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Phonology to the rescue: Nez Perce morphology revisited

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Abstract: Minimalist Morphology predicts that allomorphy is conditioned inward and locally, and that the domains of morphosyntactically and phonologically conditioned allomorphy selection are identical. Amy Rose Deal and Matthew Wolf have put forward two cases of allomorphy in Nez Perce that appear to be conditioned by an outward phonological context. I present an analysis of Nez Perce morphology and phonology which supports the conclusion that the first case is not outward-conditioned, and the second case is not allomorphy but phonology.

Keywords: allomorphy; Distributed Morphology; locality; Minimalist Morphology; Nez Perce; Stratal OT

1 Morphological locality and its challenges

1.1 Locality in Minimalist Morphology

Early generative work on allomorphy, initiated by Siegel's (1974) and Allen's (1978) studies of derivational morphology, and culminating in Carstairs' cross-linguistic investigation of inflectional paradigms (1980, 1987), arrived at two basic locality constraints, Adjacency and Peripherality, cited here from (Carstairs 1987: 193, 196).

(1) a. Adjacency Condition
No Word Formation Rule can involve X and Y, unless Y is uniquely contained in the cycle adjacent to X.

My thanks to Amy Rose Deal and to two referees for their very useful comments on an early draft, which both forced and enabled me to sharpen the argumentation, turning it into an entirely new paper. This work is greatly indebted to the thorough documentation and analysis of Nez Perce by Haruo Aoki and Harold Crook.

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b. Peripherality Condition
The realization of a property P may be sensitive inwards, i.e. to a property realized more centrally in the word-form (that is, closer in linear sequence to the root) but not outwards to an individual property realized more peripherally (further from the root).

These constraints were based on limited data, and Carstairs' realizational framework did not offer a formal rationale for them. But his work inspired a body of analytic and typological research on morphological systems, which broadly supported the generalizations, and a hunt for a theory of morphology in which they follow from first principles. The present paper is intended as a contribution to both these strands of research.

Lexical Morphology and Phonology (LPM, Kiparsky 1982; Mohanan 1986; Pesetsky 1979) was a first step in this direction. It is a constructional (generative, "lexical-incremental", Stump (2001)) approach in which morphology incrementally merges stems and affixes, and assembles the morphosyntactic, phonological, and semantic properties of the resulting combinations from the properties of their parts at each step, resulting in fully interpreted words that are the input to syntax. Peripherality then follows automatically, since when an affix is added, later affixes and the properties introduced by them are simply not there yet. Adjacency follows if we assume that the internal structure of a stem is erased (or becomes inaccessible) after the stem has been combined with another affix.

LPM had other positive consequences for morphology. Because the output of each combinatoric operation is phonologically and morphosyntactically interpreted, LPM predicts the cyclicity of lexical phonology, the sensitivity of phonological affix selection to cyclically derived representations, and, as we'll see, the Mirror Principle. By recognizing level-ordering, and allowing phonological processes to be restricted to derived environments, LPM relieves morphology of some responsibilities that it is ill equipped to handle (see Section 1.3 below), and eliminates some apparent non-local morphological interactions (Kiparsky 1996).

Some of LPM's features were adopted in Minimalist Morphology (MM, Stiebels 2006; Wunderlich 1996, 2001; Wunderlich and Fabri 1994). Like LPM, MM is a morpheme-based generative theory of morphology of the type assumed by Chomsky (1995), which conforms to the Minimalist Program in several respects. First, it uses a minimal combinatoric engine, essentially just a merge operation with none of DM's morphological adjustment operations, such as fission, fusion, impoverishment rules, readjustment rules, M-merger, movement, morphological metathesis, or rules of allomorphy. It runs on a formally clean version of OT, in the sense that it eschews transderivational devices such as Output-Output constraints, Paradigm Uniformity constraints, and Sympathy constraints, which are known to be computationally intractable.[1] It is also representationally minimalist. Morphemes bear a minimum of featural information in the lexicon, and they may be incompletely specified as in Prosodic Morphology, though they cannot be entirely devoid of properties, for then they would be undetectable. Finally, it minimizes dependencies. All morphological operations are local, in that the selectional restrictions of affixes must be locally satisfied, and no long-distance contexts are admissible.

The version of MM that I will assume builds on this foundation.[2] It treats morphology as the innermost layer of syntax. Recursive merge in the morphology derives fully interpreted words that are inputs to the sentence syntax, where merge continues, but is now subject to syntactic locality constraints. Instead of the classical monostratal parallel OT of previous versions of MM, this version adopts Stratal OT, where the stem level and the word level may differ in constraint ranking. Moreover, it addresses derivational morphology as well as inflection. Cyclicity and the Mirror Principle are derived from the cyclic interleaving of morphology and phonology as they were in LPM. For example, the Sanskrit passivized causative *kāryate* 'is caused to be done' is derived by first adding the suffix *-i* to causativize the root *kr̥* 'do', and then adding the suffix *-ya* to passivize the result (where passivization existentially binds the highest argument):

(2) λxλy [y *kr̥* x] → λxλyλz [z cause [y do x]] → λxλy∃z [z cause [y do x]]

In a cyclic derivation, the causative /-i/ lengthens the root when it is added; in the next cycle it is itself truncated before the passive morpheme /-ya/, causing the lengthening to become opaque.

(3) $$\text{kr̥} \xrightarrow{\text{M}} \text{kr̥ -i} \xrightarrow{\text{P}} \text{kār -i} \xrightarrow{\text{M}} \text{kār -i -ya} \xrightarrow{\text{P}} \text{kār -}\varnothing\text{ -ya} \xrightarrow{\text{M}} \text{kār -}\varnothing\text{ -ya -te}$$

Locality is derived as follows. Word formation is either affixation to a base, or compounding of bases. A base can be a root, a stem, or a word, but it cannot be an affix. Word formation begins with an underived base, and proceeds incrementally

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1 The violation of such constraints depends on rankings of other constraints, or on the existence of other (real or fictitious) outputs. They undermine three of OT's central goals: formalization, learnability, and a restrictive factorial typology. Formalizations or learning algorithms for OT ignore them (Enguehard et al. 2018; Potts and Pullum 2002; Riggle 2009; Tesar and Smolensky 1998, 2000), and they are not compatible with any existing OT software (Boersma andWeenink 2007; Bowman 2012; Hayes et al. 2017; Riggle et al. 2011; Staubs et al. 2010).

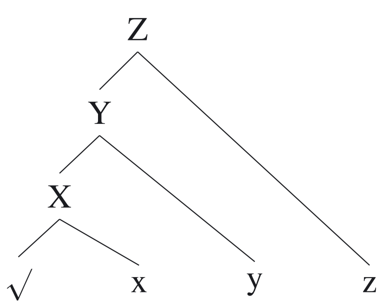
2 A somewhat related incremental approach is Müller's (2020) Harmonic Serialism-based theory of inflectional morphology.

to larger constituents. This excludes outwardly sensitive affix selection, because upcoming material is not yet present at the point when an affix is selected, and it cannot be replaced afterwards when the outward context comes into view, since allomorphy is handled only by selection, and there are no replacive operations or readjustment rules. An affixal allomorph can be selected by the structurally adjacent morpheme of the stem to which it is added, but not by an affix located deeper inside the word. The erasure of internal structure that predicts this (Allen 1978) is independently needed in so far as syntactic operations do not affect word-internal structure or care about the difference between simple and derived words (although these facts in themselves do not determine its timing in the morphological derivation). Affixes can, however, be selected by the morphosyntactic features that the stem to which they are added bears inherently or has acquired from previous affixes.

The same locality and inward sensitivity and constraints that constrain allomorphy are predicted to apply to the selection of the morphemes themselves. As in much of the modern morphological literature, the term ALLOMORPHY here refers to phonologically unpredictable, suppletive alternation. It does not refer to phonological alternations, which are contextual accommodations implemented after morphemes are in place, either cyclically in the word phonology or postlexically; such operations have different formal properties and obey different locality conditions, where *phonological* adjacency is key and outward dependencies are routinely encountered (Kiparsky 1996).

Consider a morphological structure of the form (4), representing hierarchical relations but not linear order.

(4)



The possible inward dependencies in (4) are those in (5),

(5) a. z can depend on Y and on its immediate constituents X and y
b. y can depend on X and on its immediate constituents √ and x
c. x can depend on √
d. √ can depend on x
e. z can't depend on x or on √

and outward morphological dependencies, even local ones, whether morphological or phonological, are entirely ruled out:

(6) a. y can't depend on z,
b. x can't depend on y or on z,
c. √ can't depend on y or on z

When a *root* is combined with an affix, this setup predicts that dependency in both directions is possible, for bound roots and affixes by themselves are not cyclic domains, as independently shown by the fact that they are not necessarily phonologically well-formed stems. The first step of the derivation is then to merge the root with an affix, at which point they can morphologically select each other.

(7)

In fact, affixes commonly select root allomorphs; mutual selection is also common. I return to this point with Nez Perce examples in Section 2 below.

Many generalizations about word structure are violable, but not anything goes. A morphological theory should be able to handle the exceptional cases gracefully with a minimum of extra machinery. The Mirror Principle, for example, is violable. Counterscopal affix order and constituency (bracketing paradoxes) are well-attested, and any theory must accommodate them. In MM they arise when morphotactic constraints force morphemes to be "tucked in" before the affix that was added in the previous cycle (because of bracketing erasure it cannot be inserted any lower). This makes the unique prediction that affixal scope mismatches are associated with non-cyclic/anti-cyclic application of phonology (ENDOCYCLICITY, Hyman and Orgun 2005). Bracketing paradoxes are just the special case when the affixes are on opposite sides of the stem.

Seeming long-distance effects that masquerade as exceptions to (4a) arise by the inheritance of morphosyntactic features upwards through successive cycles, ending up as properties of the words that the morphological derivation outputs. The architecture requires this since words must be fully specified for morphosyntactic features in order to combine with each other in the syntax. For example, supposing that a passive affix modifies the argument structure by existentially binding the subject, the argument structure of the stem it attaches to is inherited through successive stages of affixation and can then condition morphology across intervening affixes in the word, and agreement and case assignment in the syntax. Its morphological source, though, is not accessible, due to bracketing erasure.

Finally, affixes can fuse into composite affixes whose properties are not fully predictable from their parts. We will see a Nez Perce case in Section 3.1. An English example is the fusion of *-ist* and *-ic* into an affix *-istic*, whose independence is revealed by semantics, morphology, and phonology. Semantically, *novelistic*, *artistic*, and *stylistic* denote properties of novels, art, and style, not properties of novelists, artists, and stylists. *Simplistic*, *cannibalistic*, and *characteristic* are derived by *-istic* from *simple*, *cannibal*, and *character*, not by *-ic* from **simplist*, **cannibalist*, **characterist*. Subtler morphological evidence is that words in *-istic* and *-ic* accept different suffixes: *-ic* is productively suffixed with *-ity* and *-ize*, but **atheisticity*, **stylisticity*, **simplisticize*, **characteristicize* are impossible. On the phonological side, end-stressed polysyllabic bases accept *-ic* but not *-istic*: *alarmist, careerist, cartoonistic, elitist, defeatist, Fourierist* vs. **alarmistic, *careeristic, *cartoonistic*, **defeatistic*, **elitistic*, **Fourieristic* are (Strauss 1982). Since these properties of *-istic* are not properties of either *-ist* or *-ic*, we conclude that *-istic* is a separate suffix in its own right. Recognizing *-istic* as a stem-level suffix also resolves the level-ordering problem of adding stem-level *-ic* to word-level *-ist*.

1.2 Locality in Distributed Morphology

MM is in many respects similar to Distributed Morphology (DM, Arregi and Nevins 2012; Embick 2010, 2015; Harley 2014; Marantz 1995, 2013). Both theories are morpheme-based and countenance morphological constituency, and both are compatible with the Minimalist Program (though I argue below that MM is conceptually and empirically a better fit). The major formal difference is that whereas MM is constructional/generative, DM is realizational/interpretive. DM assumes that words are built in the syntax and spelled out in the morphology. Syntactic terminals are shipped to the morphology for spellout in certain domains, which are identified with syntactic PHASES by some authors, but distinguished from them by others, including Deal and Wolf (2017) for Nez Perce (see Section 2). Each domain contains one or more terminals, which are hierarchically organized but not yet linearized.

Spellout within a domain cannot see terminals outside of it. This embodies a substantial locality constraint on morphology, but it does not restrict dependencies within a domain. If (4) and (7) are at all on target, DM will need addenda that enforce local inward dependency. One candidate is (8).

(8) Vocabulary insertion applies first to the most deeply embedded node in a structure and then targets outer nodes successively. (Embick 2010: 42).

Coupled with an appropriate bracket erasure convention, (8) ensures that spellout accesses inward local contexts.

One weakness of this approach is that (8) is not conceptually motivated in DM, as Embick (2010, 2015: 193) points out. In a realizational theory, there is no formal reason why spellout should take place one terminal at a time in a uniform outward direction, rather than applying first to the outermost node and inward from there until it reaches the most deeply embedded node, or simultaneously everywhere, or in random order.

