codes masculine plural in nouns and adjectives (in the nominative case). The evidence that we supplied for this in 3.4 was the fact that the whole paradigm of gender and numbers exponents in participles, as compared to nouns and adjectives, seems to be precisely the same. If the M.PL /-i/ in (43) triggers a π-cycle, then all masculine plural nouns and adjectives should undergo the same cycle of /i/-deletion, but this does not happen. One could stipulate that the M.PL used in the participles is a different exponent that is accidentally homophonous to the one used in nouns and adjectives, but such a stipulation would be entirely unconvincing given the paradigm of number-gender exponents mentioned above and discussed in 3.4.

We have encountered a serious problem: the Cyclic level of phonology cannot derive the deletion of the M.PL /-i/, and the M-Word level of phonology fails to do the same thing. It seems that the distinction between the Cyclic level and M-Word level phonologies over-generates and under-generates at the same time: it either predicts over-application or under-application of /i/-deletion. However, this problem is not unique to the phonological grammar used by Embick (2010, 2013). Cophonology Theory (Inkelas & Zoll 2007; Inkelas 2008, 2011) suffers from a similar problem. Observe the derivation from (43) transformed into a representation such as would be used in Cophonology Theory:

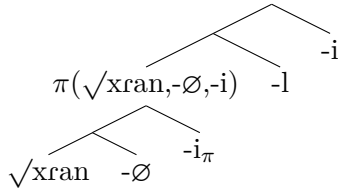

Figure 4.8: Deriving /ˈxɾan-i-l-i/→[ˈxɾa.nəl] in Cophonology Theory

Recall, from section 4.2, that Cophonology Theory subscribes to the *Stem Scope* principle, which dictates that the cophonology triggered by a suffix can only affect whatever the suffix scopes over. In Figure (4.8) above, the theme /-i/, which is responsible for triggering the /i/-deleting π-cycle, only scopes over the root and the zero verbalizing suffix, but not over the final M.PL /-i/. We could attempt to endow the M.PL /-i/ with another π-diacritic, but this would run into the same problems as Embick's system discussed above: this system also makes /i/-deletion either under-apply or over-apply.

The problem here is that the M.PL exponent /-i/ can attach to different derivational bases and it seems to be influenced by the phonology to which the respective derivational base subscribes to: if /-i/ attaches to a participial base (i.e. [PTC]+/-i/), it will be processed by the /i/-deleting cophonology, but if it attaches to an nominal or adjectival base (i.e. [ADJ]+/-i/), it will be processed by the /i/-preserving cophonology. It is not clear how this could be derived in the phonological grammar that Embick (2010, 2013) subscribes to: the major problem with an approach like this is the overly rigid way in which *phonological domains* are defined. Embick's system delegates construction-specific phonological effects to the Cyclic level of phonology, while this feeds the M-Word level of phonology. As we discussed above, this rigid distinction between the fixed Cyclic and M-Word levels of phonology either causes under-application of over-application of /i/-deletion. In the following section, we will propose that phonological domains should be defined on a purely 'construction-specific' basis, specifically in a way that directly follows syntactic phases.

4.5 Proposal: Domains of phonological Spell-Out

In the previous section, we explained that the phonological grammar that is used by Embick (2010, 2013) cannot derive the construction-specific effect of /i/-deletion in NM Slovenian. We also explained that the problem chiefly stems from the rigid definition of phonological domains which that view of phonology assumes: the rigid distinction between the fixed levels of Cyclic

phonology and M-Word phonology is problematic. In this section, we will first explain that the domains of phonological spell-out should be set on a construction-specific basis, specifically in a way that directly follows from *phasal spell-out* of syntax. In addition, we will also discuss a brief and tentative formal solution that will successfully derive the application of /i/-deletion in NM Slovenian.

To explain why the M.PL exponent /-i/ undergoes deletion in the participles but not in nouns in adjectives we will subscribe to the general research program set out by Marvin (2002), Marantz (2007), Samuels (2009), Piggott & Travis (2013) and Newell & Piggott (2014), who argue that a syntactic phase-cycle also forms a domain for phonological computation. Since the fixed distinction between Cyclic and M-Word phonology levels, as advocated by Embick (2010, 2013), cannot predict the domain of /i/-deletion in NM Slovenian, we should investigate whether a *phase cycle* is the domain in which construction-specific phonological effects are processed. Recall that a participle contains only one phase head, the verbalizer v^0, which means that verbs and participles are computed in a single phase-cycle. Simple nouns and adjectives also contain a single phase-head, the nominalizer n^0 and adjectivizer a^0, respectively, also forming a single phase. The generalization about the domain of /i/-deletion in NM Slovenian can be captured very simply by referring to phase-cycles as follows:

(44) *i-deletion generalization*
/i/-deletion occurs in verbal phases, but not in nominal or adjectival phases.

A phase domain encompasses the entire word in NM Slovenian participles, which means that the word-final M.PL /-i/ is also a part of this phase. If /i/-deletion targets the phase as a phonological domain, then we directly predict that the M.PL /-i/ will delete in such phases. Since /i/-deletion takes place in verbs and participles in NM Slovenian, this means that it is contained to the verbal phase – no such deletion occurs in nominal or adjectival phases. Notice that by assuming a phase-cycle as the domain for /i/-deletion, we have also explained why /i/-deletion seems to operate in verbs and participles: participles are constructions that are derived with the syntactic head Ptc^0 attaching to the verbal stem; Ptc^0 is a *functional* and not a *categorial* head, which also means that Ptc^0 cannot be a phase-head and so must still be contained in the verbal phase.

The generalization in (44) is supported by the nouns and adjectives that we discussed previously, as they all show the attachment of the M.PL /-i/ and

it does not undergo deletion. However, even better data can be found in NM Slovenian: participial stems may be used to form de-participial adjectives with the adjectivizer /-n/. Consider the following datum with √xɾan 'feed':

INPUT	OUTPUT	
/√xɾan-i-l-i/	ˈxɾanəl	(PTC.M.PL)
/√xɾan-i-l-**n**-i/	xɾaˈnilni	(ADJ.M.PL)

Table 4.8: De-participial adjective

Above, the M.PL /-i/ deletes when a participle is constructed, but if the participial stem is used to construct a de-participial adjective with /-n/, the M.PL /-i/ never deletes. This is directly expected given the generalization in (44), since the M.PL /-i/ is in a different phase in the de-participial adjective: with a de-participial adjective, such as [[[[[[√FEED] v^0] Asp^0] Ptc^0] a^0] #^{0}], it is in the adjectival phase, but with pure participles it is in the verbal phase. If the constructions above were processed by the same phonology that processes verbal and participial constructions, then we would expect the output to be *[xɾaˈnilən], and not [xɾaˈnilni].

The work on phase-cycles as phonological domains (Marvin 2002; Marantz 2007; Samuels 2009; Piggott & Travis 2013; Newell & Piggott 2014) looks for instances of cyclicity in phonology and attempts to determine if these instances can correspond to phase boundaries. The contribution of the present thesis is in the evidence, presented above, which indicates that phase-cycles seem to play a crucial role in determining the *domains for construction-specific phonological processes*. This seems to be the case with /i/-deletion in NM Slovenian which applies in verbal phases only.

If a phase-cycle is the domain in which construction-specific phonology is processed, this creates some friction with the fixed levels of phonology assumed by Embick (2010, 2013) who follows Halle & Vergnaud (1987): under that view, any construction-specific phonology is tied to the Cyclic level and, after that, whole words are processed on the M-Word level. Since the verbal phase is a complete word in NM Slovenian, undergoing a construction-specific phonological effect, it seems that the distinction between Cyclic phonology and M-Word phonology should be done away with. It seems more appropriate to think of the phase, and not the word, as a 'central phonological domain', within which π-cycles may be triggered. In what follows, we will subsume this idea that the phase is a *central phonological domain* in order to present a possible, tentative solution to the issue of the domain of /i/-deletion. However, it should be noted we will not explore or discuss the predictions that such an assumption may have for the wider organization within the phonological grammar in terms of its levels (e.g. Phrasal

level vs. other levels). While this issue is of substantial importance, length limitations on this thesis prohibit us from exploring it further.