Secondly, (8) is applicable also to root affixation, because the DM literature defines the root $\sqrt{}$ as the most deeply embedded node in structures such as (4) and (7) (Deal and Wolf 2017; Wolf 2013). Then (8) causes the root to be spelled out first, in which case its allomorphy cannot depend on its sister affix, contrary to what is observed in many instances, including the Nez Perce case examined in Section 2. One might ask why the root should be more deeply embedded than its affixal sister, since both actually sit at the same depth in the tree. But if the definition is dropped, and both are considered equal in depth, then (8) will be undefined for them. A remedy might be to change its wording to: "Vocabulary insertion applies first simultaneously to the daughters of the most deeply embedded branching node in a structure and then targets outer nodes successively."

In contrast, because MM has no spellout and locates allomorphy selection at merge, it derives both inward dependency and root-affix mutual dependency as theorems, as we saw in Section 1.1.

Another point is that bracket erasure is not conceptually motivated either in DM, nor empirically needed for anything else than precluding long-distance inward morphological dependencies. In MM it is at least needed independently to guarantee the inaccessibility of word-internal structure to syntax, though its timing in the morphological derivation must be fixed on empirical grounds. The strongest hypothesis is that the internal brackets of a base are erased once it has been merged and the result has been phonologically and semantically interpreted. Conceivably this is subject to parametric variation, like the subjacency constraint that it is reminiscent of. Deferred bracket erasure would allow non-local conditioning, but still only inwardly.

Finally, in DM the morphosyntactic features are always there already on the abstract syntactic terminals prior to spellout. This opens up the possibility that they could condition inward and outward allomorphy selection regardless of where vocabulary is inserted, and even that morphosyntactic and phonological/morphological conditions on allomorphy selection might apply in distinct domains. If this formal freedom is not realized in languages, (8) or its amended version needs to be complemented with additional constraints. Bobaljik 2000 reasoned that the featural content of the abstract terminals of an entire phase should be visible to morphology until the terminals are spelled out, allowing both long-distance and local outward dependency on morphosyntactic properties. He further conjectured that cyclic spellout discharges the abstract featural content and renders it invisible, and leaving the purely morphological, "diacritic" properties of morphemes (and presumably also their phonological properties) accessible throughout the remainder of the derivation, allowing local and long-distance inward dependency on them. His argument that this theoretical expectation is confirmed in Itelmen verb morphology, while tightly reasoned and well documented, relies on fragile analytic assumptions about the morphological constituent structure of inflected verbs and about the distinction between allomorphy and agreement (Bonet and Harbour 2012: 232), and awaits further confirmation.

Carstairs (1987: 186–188) arrived empirically at just the opposite generalization, that outward phonological conditioning occurs, but outward morphological and morphosyntactic conditioning does not, and accordingly formulated his Peripherality Condition (1b) to exclude phonological conditioning.

Optimal Construction Morphology (Inkelas 2017) has yet another, more permissive view on phonological and morphosyntactic conditioning of allomorphy. It assumes that morphemes are inserted cyclically from the bottom up, but that the syntactic and semantic "target features", rather than being expunged when their morphological exponents are inserted, remain visible throughout the derivation. This gives morphology access at every stage to a target which contains the syntactic and semantic features of the word under construction.

In contrast, MM predicts out of the box that phonological and morphosyntactic allomorphy selection takes place in the same domain. At present this simple and strong hypothesis remains empirically viable.

Other questions include how vocabulary insertion is related to linearization, and when roots are inserted in the derivation. Embick (2010, 2015) holds that spellout precedes linearization, Arregi and Nevins (2012) and Ostrove (2019) that it follows. Marantz (1995, 2013), Embick and Halle (2005), and Embick (2010) have roots inserted late, and Harley (2014) has them inserted early because their allomorphs compete with each other by the Elsewhere Condition, like affixes do.[3] DM leaves these questions to be decided on merely empirical grounds. In MM they do not even arise, since there is no process of linearization and no spellout to begin

3 Any doubts about the existence of suppletive root allomorphy have been laid to rest by Veselinova (2006), Siddiqi (2009), Bonet and Harbour (2012), Haugen (2016), Kilbourn-Ceron et al. (2016), (Spencer 2016: 9), Inkelas (2017), among others.

with. There is no way morphology can *not* see linear order, and there is no way roots can *not* be "inserted" at the same point in the derivation as other morphology.

The common theme of this section is that DM per se does not predict locality beyond restricting vocabulary insertion to a phase: much of its empirical content depends on how the spellout procedure is set up and what additional conditions are placed on it. With (8) added it excludes local and long-distance outward conditioning of allomorphy by the phonological and morphological information introduced by spellout within the phase, but still leaves open the possibility of outward conditioning of allomorphy by the morphosyntactic information present in the syntactic input of the phase. In every case MM makes a simple *intrinsic* architecturally grounded prediction that can't be far off the mark given our current understanding of the empirical terrain.

1.3 Readjustment rules: morphology or phonology?

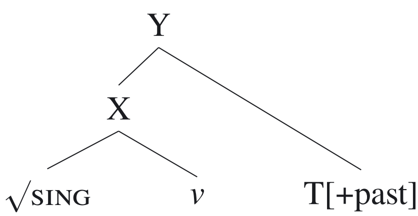
Most articulations of DM allow READJUSTMENT RULES to apply after spellout. Some researchers define readjustment rules as phonological operations that are morphologically or morphosyntactically conditioned (Embick 2010). Others define them as morphologically conditioned allomorphic replacements, which may perform even global operations, such as *-ceive* → *cept* in *reception* (Siddiqi 2009). Moreover, in practice they are allowed to be conditioned not only by morphological contexts, but also in the context of arbitrarily listed morphemes, and to apply to particular listed morphemes (Embick and Halle 2005; Halle and Marantz 1993). They are not claimed to be subject to morphological or phonological locality conditions. Unlike allomorphy selection, their trigger need not be adjacent to the target, nor in the same morphological constituent as the target; and unlike phonology, they do not operate on single segments under structural adjacency. They just have to be in the same PF cycle (the READJUSTMENT ACTIVITY HYPOTHESIS, Embick 2010). It is not settled how they are supposed to interact with phonology and with allomorphy, or indeed whether they are distinct from either of those things.

The main use of this powerful device in DM has been for non-concatenative morphology, and specifically to derive stem alternations such as ablaut and umlaut by means of operations conditioned by overt or null affixes. A standard example is the readjustment rule that takes *sing* to *sang* by replacing its vowel *i* by *a* before the Past tense suffix, which is then deleted (Embick 2015, 202, among others). Some researchers claim that the only legitimate use of readjustment rule is for such stem alternations (Božič 2019), and that other alleged readjustment rules are really just instances of allomorphy.

But even the core uses of readjustment rules for stem alternations have been questioned, both by critics of DM (Pullum and Zwicky 1992; Stump 2001) and by its advocates (Haugen 2016; Merchant 2015). Siddiqi (2009, 30) observes: "In addition to the marked complexity of the derivation of a relatively innocuous word like *mice*, a strange interdependence occurs in the derivation. The null plural morpheme is licensed by the presence of *mouse* and the readjustment of *mouse* to *mice* is licensed by the presence of [PLURAL]". In response to such qualms, he explores alternative accounts that list the variant forms of the stems as allomorphs of the root selected by the null morpheme. Embick (2017) proposes that strong verbs are parts of complex lexical items which are inserted into non-terminal nodes; the past tense allomorph *sang* in (9a) is inserted in (9b).

(9) a. √SING, T[+past] ↔ sang
√SING ↔ sing

b.



This makes sense for true suppletion of the *go* ~ *went* type, but not for systematic ablaut patterns, some of which even have a measure of productivity.[4]

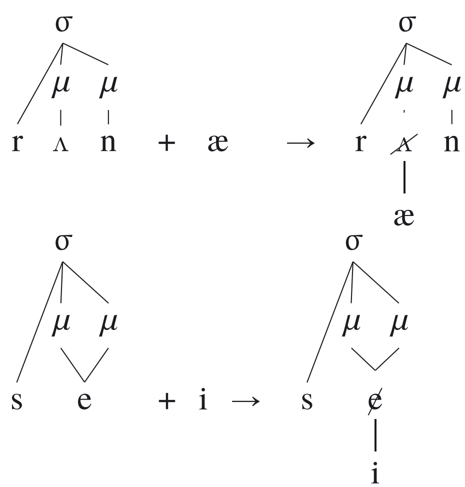
Prosodic Morphology offers a third, arguably superior approach to stem alternations, which is consistent both with MM and with DM (Bermúdez-Otero 2012, 2013; Bye and Svenonius 2012; Kiparsky 2020; McCarthy and Prince 1993; Revithiadou et al. 2019; Trommer 2011, 2015b). It generalizes the classical morpheme in two ways. The first generalization is that morphemes can be phonologically underspecified. Their phonological content is not necessarily a sequence of fully specified segments, but it can include or consist of feature bundles with no segmental or syllabic structure, or syllable structures with sparse featural content or none, or (in some OT versions of the theory) even a constraint ranking. The second generalization is that morphemes are combined by the association procedures of autosegmental phonology, which govern locality, directionality of association, extrametricality, and feature combinations (as needed in phonology for OCP effects, among other phenomena), with simple concatenation just the special

4 The strong past tense forms *dug*, *stuck*, *strung* have replaced older weak past tense forms *digged, sticked, and stringed*, and *struck*, *wrung*, *hung*, *won*, *snuck* have replaced older less regular strong past tense forms.

case which arises when they are composed of separate segments. At the same time, non-segmental morphemes are like ordinary affixes in the kinds of morpho-syntactic features they bear, and in their distributional properties, scopal relations in the word, and locality of allomorphy selection. The theoretical gain is that "non-concatenative" morphology then falls under the intersection of well-established phonological and morphological principles.

Prosodic Morphology makes it possible to treat stem modifications such as umlaut and ablaut not as allomorphy or readjustment effects, but more insightfully as floating feature bundles with no segmental or syllabic structure of their own, which dock on the nearest possible segmental slot and overwrite it. In *mice*, *geese*, and *women*, for example, the plural allomorph is a feature bundle [–back] superimposed on the stem vowel. In *sang* and *ran*, the past tense allomorph is a feature bundle [+low, –back] superimposed on the root vowel (10a). In Nez Perce, the imperfective (incompletive) aspect suffix *-see/-saa* combines with the plural *i*, giving *-sii* (10b).

(10) a. b.



In Section 3.1 I briefly present a Nez Perce instance of prosodic morphology, a stem-final floating nasal that accounts phonologically for what has been treated as stem-class allomorphy or a readjustment rule effect.

I will gloss non-concatenative morphological combinations with slashes, e.g. *ran* as run/Past, reserving the periods of the Leipzig glossing conventions for portmanteaux, e.g. *went* as go.Past.

1.4 Spans and portmanteaux

DM views inflectional morphology as spelling out terminal nodes in a hierarchical syntactic representation in which each functional category is a distinct head, and each head ideally corresponds to one distinct affix (Alexiadou et al. 2015; Kallulli 2007; Merchant 2015; Rivero 1990; Tsimpli 2006). Where several functional features correspond to a single affix, DM provides several analytic options: rebracketing operations that merge syntactic heads, realization of multiple heads by single affixes by fusion or spanning, and assigning one feature to the overt affix and the rest to null affixes to achieve a one-to-one feature/affix correspondence. For example, since Number and Person features are always morphologically bundled into one suffix in Latin and Greek verbs, DM could combine them into a single AGR head already in the syntax, or merge them into a single affix post-syntactically, or split them into a null number affix and an overt person affix with singular and plural allomorphs conditioned by the number specification of the null affix. MM eliminates rebracketing and fusion operations, and allows inflectional morphemes to have multiple features (as derivational morphemes on any analysis surely must have), and reduces the need for null affixes by default assignment of unmarked features to underspecified morphemes.

DM and MM have different consequences for morphological locality and extended exponence. Merchant (2015) points out that the selection of suppletive verb roots in Greek depends on both Aspect and Voice, which for him is separate syntactic heads. The locality condition (8), which restricts outward conditioning to morphosyntactic features of a linearly adjacent node, allows only the inner of these heads, assumed to be Voice, to condition root allomorphy. This requires rejecting (8) and allowing allomorphy to be conditioned by structurally adjacent SPANS, defined as sequences of contiguous heads in a single extended projection (Svenonius 2016).

Christopoulos and Petrosino (2018) object that allowing selection by spans opens the doors to unattested long-distance interactions. They stress that in no dialect or stage of Greek is root allomorphy triggered by inflectional material across *overt* suffixes. Both (4) and (8) predict this to be a cross-linguistic generalization. C&P argue further that allowing selection within a span amounts to abandoning adjacency altogether, since nothing formally prevents a conditioning span from containing material that is irrelevant to the selectional process. For example, long-distance selection of $\sqrt{}$ by the morpheme Z in [[[[$\sqrt{}$] X] Y] Z] could be treated as local selection by the span XYZ. For Greek, they account for the fact that Voice and Aspect are morphologically fused into a single suffix by positing a postsyntactic (morphological) rebracketing operation that flattens the constituent structure by collapsing the Aspect and Voice heads into a single head, viz. [[[Root]Voice] Aspect] → [[Root]Voice-Aspect]. The composite Voice-Aspect head conditions root allomorphy, and is itself spelled out as a portmanteau suffix.

In MM the Voice-Aspect portmanteau is the *only* possible analysis. There is no antecedent syntactic structure that morphology spells out, and therefore no fusion or flattening operations that combine separate heads into single portmanteaux. The conditioning contexts of allomorphy, and the locality conditions that govern it, are necessarily defined on morphological structure. This makes Greek root allomorphy locally conditioned, while still automatically ruling out hypothetical kinds of long-distance dependencies that DM needs additional constraints to exclude.

1.5 Towards a resolution

To recapitulate: MM's interface between morphology and syntax, semantics, and phonology predicts a set of stringent locality properties which, if correct, would have to be secured by supervenient constraints in DM. In particular, it predicts that allomorphy is conditioned inward and locally, while DM's architecture is consistent with allomorphy being conditioned by the material in an entire phase. Secondly, it predicts that the domains of morphosyntactically and morphophonologically conditioned allomorphy selection are identical, whereas DM is consistent with the possibility that they might take place at different stages in the derivation and within different domains.

Realizational/interpretive frameworks from Carstairs to DM have naturally sought locality conditions on allomorphy selection to restrain their excess power. Constructional/generative frameworks such as MM have struggled with the empirical challenges to the severe restrictions that they already impose intrinsically. They have addressed them partly by enrolling additional devices such as overgeneration with blocking, and partly by re-examining the critical evidence in the light of insights from phonology, including Stratal Phonology, Prosodic Morphology and Optimality Theory, which tend to be short-changed in the morphological literature. The present essay is a contribution to the latter part of that project.

Recent work, reviewed in Deal and Wolf (2017), Perry and Vaux (2018), and Božič (2019), has enriched the debate with an inventory of cases that seem to be inconsistent with DM constraints like (8), and a fortiori with MM. Some of them are artifacts of the assumption that features must correspond one-to-one to morphemes, and disappear once portmanteaux are recognized, as outlined in Section 1.4. Others have been shown to involve purely phonological processes rather than allomorphy (Revithiadou et al. 2019). This paper re-examines the two Nez Perce cases presented by Deal and Wolf 2017. They are among the clearest apparent instances of allomorphy selection conditioned by an outward phonological context that have been put forward so far. One of them turns out to be a root-suffix dependency of the type (7), entirely straightforward in MM, but in off-the-shelf DM requiring a weakening of

(8), such as the one proposed by Deal and Wolf (2017). The other case is more intricate and interesting. It involves a morpheme with apparent phonologically conditioned outward-sensitive allomorphy of type (6). Such an allomorphy relation is on the face of it incompatible with MM, and would necessitate another weakening of (8) in DM. I will present evidence that it is actually not a case of allomorphy but a phonological alternation, which duly obeys the applicable phonological locality principles. My findings are consistent with three tenets in particular: (1) that the contexts of allomorphy selection are local and inward, (2) that allomorphy does not involve replacement or conflation operations and can be limited without loss of generality to the selection of lexically listed allomorphs, and (3) that readjustment rules are not needed. The analysis also supports the demarcation of allomorphy and morphophonology proposed in Kiparsky (1996), which is consistent with MM.

2 Outwardly conditioned root allomorphy

The first case presented by Deal and Wolf (2017, henceforth D&W) involves the verb root 'go', 'do' (two homonymous roots in Aoki (1994, henceforth AD). It has two forms, /kuu-/ before a consonant and /kii-/ before a vowel. Each form has variants conditioned by regular phonology: /kuu-/ is lowered to *koo-* by vowel harmony in a word that contains any morpheme with *a* or *o*, as in (11c), (11d), (11e), and unstressed *kuu-/koo-* regularly shortens to *ku-/ko-*, as in (11b)–(11e). But the choice between /kuu-/ and /kii-/ itself, being morpheme-specific and not driven by any phonological constraint of the language, is a matter of allomorphy.[5]

(11) a. /kúu-t/ *kúu-t* 'going'
b. /kuu-síix/ *ku-siix* 'we are doing', 'we are going'
c. /hi-teqe-kuu-see-qa/ *hi-tqa-ko-sáa-qa* 'he took a quick trip recently'[6]

5 My examples come from Deal and Wolf (2017), Aoki (1970, 1979, 1994), Aoki and Walker (1988), and Crook (1999), henceforth D&W, AG, AT, AD, AW, and C, cited with page numbers. For examples sourced from the texts in AT and AW I also cite the running line number as marked there, e.g. AW 344: 118 means "page 344, line 118 of Aoki and Walker (1988)". My transcription adheres to the accepted tribal orthography used by D&W, with one exception: I retain Aoki's rendering of glottalized consonants as ṅ, ċ, etc., since it makes it clear that they are single segments, not clusters, as might be mistakenly inferred from the practical orthography's spelling *n*', *c*'. Indeed, there is a phonemic contrast between /Ċ/ and /'C/, e.g. *qiẏáaw* 'dry' vs. *qiyáw* 'thirsty', and even a marginal contrast between these and reverse clusters like /C'/ (Crook 1999: 46).

6 Nez Perce does not mark gender. The translations of my examples reproduce the gendered pronouns of my text sources.

d. /kuu-táayN-see/ *ko-táay-ca* 'I am pretending to go'
e. /kuu-see-qa/ *ko-sáa-qa* 'I did recently', 'I went a little while ago'

The prevocalic allomorph /kii-/ undergoes regular hiatus repair to *kiy-* (C 258).

(12) a. /kii-ú'/ *kiy-uu*' 'I will do', 'I will go'
b. /nées-kii-éňi-im-e/ *nées-kiy-eňi-m-e* 'you did something to ours/for us'
c. /'e-kii-úu-see/' *e-kiy-úu-se* 'I am going toward (it)'
d. /pe-kii-áatk-uu'/ *pa-kiy-áatk-o*' 'we will take part'
e. /píi-téew-kii-éeyik-úu-see/ *pitewkiyeykúuse* 'we visit each other at night'
f. /kii-éeyik-see/ *kiy-éeyik-se* 'I am wandering'
g. /kii-éetwikN-see/ *kiy-éetwik-ce* 'I go following (mine)'

D&W note that material outside of aspect, even when string-adjacent to the root, has no effect on the choice of the root allomorph. It comprises the categories of spatial deixis (translocative and cislocative) and tense. For example, the vocalic past tense ("perfective") suffix *-e* in (13a,b) selects the allomorph /kúu/ of the root (with hiatus-breaking *y* again), just as the consonantal combinations cislocative+past /-m-e/ *-m-e* in (13c) and translocative+past /kik-e/ in (13d) do:[7]

(13) a. /hi-kuu-e/ *hi-kú(u)y-e* 'he went'[8]
b. /ẻ-kuu-e/ *'e-kú(u)y-e* 'I did (something) to it'
c. /kuu-m-e/ *kúu-m-e* 'I came'
d. /hi-pe-kuu-kik-e/ *hi-pe-kúu-kik-e* 'they went on'

7 (Rude 1985: 53) and D&W treat *-e* as an allomorph of the remote past tense suffix *-ne*, according to D&W preceded by a null allomorph of the perfect aspect suffix *-s*. For Aoki and Crook, *-ne* and *-e* are formally, distributionally, and semantically distinct morphemes: *-ne* is a remote past, which describes events and states "that happened a long time ago", "completed prior to the recent past, especially in the mythical past" (AG p. 113, AD p. 243, C p. 98). It has the invariant form *-ne/-na* and occurs after the imperfective (incompletive) and habitual aspect suffixes *-see*, *-qaa*, and after cislocative *-m* (C 114), so it certainly belongs in the word-level in (15), (26). The suffix *-e* (*-ne* only after C-stems), though classified by grammars as perfective aspect, is said to be semantically a nondescript "indefinite past" or "neutral past", which describes "an action that was completed at any time in the past", whether recent or remote, and whether of current relevance or not. Both suffixes contrast with the recent past *-qa*, which indicates a recent event and implies ongoing action at that time (C 98). What is not clear to me is how *-e*'s "neutral past" meaning could be compositionally derived from perfect aspect plus remote past, as D&W's analysis seems to postulate. Still, in view of its temporal meaning, and its failure to trigger *kii*-allomorphy, it is reasonable to locate *-e* in the external Tense slot at the word level, as D&W do.

8 The prevocalic allomorph is shown as *kuu-* in D&W 32, 50. All other sources have shortened *ku-* (AD p. 238, 242, C p. 124, AW p. 555:107, AT p. 15:21, Rude 1985: 59).

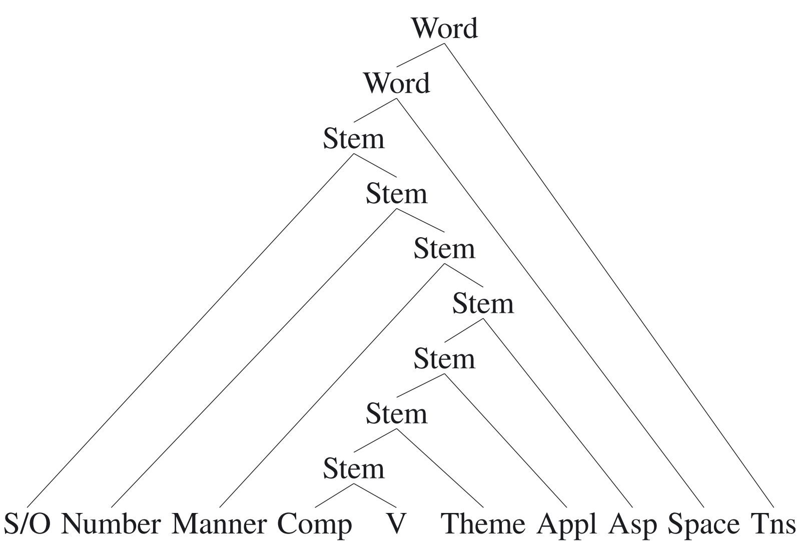
Recasting the allomorphy rule in morphological terms would be complicated, especially in the case affixes of the light verb type such as *-áatk* ‘in passing’ and *-táayN* ‘pretend’, ‘do half-heartedly’, which select the allomorphs *kuu/kii*, just as inflectional affixes do, but can hardly be individuated just by their functional features:

(14) a. *kotáayca* (AD 245)
kuu-táayN-see
go-pretend-Imperf
‘I am pretending to go’

b. *páakiyatka* (AW 34:395)
pée-kii-áatk-e
3S.3O-do-in.passing-Perfective
‘it did something to him in passing’

Example (15) extends D&W’s two-level Stratal OT analysis of the verb morphology to additional data in AG (pp. 80–126) and C (p. 92); the allomorphs *kuu/kii* and their triggering contexts are boldfaced.

(15)



a.	*píi*		*téew*	***kii***	*éeyik*	*úu*		*see*			(12e)
b.		*pe*			***kii***	***éetk***		*úu*			(12d)
c.		*nées*			***kii***		***éṅi***		*im*	*e*	(12b)
d.					***kii***			***úu’***			(12a)
e.				***kuu***	***tâyN***			*see*			(14b)
f.	*hi*		*teqe*		***kuu***			***see***		*qa*	(11c)
g.	*e*				***kuu***					***e***	(13a)
h.	*hi*	*pe*			***kuu***				***kik***	*e*	(13b)

The core of the stem level is a root, which may be a light verb with a preceding complement, e.g. *kuu-tayN-* 'go-pretend', *leew-limqa-* 'house-fix', 'repair', 'iyee-luu- 'in.water-soak'. The root can be followed by up to two "thematic" suffixes (AG p. 65, 93–95), which mark mostly direction and degree, such as *-úu-* 'toward' and *-cíimi-* 'only', followed by the applicative morpheme *-éṅi* to which we turn in the next section, and then, at the right edge of the stem, by a marker of aspect or mood, such as incompletive, perfective, prospective, imperative. This stem core may be preceded, still within the stem, by up to at least three of a large set of adverbial prefixes that denote manner, instrument, circumstance, or place (such as *teqe-* 'quickly', *cepée-* 'by pressure', *teew-* 'at night', 'in sleep', *wiyée-* 'while going'), causative, and then, at the left edge, by prefixes that mark number, distributivity, reflexivity/reciprocality, object agreement, and subject agreement. At the Word level, this stem can then be augmented by spatial and tense suffixes.

Example (15) omits some functional categories for lack of space, notably the distributive prefix (16a), which follows Number, and the causative prefix (16b), which comes before the innermost Stem. Like the other prefixes, they do not interact with root allomorphy.

(16) a. '*epewíiwe'nikeṅyu*' (AW 149.131)
'e-pe-wíi-we-'iniki-éṅi-ú'
3O-PL-DISTR-with.words-give-APPL-PROSP
'you (pl.) should name each one of them'
b. *'ináatqacapa'yayawks* (AD 941)
'inée-teqe-sepée-'iyée-yawN-k-s
1SG.REFL-quickly-CAUS-in.water-cool-?-PERFECT
'just let me briefly cool myself in the water'

Each word in (14) and (16) consists in its entirety of a stem. Affixes that may be added outside the stem, at the word-level, include deictic locative ("Space") suffixes, such as cislocative *-m-* in (13c) and translocative *-kik-* in (13c) (=(15h))s, which mark direction from the speaker's perspective (e.g. "come" vs. "go"), and by inference also person and evidentiality (C 110). These may be followed by a terminal tense suffix, such as the past *-e* in (13) and the recent past *-qa* in (11c) (=(15f)).