If the phase is the 'central phonological domain', we still need to explain how a π-cycle that is triggered by an exponent of Asp^0 is able to determine the cophonology within which the M.PL /-i/ is processed. Recall the linearized participle and its exponents:

(45) a. Step # 1: VI inserts /xɾan/ for $\sqrt{\text{FEED}}$
b. Step # 2: VI inserts /∅/ for v^0
c. Step # 3: VI inserts /i/$_\pi$ for Asp^0
d. Step # 4: VI inserts /l/ for Ptc^0
e. Step # 5: VI inserts /i/ for $\text{Agr}^0_{[\text{M.PL}]}$

As soon as /i/$_\pi$ is inserted for Asp^0, a π-cycle is triggered on /$\sqrt{}$xɾan-∅-i/. After that, Vocabulary Insertion proceeds to insert /-l/ and /-i/. Since we are assuming that there is no M-Word phonology, we can claim that the phonology simply 'cycles out' on these remaining exponents, *using the cophonology π previously set in the phonological grammar by the diacritic π*. Nothing is shipped off to a separate M-Word level phonology as in Embick's system, but the computation is simply continued to the end of the phase. This stems from the idea that the phase sets the crucial domain for phonological computation and not the morphological word.

To formally implement the idea that the phonological grammar $\mathcal{G}$ may 'cycle out' on the exponents /-l/ and /-i/, we need to be very explicit about how a cophonology is set in $\mathcal{G}$. Let us assume that $\mathcal{G}$ has a *buffer* that stores the relevant π, which is essentially a list of ranked constraints:

(46) *Buffer of $\mathcal{G}$*
a. Phonological grammar $\mathcal{G}$ has a buffer which stores instructions for ranking constraints π (a cophonology): $\mathcal{G}_{\{\pi\}}$
b. If an exponent specifies π_1, then $\mathcal{G}_{\{\pi_1\}}$
c. If no exponent specifies π, then $\mathcal{G}_{\{\pi_0\}}$ (use default cophonology)

The crucial idea behind this formalization is that a cophonology needs to be contained in the buffer of the grammar, but if no cophonology is specified, the grammar just uses the cophonology that is treated as default. In NM Slovenian, this would be the /i/-preserving cophonology because it is more wide-spread through the grammar than the /i/-deleting one.

It now becomes crucial to set a locality constraint on the buffer. We will assume that the buffer retains the cophonology until it either encounters a

new π-diacritic, or when it encounters the end of the phase-cycle. We can assume that the end of the phase-cycle the buffer needs to 'reset':

(47) *Buffer locality*
The buffer will retain π_n introduced by an exponent until:
a. an exponent specifies π_m
b. the end of the phase-cycle (where the buffer resets)

That the buffer can be overridden by a new cophonology is a standard assumption on how cyclicity works either on the Cyclic level of phonology in the system used by Embick (2010, 2013), or in Cophonology Theory (Orgun 1996; Inkelas & Zoll 2007; Inkelas 2008, 2011); here it is just stated formally. The other locality constraint on the buffer is essentially that of a phase-boundary: the idea that the buffer has to reset with each phase is a formal implementation of phases interrupting construction-specific phonological processes. The locality constraint in (47), therefore, predicts that the buffer can only be tampered with in one of the two cases just discussed (a. or b.). In the NM Slovenian participles, as shown in (45), the buffer will be set for an /i/-deleting cophonology, which is triggered by π_i on the Asp^0 exponent /-i/: after the π_i-cycle has been run on /$\sqrt{}$xran-∅-i/, the /i/-deleting cophonology π_i should be retained in the buffer, as no new π is introduced, and the end of the phase has not been reached. This should ensure that the /i/-deleting cophonology will affect the M.PL /-i/. The locality constraint in (47) becomes a necessity as soon as we assume that there is no M-Word level phonology which the whole participle could be shipped off to – the grammar $\mathcal{G}$ needs to literally 'cycle out' on the yet unprocessed exponents with whatever it has in the buffer. The locality constraint in (47) basically only requires the buffer to be tampered with when absolutely necessary – only when one of the two locality boundaries is met.[50]