I assume that some of the inflectional categories in (15), at least Person and Aspect, are obligatory.[9] An obligatory category must be valued by an overt or null

9 Number and Tense seem to be optional. Verbs that are not marked for plural subject are neutral with respect to number, and can have either singular or plural subjects (Crook 1999: 100 ff.; Rude 1985: 36). The fact that a narrator can start out with a statement or two in the remote past and then shift into the incompletive (Crook 1999: 111) would indicate that tense is an optional category, and that verbs without overt tense are tenseless rather than default-tensed, like the Vedic injunctive (Kiparsky 1998).

morpheme. A morpheme may value more than one feature, or be composite, as Nez Perce /-see/ii-/, which fuses incompletive Aspect and plural Number of the subject. Other categories, such as Space and Manner, are optional: a verb without a cislocative or translocative morpheme does not receive a default value and is simply orientation-neutral. For example, the verb *kuu* with cislocative suffixes means 'come (here)', with translocative suffixes it means 'go away (from here)', and without a spatial deixis suffix it denotes nondescript motion 'go', which can be further specified by prefixes for manner, location, and direction. The assumption is that a word has only as many constituents as it has (overt or null) morphemes, and that the constituent structure is built by successive merge operations, whose order is constrained by selectional and semantic information in the lexical representations of the morphemes.

In this verb structure, the generalization is that the root allomorph /kii/ (boldfaced in (15) with the relevant context) is selected before vowels at the stem level, which is to say if a vocalic light verb (15a), a vocalic thematic suffix (15b), the vocalic applicative suffix *-én̓i* (15c), or a vocalic aspect suffix (15d) immediately follows. The allomorph /kuu/ is the elsewhere form, selected before consonants at the stem level (15e) and (15f), and in all contexts at the word level (15g) and (15g,h). Under our assumptions, the *kuu/kii* root allomorphy is strictly local, in that the allomorph is fixed by the first phoneme of its sister, which make up the lowest constituent of the verb, built by the first merge operation. For example, in (15d) there is no Theme or applicative constituent, not even a null one, between the root allomorph *kii* and its conditioning aspectual trigger *-úu*'. Therefore they are at the same depth of embedding in the word; no outward sensitivity is involved (Note that we do not assume that a null verbalizing morpheme is inserted after roots).

Interestingly, plural prefixes are in complementary distribution with plural-marking aspect suffixes (C p. 104). For example, the plural subject prefix *pe-* is added to verbs with a prospective or perfective suffix, which does not register number, cf. (16a) and (17a), but not to verbs with the imperfective (progressive) suffix, which does register number, cf. (17b).

(17)	a.	*pekúye*	b.	*kusíix* (**pekusíix*)
		pe-kuu-e		kuu-síix (*pe-kuu-síix)
		PlSubj-do/go-Perfective		do/go-Imperf/Pl
		'we did', 'we went'		'we are doing', 'we are going'

In a flat templatic structure this would be a long-distance dependency. From our perspective it is a local dependency, for the suffix passes on its plural feature to the stem, where it is then visible to prefixation, as explained in Section 1.1. The complementarity of number marking is predicted in MM by an economy principle which prohibits fully vacuous affixation (as distinct from multiple exponence, which arises routinely when the feature content of portmanteau affixes is already borne by the stem).

Although the stem and word levels in (15) do not correspond to standardly assumed syntactic phases, in that Aspect marks off the stem level in the word but is not phasal in the syntax (D&W p. 51), the hierarchical relations of word constituents match the semantics reasonably well. The stem morphology constructs a predicational core (who does what to whom and how) and the word morphology adds an outer layer of deictic predicate modifiers (where and when). Within the stem, the core affixes build argument structure, the inner prefixes are predicate modifiers, and the outer prefixes reference the arguments (C p. 168, 177). The exact same two morphological levels also determine the realization of the applicative (benefactive/possessive) morpheme, to which we turn in the next section.

From MM's perspective, then, D&W's first case involves no outward conditioning. It is a classic instance of root-affix selection at first merge as laid out in Section 2. Its possibility is predicted by the incremental construction of words by morphological merge operations, coupled with the principles that allomorphy is selection and not a replacement operation, and that selection occurs at the point when an item is merged. Bound roots are introduced into the derivation together with their first affix, and exactly at that point they can select each other.

Recall from Section 1.1 the corollary of MM that the selection between roots and affixes at first merge can be mutual. The Nez Perce possessor prefixes and kin terms are a case in point. The 1Sg. possessive prefix has two allomorphs: *ne*'- before all twelve terms denoting older blood relatives, such (18a), and 'inim- before all other kin terms, such as (18b). Conversely, some of the kin terms themselves have special bound allomorphs depending on what their possessor is (18c).

(18) a. *ne*'*-íic* ‘my mother’
b. /’iním-’ácip/ ’i ń̓m-ácip (AD p. 961) ‘my younger sister (female ego)’
c. *péhet* ‘older sister’ (non-possessed free form), *ne*'*-níc* ‘my older sister’, *’im̓n-ís* ‘your older sister’

3 Outwardly conditioned affix allomorphy?

3.1 The applicative

D&W's second case of outward dependency presents a more serious theoretical challenge. The shape of the suffix that D&W call μ, and identify as the applicative head of a functional projection that hosts raised recipients, benefactives, and possessors, depends on the phonological context immediately to its right within the stem. The suffix has the form *-ey̓-* when it directly precedes within the stem a suffix or sequence of suffixes consisting of -CV, or beginning with -CV. Before other suffixes within the stem, before suffixes of any shape outside of the stem, and word-finally, it is *-en̓i-*, with regular glide formation to *-en̓y-* before -V. Thus the long form *-en̓y-/-en̓i-* is the elsewhere form, pre-empted by the short form *-ey̓-* immediately before -CV within a stem. I represent it as underlying /-én̓i-/, noting that there is no phonemic distinction between /i/ and /y/ in Nez Perce.

Unlike the *kuu-/kii-* alternation, the alternation between the long form and the short form does not involve allomorphy selection at first merge, since the conditioning suffix is not the sister of the applicative. If it were allomorphy, it would therefore be a genuine case of outward dependency.

Examples (19)–(22) illustrate the applicative alternation. AG places the applicative into the Theme slot, but it is evidently a functional category of its own; in (21c) it is followed by the Theme *-teeN* ‘go away to’, which is itself followed by aspect. The long form *-én̓y-* occurs before -V:[10]

(19) a. /kiy-én̓i-úu’/ *kiy**én̓yu**’* ‘I will make for you’ (prospective /-úu’/) AW 256:76

b. /hi-nées-wii-hoł-hołN-én̓i-úu’-qa/ *hináaswihołhołn**an̓yo**’qa* ‘she could tear each of them apart’ (conditional /-úu’-qa/) AW 546:51

c. /pée-kii-én̓i-e/ *péekiy**en̓ye*** ‘he did for her’ (perfective) AW 75:79

d. /pée-teqe-seq̓ep-qawn-én̓i-e/ *pátqasq̓apqawn**an̓ya*** (perfective) ‘she suddenly pinched him’ AW 285.10

e. /pée-teqe-wíi-q̓oł-naq̓ii-én̓i-see/ *páatqawiq̓ołnaq̓iy**ay̓**sa* ‘he$_i$ had removed them completely’ (imperfective) AW 104.8

The long form *-en̓i-* occurs before -C suffixes, such as stem-level nominalizing /-t/, perfective /-s/, and imperative plural pl. /-tx/, and word-level cislocative /-m/.

(20) a. /hipi-én̓i-t/ *hip**én̓i**t* ‘eating someone else’s (e.g. body part)’, ‘communion’ AD 158

b. /kéemek léew-limqaa-én̓i-s/ *kéemex láwlimqa**’ánis*** ‘(let me) repair yours’ AW 262:8

c. /’e-’ewíi-én̓i-s/ ’ew’y***éen̓i**s* ‘I just killed it for [you]’ (perfect) AW 72:17

10 I follow D&W in representing the long form with a glottalized nasal *n̓* (orthographic *n*’, see fn. 5). AG 98, AD 84, and C 178 have *-e’ni-*, *-e’ny-*, with the glottal component as a separate stop. Since Nez Perce glottalized sonorants are preglottalized (C 28, 263), the distinction is phonetically a delicate one (though it is phonemic, see fn. 5), but fortunately not critical for purposes of the allomorphy discussed here. I assume the representation with /n̓/ reported by D&W, but the analysis offered here could be easily adapted to Crook’s and Aoki’s / ’n/.

	d.	/píi-'ewii-éṅi-m/ *pí'ewye'**eni**m* 'kill it for me' (cislocative)	AD 999
	e.	/hekiN-éṅi-m/ *hexn**ê'ni**m* 'you see' (perf. cisloc.)	AW 176:64
	f.	/hanii-éṅi-m-tx/ *haniy**áṅi**mtx* 'make me (something)' (cisloc.pl.imper.)	AW 154:20

The short form *-eẏ-* occurs before stem-level -CV: imperfective present /-see/ (pl. /-síix/), optative /-t̓ee/, stem formative /-k/, /-téeN/ 'go to'.

(21)	a.	/pée-kii-éṅi-see/ *péekiy**eẏ**se* 'he does for him', 'he$_i$ did to his$_j$' (imperf.)	AW 28:295
	b.	/pée-kii-éṅi-siix/ *péekiy**eẏ**six* 'they do it for them' (imperf. pl.)	AW 57:227
	c.	/pée-kiy-éṅi-téeN-see-m/ *péekiy**eẏ**tecem* 'let them come and prepare it' (cisloc. imperf.)	AW 59:263
	d.	/pée-teqe-wíi-hekiN-éṅi-see/ *péetqewihexn**eẏ**se* 'he looked at each one's' (imperf.)	AW 104:7
	e.	/'e-pée-hekiN-éeyik-éṅi-k-uu'/ *'epéexneyik**eẏ***ku' 'we'll move around to see someone's' (prospective)	AD 110

The long form *-éṅi-* also occurs before word-level -CV and word-finally: cislocative past /-m-e/ *-me*, translocactive /-ki/ (see also (12b)).

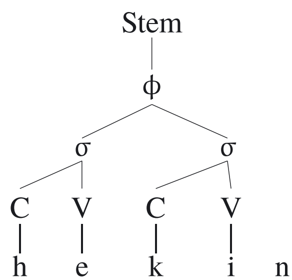
(22)	a.	pée-haníí-éṅi-m-e *páany**aṅi**ma* 'she made them for him' (cisloc. perfective)	Rude (1985): 87
	b.	/pée-'iniki-eṅi-m-e *pée'nik**eṅi**me* 'I put it on for him' (cisloc. perfective)	Rude (1985): 87
	c.	/'e-'iyáqN-éṅi-m-e/ *'aẇ-yáx̣n-**aṅi**-m-a* 'I found me it'	D&W 41
	d.	/'e-'iyáqN-éṅi-ki *'aẇ-yáx̣n-**aṅi**-ki* 'I found him/her it'	D&W 41
	e.	/'e-'iyáqN-éṅi/ *'aẇ-yáx̣n-**aṅi*** 'find it!'	D&W 38

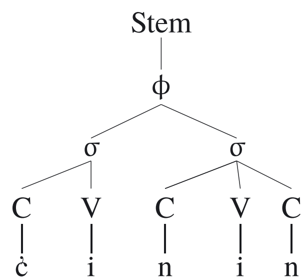
The analysis adopted here treats the *-n-* that appears before all vocalic endings, including the applicative in (19b), (21d), (22c), (22d), and (22e), as morphologically part of the root, shown here in underlying representations as /-N/. Nez Perce roots and stem suffixes are of two types, called the S-class and the C-class (Aoki 1970: 81). Following Rude (1985), I take C-class morphemes to have a latent underlying floating /-n/, which is realized as *-n* when the phonotactics permits, otherwise merges with a following consonant if possible, and if even that is precluded, is deleted. Specifically, it is syllabified as an onset *n* before vocalic suffixes, as a coda nasal before suffixes beginning with velar, uvular, and labial consonants, merges with suffix-initial *-s* into *-c* (hence the term “C-class”), and disappears entirely before *-t* and word-finally.[11]

The root-final floating /-N/ contrasts with a much rarer anchored /-n/, which has the same stopping effect on a following /-s/, but always surfaces as an overt nasal, as in (23b).

(23)	a.	*hekíce* (AD 108)	b.	*c̓inínce* (AD 71)
		hekiN-see		c̓inín-see
		see-IMPERF		heavy-IMPERF
		‘I see (mine)’		‘(mine) is heavy’

The difference between floating /-N/ and anchored /-n/ is that floating /N/ lacks a C-slot of its own.

(24) a.


b.


Although both the deletion of anchored segments and the deletion of floating segments incur a MAX violation, the *realization* of floating segments may incur additional faithfulness violations of the DEP constraint family, such as DEP-C and DEP-V, which penalizes the addition of syllabic positions (skeletal slots) to the representation, and of DEP(ASSOCIATION) (Itô et al. 1995; Myers 1997 = FILLLINK), which penalizes the addition of association lines between segments and syllabic positions. I return to these points in connection to the analysis of fusion in Section 3.5.

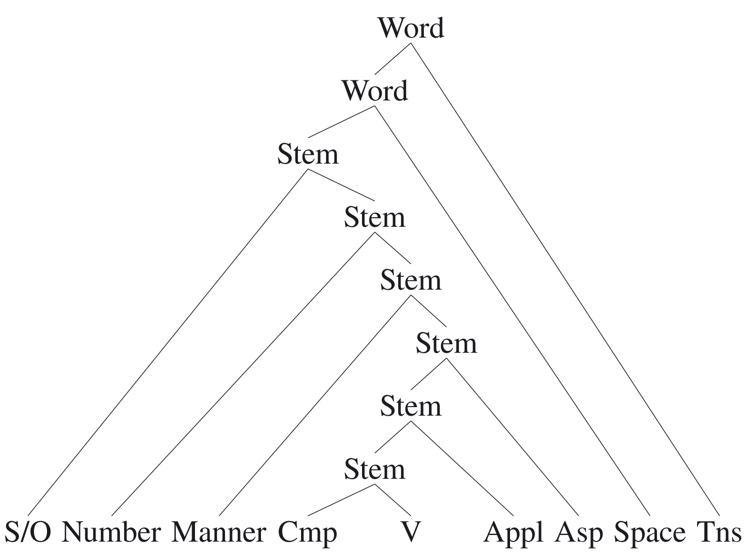
Aoki, Crook, and D&W consider the nasal to belong morphologically to the suffix, conditioned by an allomorphy or readjustment rule triggered by a lexically specified stem-class feature of C-class morphemes. While such a morphological treatment of the nasal increment is compatible with a phonological account of the alternation between the long and short applicative that we are concerned with, I adopt Rude’s much simpler floating nasal analysis here.

11 E.g. /q̓uuyímN-úu-see/ *q̓uyimnúuse* ‘I am going up to them’, /hi-q̓uyímN-e/ *hiq̓uyímne* ‘he went up’, /hi-q̓uyímN-see/ *hiq̓uyímce* ‘he goes up’; /c̓ákN-iin¯s/ *c̓áxn-in̓* ‘split’ (past participle), /c̓i-c̓ákN/ *c̓i-c̓áx* /we-c̓ákN-t/ *wa-c̓ák-t* ‘splitting’.

(25)	a.	*’eexn**éy̓**se* (AD 109)	b.	*haxn**áy̓**samqa* (AW 186.71)
		’e-hekiN-én̓i-see		hekiN-én̓i-see-m-qa
		3Obj-see-Appl-Impf		see-Appl-Impf-Cisloc-RecPst
		‘I see someone’s’		‘I/you saw someone’s recently’

The constituent structure of words is schematized in (26). As in (15), thematic suffixes may intervene between the root and the applicative, e.g. *-úukini-* ‘while approaching’ in /pée-teqe-i̓nipi-ukini-én̓y-e/ *péetqe’npuukiniyen̓ye* ‘he grabbed her as it came’ (*AW* 121:11) — likely a morpheme bundle consisting of /-úu-/ ‘to’, ‘toward’ (as in (40a) and (40b)) and the pronominal stem *-kini-* ‘this’. For reasons of space I do not include such examples with thematic suffixes in (26).

(26)



a.	*hi*	*nées*	*wii*		*RED-hołN*	*én̓i*	*u’*		*qa*	(19b)
b.				*leew*	*Limqa*	***én̓i***	*s*			(20b)
c.	*’e*				*hekiN*	***éy̓***	*see*			(25a)
d.					*hekiN*	***éy̓***	*see*	*m*	*qa*	(25a)
e.	*’e*				*’iyáqN*	***én̓i***		*ki*		(22b)

Both the long form *-én̓i-/-én̓y-* and the short form *-**éy̓**-* undergo regular vowel harmony and hiatus resolution as described in Section 2 (not shown in (26)). Vowel harmony lowers *u* to *o* and backs *e* (phonetic [æ]) to *a* in words that contains a morpheme with the dominant vowels *a* or *o*. The fifth vowel *i* is unpaired; it neither undergoes nor triggers harmony.[12] As for hiatus, every syllable in Nez Perce begins with exactly one consonant. When *-én̓i-/-éy̓-* is added to a root ending in *e/a*, the resulting sequence of abutting vowels is repaired by deleting or coalescing the vowels:

(27)	a.	*háay̓**an̓i**m* (AD 106)	b.	*titóol**an̓y**a* (AD 762)
		háay̓aa-én̓i-m		titóolaa-én̓i-e
		scratch-Appl-Cisloc.Sg.Imper		forget-Appl-Past
		‘scratch for me!’		‘I forgot (e.g. yours)’

After *i*, hiatus is bridged by *y*, e.g. (19a) *kiy-én̓y-u’* ‘I will do for you’. After *u* and *o*, the glottal element of /**y̓**/ floats leftwards to the beginning of the suffix (C 264).[13]

(28)	a.	*cilúu’**ey**se (*cilúuyey̓se)*	b.	*watóo’**ay**sa (*watóoyày̓sa)*
		cilúu-én̓i-see		watóo-én̓i-see
		boil-Appl-Imperfective		wade-Appl-Imperfective
		‘I am boiling for him’		‘I am wading for him’

This glottal shift is a morphophonological process that applies also to other suffixes that contains glottalized consonants, the “attributive” and past participle suffix /-(h)iin̓s/. We will meet it again in Section 3.5.[14]

That leaves just two apparently irreducible forms of the applicative, distributed according to the phonological context within the stem domain: a short form *-ey̓* immediately before -CVX within the stem, and a long form *-en̓i-/-en̓y-* elsewhere. Outside the stem, at the word level in (26), -CVX does not induce the short form of the applicative, even if it directly follows it (D&W 40). The stem-level aspect suffixes in (12c) and (21), and the word-level suffixes and suffix combinations in (12b), (22), are all -CVX sequences, but only the former set induces the short form.

12 Some morphemes have no *a* or *o* and still trigger backing and lowering throughout the word. In the literature these exceptional morphemes are given either an abstract harmony-triggering feature [+dominant], or an abstract sixth vowel which triggers harmony and then itself turns to *i*. The syncope process formulated in Section 3.4 suggests a simpler analysis of at least some of these morphemes as containing an underlying /a/ or /o/ which triggers harmony and is regularly syncopated.

13 The glottalization sometimes appears in *both* places: /pée-kuu-uu-én̓i-see/ *péekiyuu’ey̓se* ‘he goes toward someone else’s’, /pée-te’pe-lúu-’ey̓-see-ne/ *péete’peluu’ey̓sene* ‘he threw them in the water’ (AD 405).

14 E.g. /yax̣saa-híin̓s/ *yax̣sa’íin* ‘irrigated’. “When the attributive suffix attaches to a stem that does not end in *i*, the suffix’s glottalization is realized as glottal stop in onset position for the suffix” (Crook 1999: 263).

3.2 An exception that proves the rule?

The generalization that the short form of the applicative is selected immediately before -CV at the stem level faces a systematic exception not noticed by D&W or elsewhere in the literature. The combination of the habitual aspect /-qaa/ plus the remote past tense /-ne/ always selects the *long* form of the applicative:[15]

(29)
a. *páakiy**an̓i**qana* (AW 182:6)
pée-kuu-én̓i-qaa-ne
3S.3O-do-APPL-HAB-REMPAST
'[then] he$_i$ did his$_j$/to her'

b. *hináaskiy**an̓i**qana* (AW 397:10)
hi-nées-kuu-én̓i-qaa-ne
3S-do-APPL-HAB-REMPAST
'she would do it to them'

c. *pa'sak̓íwk**an̓i**qana* (AW 155:30)
pée-'ise-k̓íwN-k-én̓i-qaa-ne
3S.3O-cut-?-APPL-HAB-REMPAST
'he$_i$ used to cut off his$_j$'

d. *páap**an̓i**qana* (AT 40:31, AD 158)
pée-hipi-én̓i-qaa-ne
3S.3O-eat-APPL-HAB-REMPST
'he$_i$ ate his$_j$'

All other -CVX aspect-tense combinations invariably select the expected short form:

(30)
a. *'aw̓náhwayik**ay̓**saqa* (AW 142:17)
'ew-'inek-wéeyik-én̓i-see-qa
3O-carry-cross-APPL-IMPF-RCPST
'I was [just] helping them across'

b. *páasapahicy̓awk**ay̓**sana* (AW176:71)
páa-sepée-híi-ci**y̓**awN-k-én̓i-see-ne
3S3O-CS-TR-kill-APPL-IMPF-RMPST
'he$_i$ had caused his$_j$ to be killed'

c. *haxn**áy̓**samqa* (AW 186:71)
hekiN-én̓i-see-m-qa
see-APPL-IMPF-CISLOC-RCPST
'I saw someone's recently'

d. *'aw̓yáax̣n**ay̓**qaqa* (D&W 113)
'ew-i̓yáaqN-é**n̓n̓**i-qaa-qa
3O-find-APPL-HAB-RCPST
'I was recently finding his'

If the ending /-qaa-ne/ begins with aspect suffix *-qaa-*, which sits in the inner layer of the morphology along with the rest of aspectual morphology, why does it pattern with the tenses in selecting the long form? Such a long-distance outward dependency is incompatible with D&W's allomorphy analysis as well as with my phonological analysis, and raises a serious problem for MM as well as for some of the more restrictive versions of DM (Section 1.4).

The morphophonological anomaly of /-qaa-ne/ is coupled with a revealing semantic anomaly. /-qaa-ne/ is not at all restricted to "habitual" remote past

15 Additional examples: *paankak̓óopaan̓iqana* /pe-nikee-k̓úup-en̓i-qaa-ne/ 'she would break off' AW 240:41, *póopa'lwax̣-wax̣nan̓iqana*, /pe-wepée-'ilwaq-waqN-en̓i-qaa-ne/, he used to make him scream by hitting' AW 227:41 *páaxnan̓iqana* /pée-hekiN-én̓i-qaa-ne/ '[then] he saw it' AW 240: 36, 351: 37.

interpretations; it is freely used also in episodic senses, often with punctual adverbs that pick out a specific point in time, as in (31).[16]

(31) a. /p̓éq-pe … hi-hipi-qaa-ne/ *p̓éqpe hipqâana* 'at noon he ate it' (AW 110:20)
b. /kaa hi-nées-mic̓ii-qaa-ne/ *kaa hináasmic̓iqana* 'then she heard them' (AW 161:5)
c. /kaa konkí hi-tíy̓ee-qaa-ne/ *kaa konkí hitíy̓aqana* 'at that she began to laugh' (AW 162:27)
d. /kawá ú' wíiṫec hi-teqe-wisée-ke'éyN-k-qaa-ne/ *kawó' wíiṫec hitqawsáaka'yxqana* 'then he almost got up on his feet' (AW 168:58)
e. /pée-teqe-k̓alapsk-éńi-qaa-ne/ *páatqak̓alpskańiqana* 'he got a quick bite out of it' (AW 277:81)
f. /pée-'isáapa-éńi-qaa-ne/ *pa'sâapaańiqana* ~ *pa'sáapańiqana* 'he packed his on his shoulder' (AW 262:5, 263:13)
g. /pée-teqe-'inipi-éńi-qaa-ne pée-teqe-hipi-éńi-qaa-ne/ *páatqa'npańiqana páatqaapańiqana* 'he quickly snatched [and] quickly ate it' (AW 50:473)

Since *-qaa-na* does not inherit the habitual/frequentative/generic/progressive meaning from its first component /-qaa/, it is interpreted non-compositionally as a package. Since that package functions as a remote past tense, we would expect it to be located in the tense slot in the outer layer of the morphology, where -CVX suffixes select the long form of the applicative.[17] That would connect *-qaana*'s non-compositionality to its failure to trigger the short form of the applicative, preserve D&W's otherwise exceptionless generalization about the conditioning context of the *-ey̓-~-eńi-* alternation, and remove the challenge to locality that such an exception would pose for morphological theory. *-qaana* would then be a fused suffix, like English *-istic* (Section 1.1).

16 Other examples are (29a) and (29b) above. There are hundreds of instances of punctual/episodic /-qaa-na/ in the texts, frequently in clusters, e.g. AW 166:12, 16, 26, 27, 167:43, 168:58, 62; 184:32, 34, 38, 40, 41. Sometimes the narration first describes customary past events and then shifts to particular past episodes, all with /-qaana/, e.g. AW 165:1-27.

17 On semantic grounds, another likely suffix bundle is the Prospective+Recent Past *-o'qa* /-uu'-qa/, which functions as a conditional, e.g. (19b). Aoki treats *all* the aspect-tense combinations as portmanteaus (AG 115, 124), and Crook 1999: 122) considers them "complex wholes". However, only for *-qana*, where the semantic non-compositionality is clearest, is fusion motivated by formal evidence from allomorphy.

With this, we turn from the context of the alternation to the nature of the alternation itself. We first establish that the underlying form of the applicative suffix is lexically accented on the first syllable, viz. /-én̓i-/. We then motivate a syncope constraint which prohibits lexically unstressed short vowels in medial open syllables, such as the /i/ of /-éni/ before -CV endings, and show how it is satisfied by vowel deletion and a process that fuses certain adjacent segments. This fusion process turns out to be the source of the short applicative. The exposition therefore begins with the core word phonology of Nez Perce, including the stress system, syncope, vowel shortening, and fusion.