Let us now derive the process of /i/-deletion or the lack of it in NM Slovenian, by assuming that the cophonologies are stored in the proposed buffer. We need to assume that NM Slovenian has two cophonologies: the default cophonology π_0 is the /i/-preserving one, whereas π_1 is the construction-specific cophonology that triggers /i/-deletion. Let us first construct the relevant derivations with place-holders standing in for the real syntactic heads and exponents, before we move to NM Slovenian, to explain how the *buffer* we defined above works as a model:

[50] Future inquiry should determine the validity of this analysis; if it proves to be on the right track, this requirement could be derived from principles of computational efficiency, which natural human language follows in some way or another (Chomsky 2001, 2005).

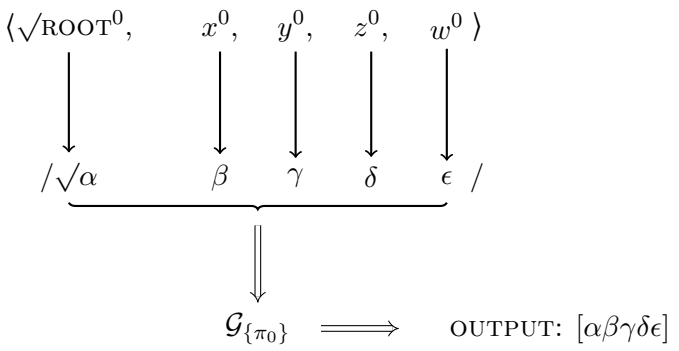

Figure 4.9: Single phase cycle with no π-cycles

In Figure (4.9) above, the concatenated heads [$\sqrt{\text{ROOT}}^0 \oplus x^0$, $x^0 \oplus y^0$, $y^0 \oplus z^0$, $z^0 \oplus w^0$] are shown, which are represented as a list of n-tuples. These heads are all contained within one phase-cycle. When Vocabulary Insertion inserts the exponents /α/, /β/, /γ/, /δ/ and /ϵ/ for the list of syntactic heads, all these exponents are processed in one phonological cycle. Notice that no π-diacritic is specified on any of the exponents, which is why the buffer of the grammar $\mathcal{G}$ sets π_0, the default cophonology for phonological computation. Now consider Figure (4.10):

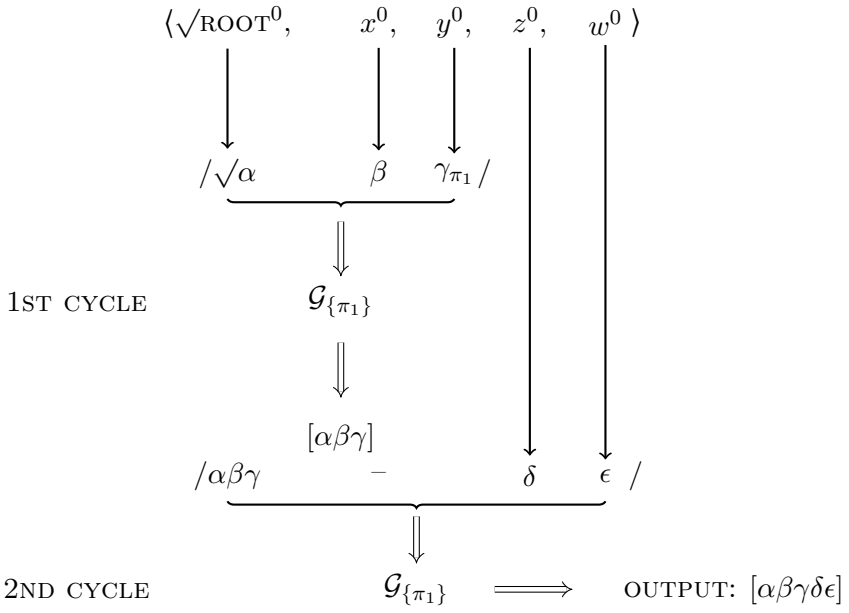

Figure 4.10: Single phase cycle with a π-cycle (π_1)

Here, the list of syntactic heads again constitutes a phase-cycle. However, when Vocabulary Insertion inserts the exponent for y^0, the exponent comes specified for a π-cycle. As soon as the exponent $/\gamma/_{\pi_1}$ is inserted, a cycle is run on $/\sqrt{}\alpha\beta\gamma/$, which is processed by $\mathcal{G}_{\{\pi_1\}}$, with cophonology π_1 set in the buffer. After this cycle has produced an output, Vocabulary Insertion continues with insertion, producing the exponents $/\delta/$ and $/\epsilon/$. After that, these two exponents need to be processed phonologically, which is why the grammar $\mathcal{G}_{\{\pi_1\}}$ simply cycles out on these remaining exponents, retaining π_1 in the buffer because no other π is specified on these exponents and because no intermediate phase-boundary is encountered.

Let us now finally turn to NM Slovenian. The following example illustrates the derivation of the participle [ˈ$\sqrt{}$xɾan-əl] 'having fed (M.PL)' from /$\sqrt{}$xɾan-i-l-i/. All the syntactic heads are contained in the verbal phase here, as noted before, and the Asp^0 theme exponent /-i/ will bear π_1:

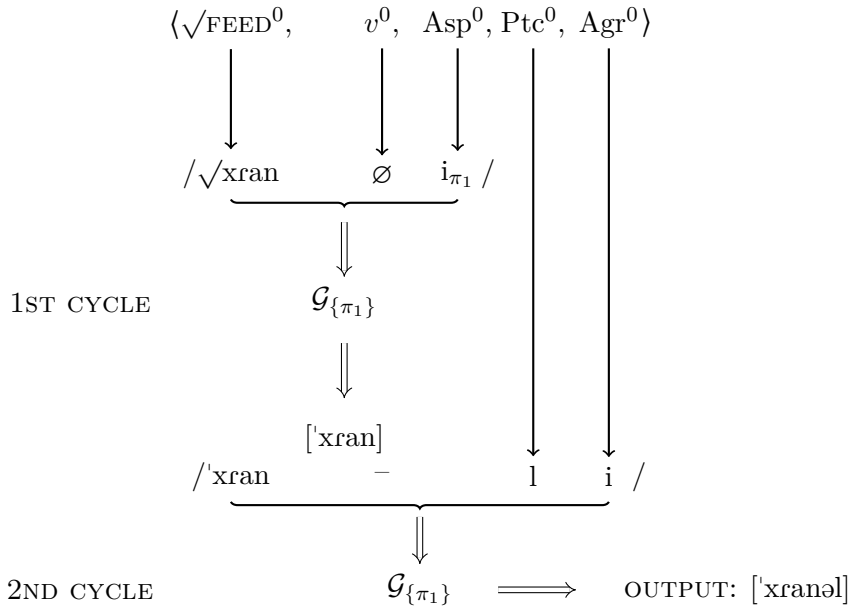

Figure 4.11: Deriving the participle [ˈ$\sqrt{}$xɾan-əl] 'having fed'

The diacritic π_1 specified on the Asp^0 exponent /-i/ triggers a π-cycle and sets π_1 in the buffer; this means that the π-cycle is processed by the /i/-deleting cophonology. After the π-cycle has produced an output, the remaining exponents, viz. /-l/ and /-i/, are inserted. Now the grammar needs to cycle out on these to process them phonologically. Since these two exponents

bear no π and they are contained in the same phase-cycle as the previously inserted exponents, the grammar retains π_1 in the buffer for their phonological processing. This is how the word-final M.PL /-i/ is deleted. With nouns and adjectives, we expect $\mathcal{G}$ to set π_0 in its buffer since no π-diacritic seem to be specified on any of the exponents there; this means that simple nouns and adjectives listed in Table (4.7) will be processed according to the schema outlined in Figure (4.9): that schema implies that whole nouns and adjectives are processed in a single phonological cycle with the default, /i/-preserving cophonology π_0 set in the grammar's buffer.