3.3 Stress and accent

A Nez Perce word has a single primary stress, but its constituent morphemes may have lexical accents, from which the stress is calculated compositionally.[18] Words that are entirely built from lexically accentless morphemes are stressed on the penultimate syllable. Inherent lexical accents override the default penult stress (Crook 1999: Ch. 4).[19] I mark lexically accented syllables with an acute accent in underlying forms of morphemes. For example, in (32a), the root /hekin/, the prefix /hi-/, and the suffix complex /-sii-ne/ are all unaccented, and the word built from them defaults to penult stress. In (32b), though, the root /cúukwe/ has a lexical accent on its initial syllable, which receives the word stress when the root is combined with unaccented prefixes.[20]

(32)	a.	*heekcíine* (AW 553:30)	b.	*hicúukwecine* (AT 74:15)
		hi-hekiN-sii-ne		hi-cúukweeN-sii-ne
		3S-see-IMPF/PL.-RMPST		3S-know-IMPF/PL-RMPST
		‘he saw him’		‘they knew/learned it’

18 As in Sanskrit (Kiparsky 1984), Slavic (Halle 2001; Halle and Kiparsky 1977; Melvold 1990), Japanese (McCawley 1968; Poser 1985), Cupeño (Alderete 2001; Hill and Hill 1968), Abkhaz (Dybo 2011; Trigo 1992), Salish (Bar-el and Watt 1998; Coelho 2002; Czaykowska-Higgins 1993; Shaw et al. 1999), Asurini (Harrison 1971).

19 The lexically specified accent may not fall on a final short vowel. It may fall on a final long vowel, in which case that vowel is, remarkably, pronounced as short, e.g. /k̓oy̓amáa/ [k̓òy̓amá] ‘cougar’ (Crook 1999: 63).

20 The syncope of medial *-i-* and coalescence of *hihe-* to *hee-* in (32a) will be explained in the next section.

When a root is combined with one or more accented prefixes, and no accented suffixes follow it, its first accented prefix bears primary stress.

(33)
a. *hinéescukwece* (C 465)
hi-nées-cúukweeN-see
3Subj-PlObj-know-Imperf
'he knows them'

b. *siléewcukwece* (C 465)
siléew-cúukweeN-see
see-know-Imperf
'I know by seeing'

c. *sepéslewcukwece* (C 465)
sepée-siléew-cúukweeN-see
Caus-see-know-Imperf
'I make you know by seeing'

d. *néesepeslewcukwece* (C 465)
nées-sepée-siléew-cúukweeN-see
PlObj-Caus-see-know-Imperf
'I make you (Pl) know by seeing'

This much is consistent with two alternative generalizations about the assignment of primary stress in stems that contain at least one lexically accented morpheme: (1) the stress falls on the *first* lexical accent of the stem, or (2) the stress falls on the lexical accent of the *structurally highest* morpheme of the stem (the one that c-commands the others in (15) and (26)). Evidence that the leftmost accent wins, rather than the highest accent, comes from accented suffixes. These are of two types, recessive and dominant. Recessive suffixal accents override default penult stress in unaccented words, but yield to accents on the roots and prefixes on their left. Dominant accents always override recessive accents, regardless of their position in the word.

Consider the suffixes /-éeyik/ 'around' (describing circular motion or aimless activity), /-téeN/ 'moving in order to', /-áatk/ 'in passing' (referring to either the subject or object), and our applicative morpheme /-éṅi/. I show that they are accented, that they compete in complex words with each other in accord with the first-wins rule, and that they are recessive and subordinated to dominant lexically accented morphemes. As sole inherent accents of a word, they naturally receive the primary stress:

(34)
a. *hitu'pnéeyiktetu* (AW 254:44)
hi-tu'piN-éeyik-teetu
3Subj-mow-around-Hab/Sing
'she used to move around cutting grass'

b. *'inptéenu'kum* (AW 136:38)
'inipi-téeN-uu'-kum
get-go.to-Prosp-Cisloc
'I will come after it'

If *-éeyik* and *-téeN* were *not* inherently accented, words like (34) would have default accent on the penultimate syllable, as the same suffix combinations do after entirely unaccented stems in (35).

(35) a. *'eektéetu* AW (287:10)
'e-hekin-teetu
3Obj-see-Hab/Sing
'I typically/always see him'

b. *petemikú'kum* (AW 344:118)
pe-temiki-uu'-kum
PlSubj-bury-Prosp-Cisloc
'you (Pl) will bury me'

Example (36) demonstrates that /-én̓i/ also has an inherent accent, which supersedes default penult accent:[21]

(36) a. *haaxnáy̓saqa ('ipním)* (AW 233:99)
hi-hekiN-én̓i-see-qa ('ipním)
3S-see-Appl-Impf-RcPst (self)
'he saw himself'

b. *'eepéy̓sene* (D&W 33)
'e-hipi-én̓i-see-ne
3Obj-eat-Appl-Impf-RmPst
'I ate his long ago'

An unaccented **-en̓i* would have penult accent in (36), viz. (36a) **haaxnay̓sáaqa* like *hipsáaqa* 'he just ate', and (36b) **'eepey̓séene* like *hipséene* 'he ate' from /hipi-see-ne/ (AW 344:121).

More evidence that suffixes like *-éeyik*, *-téeN*, and *-én̓i* are inherently accented is that they override inflectional suffixes such as incompletive plural *-síix* and prospective *-ú'*, which (for reasons to which I return shortly) otherwise regularly attract the word stress in final position if they are preceded only by unaccented morphemes, as in (37a,b), versus (37c,d).

(37) a. *himsemsíix* (AD 447)
hi-miseemi-siix
3S-lie-Impf/Pl
'they are lying'

b. *'eepú'* (AD 157)
'e-hipi-uu'
3O-eat-Prosp
'I will eat it'

c. *hi'npáatksix* (AW 199:45)
hi-'inipi-áatk-siix
3S-get-in.passing-Impf/Pl
'he picked'

d. *hipe'npéeyiku'* (AW 420:61)
hi-pe-'inip-éeyik-uu'
3-PlS-come.for-around-Prosp
'they will come after me'

Recessive inherent accents yield to inherent accents on roots and prefixes to their left; see (38) for /-éeyik/ and /-téeN/, and (19b) to (19f), (20b), (20d), (21b) to (21e), (22a) to (22d) for /-én̓i/.

(38) a. *hiwáaw̓atana* (AW 599:64)
hi-wáaw̓a-téeN-e
3Subj-fish-go.to-Perf
'he went to fish'

b. *hiwéeyikeyiksix* (AD 872)
hi-wéeyik-éeyik-siix
3S-across-around-Impf/Pl
'they are crossing back and forth'

21 Vowels coalesce across *h* and glides into long vowels, which do not shorten when unstressed (Crook1999: 255 ff.).

Therefore, when two inherently recessive-accented affixes compete, the leftmost prevails:

(39) a. *’e’npéý̓tecix* (AW 11.12)
’e-’inipi-én̓i-téeN-siix
3O-get-APPL-go.to-IMPF/PL
‘we go to get its [eaglets]’

b. *hi’npéý̓tenu’* (AW 25.246)
hi-’inipi-én̓i-téeN-uu’
3S-get-APPL-go.to-PROSP
‘he will go and get it [for me]’

c. *wíineyikse* (AD 879)
wíiN-éeyik-se
cry-around-IMPF
‘I cry around’

d. *wiyéewiine* (AW 494:12)
wiyée-wíiN-e
go-cry-PERF
‘I cry as I go’

The second type of inherent lexical accent is DOMINANT accent, which I mark in underlying forms with a double accent ̋. Dominant inherent accents always attract the primary word stress, as illustrated in (40) with the directional suffixes /-ű́u/ ‘toward’ and /-ấapiik/ ‘away from’.

(40) a. *pewyenkeexnúuye* (AW 447:135)
pée-wiyée-nikée-hekin-ű́u-e
3S.3O-going-pull-see-toward-PERF
‘he aimed at it as he walked’

b. *hinaspaynóoyan̓iqana* (AW 470:3)
hi-nées-páayN-ű́u-én̓i-qaa-ne
3S-PLO-come-TO-APPL-HAB-RMPST
‘he came upon theirs’

c. *’aqilawnáapiikaytaq* (AW 297:41)
’e-q̓ilawN-ấapiik-én̓i-t̓-aax̣
3O-turn-away-APPL-NOM-COND
‘I would turn away from his’

d. *hinasapalookáapika* (AW 92:354)
hi-nées-sepée-luuk-ấapik-a
3S-PLOBJ-CAUS-hid-away-PERF
‘he hid them out of sight’

Some accented suffixes, such as *-ű́ukini* “while approaching’, fluctuate between dominant and recessive behavior. For example, (41) is recorded with both suffixal stress and initial stress.[22]

(41) a. *póopciý̓awnookinisa* (AT 98:140)~ *poopciý̓awnóokinisa* (AG 102)
pée-wéep-ciý̓awN-úukini-see ~ pée-wéep-ciý̓awN-ű́ukini-see
3S.3O-with.hand-kill-approaching-IMPERF
‘they killed him as he approached’

In (34)–(40) we saw that /wíiN/ ‘cry’, /tíimeeN/ ‘write’, /-éeyik/ ‘around’, and /wiyée/ ‘go are recessive-accented. Example (42) demonstrates that they are overridden by

22 Cf. also the pair *peek̓e’iinúukinye* (AW 341: 76) /pée-k̓e’iiN-ű́ukini-e/ ‘she took a glance at him (as he was coming)’ vs. *péetemesitkuukinye* (AD 652) /pée-temée-sitk-úukini-e/ ‘he lassoed him$_i$ as he$_i$ approached’.

dominant inherent accents, in this case by the root /hitĕ̋emeN/ 'read', 'count', and by the suffixes /-ew̓e̋et/ 'agent', and /-tă̋yN/ 'careless or pretended action'.

(42) a. *wiinew̓éet* (AD 879) b. *timatáyca* (AD 746) c. *hinesitéemene* (AD 165)

wíiN-ew̄e̋et	tíimeeN-tă̋yN-see	hi-nées-hitĕ̋emeN-e
cry-AGENT	write-idly-IMPF	3S-PLO-count-PERF
'cry-baby'	'I write around'	'he counted them'

When two inherent dominant accents compete, the *rightmost* one prevails:

(43) a. *sepehitemenew̓éet* (AD 165) b. *hitamatáyca* (AD 165)

sepée.hitĕ̋emeN-ew̓e̋et	hitĕ̋emeeN-tă̋yN-see
CAUS-read/count-AGENT	read-idly-IMPF
'teacher'	'I read around'

Forms with multiple inherent accents provide a clue to the organization of the phonology. Inherently accented and inherently unaccented syllables are treated differently even when under secondary stress. When a word contains both inherently accented stem prefixes and inherently accented theme suffixes, only one of them ever bears main stress, but each can preserve vowel length, as in (41). No such length preservation occurs with inherently unaccented syllables that are assigned secondary stresses at a later stage of the derivation (at the Word Level, as I argue below) by constraints that are sensitive to syllable weight and to the stress of neighboring syllables. Moreover, inherently accented vowels, even when shortened, are entirely exempt from the syncopation process described in Section 3.4 below that affects inherently unaccented vowels.

Let us return to the puzzle that incompletive plural *-síix* and prospective *-ú'* get stressed after unaccented stems. Crook (1999: 445) treats them as inherently accented. But if they were inherently accented, whether dominant or recessive, they would override inherent accents on their left, which they never do. This can hardly be due to NON-FINALITY, because even medial *-siix* and *-u'* do not attract the stress off accented stems:

(44) a. *puu.yex.née.yi.ku'.kum* (AW 420:62) b. *pews.ke.'éy.nu'.kum* (C 107)

pe-weye-hekiN-éeyik-uu'-kum	pe-wis-ke'éyN-uu'-kum
PLS-now-see-around-PROSP-CISLOC	PLS-travel-move-PROSP-CISLOC
you can come around and see me now and then	you will move your home over this way

Instead, I propose that *-siix* and *-u'* are unaccented like all other inflectional suffixes, and that they attract stress because their underlying superheavy (trimoraic) weight (-CVVC). The idea (building on Crook: 1999: 401) is that final-CVVC in Nez Perce is parsed as disyllabic /-CVV.C/, where -C is a syllable or semi-syllable, so that final stress on -CVVC after unaccented stems is just the regular penult default accent. The superheavy weight of the inflectional suffixes in question is patent for /-sii.x/ *-siix*, and masked for /-uu.'/ *-u'* by vowel shortening before a glottal stop, a process which must be assumed anyway in Nez Perce.[23] This data again confirms the distinction between recessive and dominant lexical suffixes.

Summarizing the descriptive generalizations, the unique primary stress of a word falls:

(45) a. on its rightmost dominant accented syllable, if it has one,
b. otherwise on its leftmost accented syllable, if it has one,
c. otherwise on its rightmost non-final syllable (or on its final syllable if it is superheavy),
d. otherwise on its sole syllable.