The approach which we have proposed here introduces the idea that the phonological grammar has a 'cophonology' buffer which obeys phasal locality. This approach explains the π-specification of exponents as the source of construction-specific phonological effects, and their boundary is delineated by the end of a phase. This explains construction-specific phonological effects as an arbitrary property stipulated lexically on the exponents, which is essentially how Embick (2013) and Halle & Vergnaud (1987) treat them, and this is also how Cophonology Theory (Inkelas & Zoll 2007; Inkelas 2008, 2011) treats them. Recall that, in section 4.3, we explained that only some exponents of Asp^0 need to trigger a π-cycle: these were the theme /-i/, the semelfactive /-ni/ and the zero theme /-$\varnothing_1$/, whereas the rest could potentially trigger them or not (except for the second zero theme /-$\varnothing_2$/ used solely with $\sqrt{}$b- 'be' and $\sqrt{}$ʃ- 'go' formations). The analysis involving the grammar's buffer and phasal locality actually forces us to assume that all the other exponents of Asp^0 (again, except /-$\varnothing_2$/) trigger a π-cycle. This is because /i/-deletion needs to be triggered by introducing π_1, the /i/-deleting cophonology, through a diacritic. Crucially, this diacritic needs to 'persist' into the next cycle of phonological computation so that the M.PL /-i/ will delete when the grammar 'cycles out' on it. However, this is again not much different from approaches such as that advanced by Cophonology Theory, where construction-specific phonological effects must be stipulated lexically on some exponents in some manner.

This section has discussed a crucial solution that explain how the /i/-deleting cophonology can target the word-final M.PL /-i/ in the participles of NM Slovenian. The proposal that we have developed involves doing away with the rigid distinction between Cyclic phonology and M-Word phonology that Embick (2010, 2013) employs. This is replaced by a more direct reference to phases in phonological computation, and we have also introduced the notion of a 'buffer' that the phonological grammar operates with. The positive theoretical aspect of this approach is that it attempts to derive phonological domains as direct reflections of syntactic cycles (phases).

This approach is also empirically superior in that it manages to derive the construction-specific /i/-deletion process in NM Slovenian where other approaches fail. However, a crucial *caveat* is in order: this approach was developed to account for the /i/-deletion process in NM Slovenian in a way that follows from (some) independent properties of the grammar, but this is nevertheless a first, tentative attempt at deriving processes like this in a formally tractable fashion. In the future, this approach will certainly need to be modified for more adequate empirical coverage, if not for theory-internal considerations. With that in mind, it should be treated as a platform for future discussion of such phenomena and by no means a final proposal.

Chapter 5

Conclusion

The present thesis has presented data from Novo mesto Slovenian, a South Slavic language, which have revealed a process of unstressed /i/-deletion. The interesting aspect about this process is that it appears to be construction-specific: /i/-deletion is found in verbs and participles, but not in nouns or adjectives, where unstressed /i/ is fully preserved on the surface.