As noted at (41), all accents, regardless of dominance, weight, and position in the word, are visible as primary or secondary stresses at some level of the lexical phonology, since they can resist shortening. I assume this is the Stem level, since its output level feeds a system of syncope and vowel contraction processes that reduce the number of syllables in the word and create new closed syllables and long vowels, resulting in a measure of opacity at the Word level. It is at this level that weight-sensitive and position-sensitive secondary stress is assigned to inherently unaccented syllables (Crook 1999: 290, 356):

(46) a. CVV and CVVC syllables always have at least secondary stress.
b. CVC syllables have secondary stress except word-finally.
c. CV syllables are obligatorily stressed in penult position, usually in word-initial position, and otherwise optionally in an alternating stress pattern.

23 The shortening seems to be exceptionless word-finallly, for Nez Perce has no overt instances of word-final long vowels plus ', and fairly regular medially, e.g. /uu'/ in (35b), /píi-/ in *pí'ewyu'* /píi-'ewií-uu'/, and /pée-/ in *pé'wyuukinye* /pée-'ewii-úukini-e/ 'he shot her (going towards her)' (AW 200: 58, 587: 18) *pé'pew̓yeyikse* /pée-'ipéew̓i-éeyik-see/ (AW 253:34), *pé'w.yey̓.se* /pé-ȅwíi-én̓i-see/ 'he shot someone else's', 'he shot it for someone' (AD 997–8), *pá'wyaatksa* /pee-'ew'ii-áatk-s-e/ (AW 480: 35) 'he shot him as it went by'. The phonetic realization if -CVVC outside of primary stress seems to be variable. *-six* sometimes has secondary stress (-sìx C 346, 447), sometimes not (*-six* C 365, 452).

Nez Perce phonology must therefore countenance three representations relevant to stress: *(1)* the information encoded in underlying forms about lexical accents and their dominant or recessive character, *(2)* the primary and secondary stresses which realize these lexical accents independently of their bearers' syllable weight and position in the word according to (45), and *(3)* the additional rhythmic stresses that are assigned according to (46) to the surface output on the basis of the weight and position of syllables in the word after syncope and contraction. A Stratal analysis is well suited to model this layered accent system, because it provides the two relevant sets of correspondence relations on which Faithfulness constraints can be defined: between lexical accents and Stem-level stress, and between Stem-level stress and output stress.

In cited examples, I will continue to represent lexical accentuation in underlying forms by accent marks, using ´ for recessive accent and ˝ for dominant accent. In italicized output forms, phonetically realized primary and secondary stress are respectively represented by ´ and `.[24]

The descriptive generalizations (45) translate into an OT constraint system where leftward and rightward orientation alternate at three levels of prominence. Penultimate stress is RightMost stress dominated by NonFinality, as is standard in OT.

(47)
a. Max-Accent: A lexically accented syllable is stressed.
b. Culminativity: A word has one and only one primary stress.
c. RightMost-σ̋: The rightmost dominant accented syllable has primary stress.
d. LeftMost-σ́: The leftmost accented syllable has primary stress.
e. NonFinality: The final syllable does not have primary stress.
f. RightMost-σ: The rightmost syllable (because of NonFinality the penultimate or final superheavy syllable) is stressed.

Examples (47a) and (47b), being undominated, are omitted in tableau (48) for simplicity, and no candidates violating them are included there.

24 For secondary stresses I rely strictly on Crook's rules and examples; they are not marked in any texts, grammars, dictionaries or phonetic transcriptions. Impressionistically, Crook notes that initial and penult secondary stresses are stronger than others, but finds no clear reason for distinguishing multiple levels of secondary stress in the phonology.

(48)

Lexical Stress			Rtmost-σ̋	Leftmost-σ́	NonFin	Rtmost-σ
(i) /hi-pe-kuu-e/ → *hìpekúye* ‘they did’ (AW 308:95)						
a.		hípekùye				***
b.		hipékuye				**
c.	☞	hìpekúye				*
d.		hìpekuyé			*	
(ii) /hi-cúukweN-sii-ne/ → *hìcúukwecìne* ‘they knew/learned it’ (32b)						
a.		hìcùukwecíne		*		*
b.	☞	hìcúukwecìne				***
(iii) /wáaẇaa-e̋et/ → *wàa.ẇa.yáat* ‘fisherman’						
a.	☞	wàaẇayáat		*		
b.		wáaẇayàat	*			**
(iv) /hi-nées-cúukweeN-see/ → *hìnéescùkwèce* ‘he knows them’ (33a)						
a.	☞	hìnéescùkwèce				***
b.		hìnèescúkwèce		*		**
(v) /hi-nées-páayN-űu-see/ → *hìnàspàynóosa* ‘he came upon them’ (AW 379)						
a.		hìnáspàynóosa	*			***
b.		hìnàspáynóosa	*	*		**
c.	☞	hìnàspàynóosa		**		*
(vi) /’óykala/ → *’óykàla* ‘all’						
a.	☞	’óykàla				**
b.		’òykála		*		*
(vii) /sepée.hite̋emeN-eẇe̋e.t/ → *sèpèhitèmenèẇéet* ‘teacher’ (43)						
a.		sèpéhitèmenèẇèet	*			*****
b.		sèpèhitémenèẇèet	*	*		***
c.	☞	sèpèhitèmenèẇéet		**		
(viii) /nées-kii-éṅi-m-e/ → *néeskiyèṅime* ‘you did something for us’						
a.	☞	néeskiyèṅime				****
b.		nèeskiyéṅime		*		**
c.		nèeskiyèṅíme		**		*
(ix) /pée-kuu-éṅi-qaa-ne/ → *páakiyàṅiqana* ‘he did to her’						
a.	☞	páakiyàṅiqàna				*****
b.		pàakiyáṅiqàna		*		***
c.		pàakiyàṅiqána		**		*

Superheavy -CVVC is parsed as disyllabic for the reasons laid out above, so that /xáxàac/ 'grizzly bear' is parallel to (vi) /'óykàla/ 'all', and /hi-wíi-túxii-sii.x/ → *hì.wíi.tùxi-sìx* 'they were each making ropes' (54c) is parallel to (ii) /hi-cúukweN-sii-ne/ → *hìcúukwecìne* 'they knew/learned it' (32b).[25] The output forms record the stresses predicted by (47) and confirmed by AD, AW, and AT, together with the secondary stresses according to (46).

The postlexical stress system of Nez Perce remains unexplored. A small clue is that certain function words, unlike lexical words, bear final stress on underlying short vowels, e.g. 'ipí 'he/she/it', 'imé 'they' (Crook 1999: 325). The standard LPM assumption is that function words may be exempt from the lexical system and undergo only postlexical phonology,[26] where NonFinality would rank below Righmost-σ postlexically in Nez Perce. A similar explanation has been suggested for the leftmost accent placed on orthotonic deaccented finite verbs and vocatives in Sanskrit (Kiparsky 2010).

Previous work on Nez Perce stress treats only the unaccented and dominant inherently accented morphemes, and does not accommodate recessive-accented suffixes such as (34)–(39). My layered analysis has the additional advantage of eliminating Crook's (1999: 325) constraint *Stressed Lexical Head, which has to be ranked ahead of the other constraints just in case a word has accented prefixes, with the additional stipulation that just these prefixes also trigger bracket erasure (which suffixes crucially do not).[27]

25 (Crook 1999: 484–493) cites three verb roots that become dominant when they are combined with a particular derivational prefix ("hyper-accentuation"): /hoł/ 'slip' after /cuule-/ 'grasping with the hand', and /k̓iw/ 'sever' after /'isa-/ 'with blade'. Neither prefix is found in AD with any other root. These combinations are perhaps lexicalized as dominant-accented verbs like (42a) /hitée̋-meN/ 'read'. The third root, /talaqi/ 'stop', becomes dominant-accented after /teqe-/ 'quickly'. These seem to be isolated cases rather than instances of a systematic process.

26 Just as in English, pronouns *he/him* and *they/them* are exempt from vowel shift and receive no lexical stress, thereby becoming eligible to bear reduced vowels.

27 This constraint is criticized on cogent theoretical grounds by Bjorkman (2010). However, Bjorkman's claim that it is consistent with cyclic implementations of OT such as Stratal OT is incorrect, since the constraint reranking and bracketing erasure proposed by Crook are triggered not by a morphological level or category but by a specific morphologically and phonologically defined class of affixes. Bjorkman's alternative constraint Preserve Edgemost is also non-standard and shares the same empirical limitations. Bogomolets (2020) in turn reformulated Bjorkman's analysis in a formally cleaner way, albeit with less empirical coverage.

3.4 Syncope

With the accentual system in place, we can return to the question whether the long and short forms of the applicative suffix are suppletive allomorphs, or phonologically derived from a single underlying form. A prohibition of outwardly conditioned allomorphy, whether baked into the theory as in (4)–(7), or sprinkled on as in (8), is committed to a phonological derivation. It looks promising because the alternants are phonologically similar, and their distribution is phonologically conditioned by syllable structure in a strictly local context. But this is not enough, for suppletive allomorphy can also be phonologically conditioned, and we have not yet identified the phonological constraints or processes that are responsible for the short form.[28] Fortunately Aoki's (1970; 1994) and Crook's (1999) insights into Nez Perce phonology and D&W's stratal analysis of its word structure have laid the foundation for a compelling phonological account of the applicative alternation.

In view of its "elsewhere" distribution, we start from the hypothesis that the long form of the applicative morpheme is basic, and seek an explanation for the appearance of the short form *-ey̓-* before Stem-level -CV. I will present evidence that *-ey̓-* is not a suppletive allomorph, but a pronunciation of /-én̓i/ that arises by a syncope process that deletes short unstressed medial vowels, driven by the constraint (49), where $\overset{\times}{V}$ stands for an unaccented short vowel.

(49) SYNCOPE: *V.C$\overset{\times}{V}$.CV

D&W rejected a phonological derivation of the applicative alternation on the grounds that combinations of the long form *-en̓i-* with -CV would "violate no known phonological constraints of Nez Perce", citing well-formed words with the sequence *…n̓i-se*, such as *'e-tmíi-pn̓i-se* 'I am remembering it'.

D&W's counterexamples, however, differ from syncopating applicative forms like **-en̓i-se* in two crucial respects. The short *i* of *'etmíipn̓ise* is underlyingly *long* and preceded by *two* consonants, whereas that of *-en̓i-CV-* is underlyingly *short* and between *single* consonants.[29]

(50) a. ***pi.n̓ii**.se* AD 542 b. 'et.míi**p.n̓i**.se AW 105.16
piǹii-see 'e-timíi-piǹii-see
come out-IMPERF 3Obj-heart-come out-IMPERF
'I am coming out' 'I think of it' ('it comes to mind')

28 Carstairs (1987), Hargus (1993), Kiparsky (1996), Paster (2005), Embick (2010), Nevins (2011), Bonet and Harbour (2012), Arregi and Nevins (2012), Trommer (2015a), a. o.

29 From now on I will mark syllable boundaries in cited italicized forms, since they play a role in conditioning syncope.

D&W's examples are compounds of /-piǹii-/ 'come out' (AD 543–4, C 159), their form derived by two general phonological processes interacting with movable stress: in unstressed syllables, underlying long vowels shorten across the board, and short unstressed vowels are syncopated when syllable structure permits. The long /ii/ of /-piǹii-/ surfaces as long under main stress in (50a) *piǹíise*, and is shortened when accentually subordinated in (50b) *'et.míip.ǹi.se*. The underlying long /ii/ of /timíi-/ is retained under main stress in (50b), and shortened in (51), where it is accentually subordinated to the prefix.[30]

(51) *péet.mi**p.ǹi**.yeǹ.ye* AW 468:47
pée-timíi-piǹii-éǹi-e
3S.3O-heart-come.out-Appl-Perf
'he$_i$ remembered his$_j$'

The short /i/ of /-piǹii-/ and /-timíi-/ is syncopated in (50b) and (51).

In medial position, root syncope is sensitive to syllable structure, so /-hawaq-/, /-teqi-/ are respectively reduced to *-hwak-*, *-tqi-* after -V and to *-hawk-,-teq-* after -C.