In chapter 3, we proposed an analysis of /i/-deletion in a way that intertwines it with schwa epenthesis, which also appears to be operative in Novo mesto Slovenian. We encountered examples where schwa-epenthesis overapplied on the surface, for which we had posit two cycles of phonological computation. It should be noted that this step proposes a specific account of schwa epenthesis in verbs and participles in Novo mesto Slovenian, and as such it will be relevant for the examination of other neighbouring dialects. However, a particularly curious aspect of the cyclic analysis should be emphasized: in section 3.2 in (31), we were forced to propose the constraint MAX-$\mathcal{F}(\mu)$, which is not a typical MAX-constraint, as it refers to input and output moras (within the foot) which do not need to be in a correspondence relation. This was a necessary step to derive the generalization that the masculine plural /-i/ surfaces with a ['CVC]-configuration followed by a sonorant (see 3.2 for details). Since the generalization itself is sound, future work should consider different formal implementations of it, perhaps even reducing it down to the interaction of several constraints. The various different formal implementations were not examined further here because the over-reaching focus of this thesis is elsewhere, and also due to length limitations.

In chapter 4, we turned back to the process of /i/-deletion and studied it from the perspective of the PF-interface. Recall that the masculine plural agreement suffix /-i/, may attach to a participial stem, as in [PTC]-/i/, and under specific phonotactic conditions undergo deletion. But when this same suffix attaches to an adjectival or nominal stem, as in [ADJ]-/i/, it is preserved under the same phonotactic conditions in which it deletes with participles. We demonstrated that this is presents an empirical challenge for frameworks such as Cophonology Theory (Inkelas & Zoll 2007; Inkelas

2008, 2011), where the final attaching suffix, in our case /-i/, cannot 'inherit' the phonology specified in the derivational history of the stem. For approaches such as that of Embick (2013), who follows the phonological levels (Cyclic/Word/Phrasal level) of Halle & Vergnaud (1987), the phenomenon was also problematic: such an approach either under-generates by positioning /i/-deletion in the stem (on the Cyclic level), where it cannot affect the suffix /-i/, or it over-generates by positioning /i/-deletion on the Word level phonology, where it affects the entire grammar (i.e. all word classes). In 4.4, we came to the conclusion that this problem is rooted in the way such approaches define phonological domains. The fixed Cyclic vs. Word level distinction is too rigid and too restrictive. In section 4.5, we subscribed to the general research program set by Marvin (2002), Marantz (2007), Samuels (2009), Piggott & Travis (2013) and Newell & Piggott (2014), which seeks to uncover reflections of syntactic phases (Chomsky 2001, 2008) in phonology. We noted that an adequate generalization about the /i/-deletion facts can be made if it is assumed that phonological domains are generally set by *phases* and not by *fixed phonological levels*. The important contribution of such an analysis is the observation that phases also form a locality boundary for construction-specific phonological processes.

In the remainder of section 4.5, we formulated a brief and tentative proposal that formally implements the idea that phonological computation proceeds in phases. We proposed that the 'instructions' for phonological processing are stored in a *buffer* of the phonological grammar, which obeys phasal locality: more specifically, in Novo mesto Slovenian verbs and participles, an exponent in the stem triggers /i/-deletion, sending the instructions for an /i/-deleting phonology to the phonological buffer. This means that the stem is computed first, to the exclusion of the participial /-l/ and masculine plural /-i/. But after the stem has been computed, the /-i/ is added to the stem and the grammar 'cycles out' on whatever unprocessed exponents are left in the phase. When doing so, it uses the same phonology in the buffer that was specified by the stem because no phase boundary intervenes to 'reset' the buffer. This is a first attempt at deriving construction-specific processes like that of /i/-deletion. Future research should fully flesh out the predictions it makes, and in particular examine how it could be made to work with multi-phasal spell-out. If this proposal is on the right track, it would provide an important argument for a modularly distinct, but unified theory of grammar, where the locality constraints on syntactic computation are witnessed 'all the way down'.

As an additional note, the data and analysis presented in this thesis should be of interest for a diachronic inquiry. It is a well known fact that

Slovenian dialects had undergone a more general historical process of high-vowel reduction and deletion (Lenček 1982; Greenberg 2000), which must have resulted in the system found in Novo mesto Slovenian, where /i/-deletion survived into the synchronic grammar, but in a limited fashion, reduced to word-final positions (rendering it *apocopal*) in only verbs and participles. The diachronic path of development that led to this situation should be of substantial interest to theories of phonology and morphology.

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