(52) a. *ni.káa**h.waq**.sa* AD 101
nikée-hawaq-see
pull-miss-Imperf
'I aim at no particular target'

b. *to.káap.**hawq**.sa* AD 101
tuk^{w}éep-hawaq-see
with,hand-miss-Imperf
'I feel nothing'

c. *wii**t.qi**.ǹée.mi.se* AD 724
/wii-teqinéemii-see/
cry-last.time-Imperf
'I am crying for the last time'

d. *wis.**teq**.ǹée.mi.se* AD 724
/wis-teqinéemii-see/
leave-last.time-Imperf
'I am visiting for the last time'

Vowels in initial open syllables never syncopate, for CC- onsets are categorically excluded in the language (**nkáahwaqsa, *tkáaphawksa*). Vowels after closed syllables do however syncopate if the output is syllabifiable in virtue of consonant fusion. Underlying long vowels such as /uu/ in (53a) and /ee/ (53b) never syncopate, even when shortened in unstressed or secondary-stressed syllables:

(53) a. *hi.**ku**.síix* AD 237
hi-kuu-síix
3S-do-Imperf/Pl
'they are doing'

b. *pel.ki.líi.n**e**.yi.ku'* AW 205:15
pe-likilíiN-éeyik-úu'
PlS-go.around-around-Prosp
'we/you will go around and around'

Underlyingly accented vowels do not syncopate. For example, the root /túxii/ has an inherently accented short /ú/, seen in (54a). In (54b) it is subordinated to

30 Recall that secondary stress does not systematically license vowel length.
30 Recall that secondary stress does not systematically license vowel length.

another accented syllable on its left, but still does not syncopate. Thus, inherent accents remain visible to MAX-&VACUTE; even when not manifested as a primary stress. So /túxi/ does not reduce to *…*txi*…. in (54).[31]

(54) a. *hi.tú.xi-six* (AW 13.43) /hi-túxii-síix/ 3S-make.rope-IMPERF/PL 'they make ropes'

b. *hi.wíi.tu.xi-six* (AW 13.44) /hi-wíi-túxii-síix/ 3S-each-make.rope-IMPERF/PL 'they were each making ropes'

Syncope and shortening collaborate to transpose the phonemic length contrast into a V:Ø contrast, in a chain shift by which shortening makes syncope opaque by introducing new short vowels that fail to delete. In non-syncopating environments, shortening simply neutralizes vowel length. While underlying long vowels are shortened if they are unstressed,[32] short vowels are never lengthened under stress — let us assume in virtue of high-ranking DEP-μ (Hume et al. 1997). Consequently the length of a vowel under stress and its retention in syncopation contexts are two independent diagnostics of its underlying length.[33]

(55)–(57) further highlight the predicted orderly opacity of syncope.[34] In (55a) the main stress falls on the accented prefix *pée*, and the long /ii/ of the root shortens (but does not delete); the length is manifested under stress in (55b).

(55) a. /pée-heewtuk̓íi-e/ *pée.hew.tu.k̓i.ye* 'he caught up with her' (AW 17.114)
b. /heewtuk̓íi-see/ *hew.tu.k̓íi.se* 'I am catching up with (mine)' (AD 123)

31 In compounds, the accent of the governed member is lost, e.g./wix̣sú'-qimímii-k-s/ *wix̣su'ú-qimmiiks* 'my foot went to sleep from sitting' (AD 586).

32 Most systematically in the variety described in Crook (1999) and D&W; AD sometimes shows retention or optional shortening of underlying vowel length, e.g. *péekusene* ~ *péekuusene* 'they did it long ago' (AD 238), *púuy̓pewýyey̓se* ~ *púuy̓peewýyey̓se* 'he looked for his while flying' (AD 1061). Perhaps the shortening of unstressed long vowels was still an ongoing sound change at the earlier stage described by Aoki, operating as a gradient postlexical process, or even part of phonetic implementation, and producing only a near merger. The variability in length preservation revealed by these sources does not challenge the underlying length distinction and the basic shortening and syncope processes. Aoki also often transcribes the short form of the applicative morpheme as long when stressed (AG 98, AG 98, AD 84, AD 96, C 178, AD 1047, AD 1061), but it is short in AD 109–10 and always in D&W.

33 A small class of morphemes has long vowels that never shorten (C 170, 328); *likilíi-* is one example, see (53b). Crook considers that they are underlying disyllabic VCV. The sequences /ewe/, /awa/ coalesce regularly to *uu, oo* (e.g. (57d)), which do not shorten (C 266). Monosyllabic members of compounds and full-word reduplications don't seem to shorten, e.g. *kuucpúu* 'mink' (*kúus* 'water' + *púu* 'inhabitant of' (AD 250).

34 I am grateful to Amy Rose Deal for bringing these examples from AW to my attention.

In (56) the main stress again falls on the inherently accented *pée*, and the unstressed long vowels of /-éetwikN/ (see (12f)), /-see/ and /kii-/ (the allomorph of /kuu/, Section 2) shorten.

(56) /pée-kii-éetwikN-see/ *pée.ki.yet.wik.ce* 'he did it after him' (AW 12.20)

Examples (57a) and (57b) confirm the underlying stress and length of the second root vowel of /t̓awáanii/, and the third root vowel's retention in the syncope environment in all four examples confirms its length. In (57c) and (57d), where the stress shifts off the root to the inherently accented prefixes, *both* long root vowels shorten.[35]

(57) a. /t̓awáanii-siix/ *t̓a.wáa.ni.six* 'to do' (AW 14.54)
b. /hi-t̓awáanii-ú'/ *hit̓.wâa.ni.yo'* 'they might do it' (AD 811)
c. /páa-t̓awáanii-see/ *páat̓.wa.ni.sa* 'they do it' (AW 169:64)
d. /hi-tuk̓ʷéep-t̓awáanii-qaa-ne/ *hit.k̓óop.t̓a.wa.ni.qa.na* 'he did that with his fingernail' (AD 811)

With no less than five medial short open unstressed syllables in a row, (57d) demonstrates the opacity of syncope that results from its interaction with shortening.

Crook (1999) and Hargus et al. (2015) analyze the fleeting vowels of verb roots like (58a) as epenthetic rather than syncopated. Stable vowels would then be underlying, as in roots like (58b).

(58) a. *teqíik-se, hi-tqîik-se* 'I am / he is coming down'
b. *teqíi-se, hi-teqîi-se* 'I am / he is fishing with a net'

What these authors represent as an underlying Ø ~ V contrast /tqíik/ vs. /teqii/ is in my analysis an underlying length contrast /teqíik/ vs. /teeqii/. A core argument is that non-syncopating unaccented vowels are regularly long when they bear the primary word stress, as in the nominalized *téeqi-t* 'fishing with a net'. Nez Perce has no process whatever that lengthens stressed vowels, but it does have a robust contrast between long and short vowels. It is therefore natural to analyze the contrast between fleeting and stable vowels as an instantiation of the length contrast. The following theoretical and typological considerations support this conclusion.

First, the epenthesis analysis of initial CVC- ~ CC- alternations requires underlying initial geminates, such as /qq-/, /cc-/, /mm̓-/, /tt-/, /ww-/, and even underlyingly vowel-less roots: (59f) would be from underlying /'np/.

35 In (57d), *k̓ʷee* contracts regularly to *kuu*, which then lowers by vowel harmony, as in (57b).

(59) a. /hi-qeqéewii-see/ *hi**q.q**ée.wi.se* ‘he is drunk’, cf. ***qe.q***ée.wi.se ‘I am drunk’, ***qe.q***e.wi.ye.ẁéet ‘drunkard’
b. /wéeẁu-mim̓áasN-k-see/ *wáa.ẁo**m̓.m**ack.sa* ‘I feel numb from lying down’, cf. *mi.m̓áas.ca* from /mim̓áasN-see/ ‘I am numb’
c. /’e-cicéqeeN-see/ *’e**c.c**é.qe.ce* ‘I enjoy it’, cf. *hi.pes.léw.**cic**.qe.nu*’ ‘they will enjoy watching it’
d. /’e-titóolaa-éṅi-see/ *’a**t.t**óo.laẏ.sa* ‘I forget his’, cf. ***ti.t**óo.la.sa* ‘I forget (mine)’, /titóolaa-éṅi-e/ ***ti.t**óo.laṅ.ya* ‘I forgot (e.g. yours)’ (AD 761–2)
e. /hi-wiwéep-lehp-see/ *hi**w.w**éep.lehp.se* ‘it causes (someone) to have an illusion’, cf. /wiwéep-lehp-t/ ***wi.w**éep.lehpt* ‘premonition by optical illusion’
f. /’inipi-x/ *’i.níp-x* ‘take!’, *pée’n.p*-ù’ ‘he will take’

Initial phonemic geminates are typologically rare, and they would be especially surprising in Nez Perce, where even medial geminates are uncommon, and where non-derived geminates are scarce, and on one view even non-existent.[36] Moreover, morpheme-internal geminates are usually not broken up by epenthesis (Hayes 1986; Schein and Steriade 1986), and nasal sequences across morpheme boundaries in Nez Perce are regularly eliminated by degemination and deletion, not by epenthesis as in (59b) (Crook 1999: 114), e.g. /qíiwn/ *qíiwn* ‘old man’, acc. /qíiwn-ne/ *qíiwne*, *k̓úuseẏn* ‘Montana’, acc. *k̓úuseẏne*, *pátan* ‘bush’, acc. *patána*, also (33d). Vowel-less roots would also complicate the grammar by requiring morpheme-specific contexts for epenthesis. For example, why do we get *’iníp-x* rather than **’ínpix?* In the syncope analysis the pattern is predictable from the root /’inipi/, which begins with exactly one consonant like all the roots, stems, and words of Nez Perce do.

The strongest argument against epenthesis is that the quality of the fleeting vowel is unpredictable. It can be any of the five vowels, *u*/*o*, *e*/*a* (depending on harmony), *i*, or a copy of the following vowel (C 165), as in (60a-c).

(60) a. /’ewíi-see/ *’e.wíi.se* ‘I shoot it’, /pée-’ewíi-see/ *pé’.wi.se* ‘he shoots it’, /pé-ẻwíi-éṅi-see/ *pé’w.yeẏ.se* ‘he shot someone else’s’, ‘he shot it for someone’ (AD 997–8)
b. /hi-taq̓ii-see-qa/ *hit.q̓i.sáa.qa* ‘it was coming out of the water’, cf. /taq̓ii-see-qa/ *ta.q̓i.sáa.qa* ‘I was coming out of the water’
c. /tulée-cakák-see/ *to.láac.kak-sa* ‘I prick with spurs’, *ca.káx* ‘hurt’

36 (Crook 1999: 16, 145) and (Aoki 1970: 28–33); there is however a process of expressive gemination, which applies to the onset of syllable with primary stress if a secondary stress precedes (C 90).

d. /wíi-pukúy-k-see/ *wíip.kúyk.se* ‘I untie each of them’, cf. *pu.kúy* ‘loose’
f. /hi-quqú-wéeyik-see/ *hiq.qú.we.yik.se* ‘he [the horse] is galloping across’ (AD 872, C 181), cf. /quqú-wéeyik-see/ *qu.qú.we.yik.se* ‘I am galloping across’
g. /hi-tox̣pi-leht-see/ *hi-tx̣pi-láht.sa* ‘he stretched his legs out’ (AD 333), cf. /tox̣pi-leht-see/ *tox̣.pi.láht.sa* ‘my legs are stretched out’

An epenthesis analysis would have to specify the quality of the inserted vowel by some morpheme feature; for roots with two different fleeting vowels, *two* such features would be needed, as in (52c,d), where syncope yields the right results directly from underlying /wii-teqinéemii-/ and /wis-teqinéemii-/.

3.5 Syncope, fusion, and the applicative

We have determined that the first vowel of the applicative morpheme /-éń̓i/ is inherently accented. Therefore this vowel is immune to syncope. The second vowel of /-éń̓i/, however, violates the syncope constraint if and only if it is followed by -CV within the stem. That immediately explains why the short form of the applicative appears just before -CV within the stem.

At this point it becomes important that from the OT perspective (49) Syncope is a constraint against certain syllabic configurations, and not a deletion rule. Nez Perce enforces its restrictive syllable structure not only by deletion, but also by coalescing abutting vowels and consonants. In particular, when consonants come into contact, either in morpheme combinations or as a result of syncope within morphemes, they can fuse into a single segment that combines features of both to the maximal possible extent.

Let us consider more closely how the syncope constraint is violated and satisfied and how it interacts with the rest of the phonology. Constraint satisfaction must be evaluated at the output. Therefore syncope may take effect even when its immediate output is ill-formed, provided that the constraint system – in Stratal OT, that of the current level – then renders it well-formed. In Nez Perce, syncope commonly feeds coalescence of the consonant clusters it creates. For example, although the -CCC-cluster *-w’n-* is disallowed, syncope of *i* can apply to /-w’in-/ because a productive process of the language fuses the output into *-ẃ̓n-*, as (61a) illustrates.

(61) a. /éw-’inéhneeN-see/ *éw̓.néh.ne.ce* ‘I am carrying it’ (AD 1030)
b. /inim-’ásqa-p/ *iń̓.más.qap* ‘my younger brother’ (AD 976)
c. /wéep-ciỷawN-e’s/ *wáap.ci.ỷaw̓.nas* ‘for killing’ (AD 88)

In (61b) the fusion operation in turn feeds a leftward shift of the glottal feature, viz. /-nim’-/ → ***nm’*** → ***nm̓*** → ***n̓m*** (as also in (18b)), where the last step is driven by the constraint that only the first member of a sonorant cluster may be glottalized, which is inviolable in Nez Perce. This alignment constraint rules out in particular all sonorant clusters ending in ẏ, *l̓*, *n̓*, *m̓* (including geminates, (59b)).

(62) *RR̓: In a sequence of sonorant consonants, only the initial one may be glottalized.

In (61c) these processes are in turn fed by the glottal shift described above at (28), viz. /-wn-a’s/ → *-wn’as* → *-wn̓as* → *-w̓nas*.

Although I have described these processes in terms of ordered rules, they are compatible with ordinary OT-style simultaneous constraint optimization because they take effect in transparent feeding order. The reduction of the long applicative to the short applicative can now be seen as part of this larger pattern of syncope and fusion.

Fusion merges two or more segments into a single segment that shares features with each component. By definition, a fused segment has at least one feature specification of each of its component segments (The total deletion of the floating *-n* of C-stems before *t*, as in /we-c̓ákN-t/ *wa-c̓ák-t*, footnote 11, does therefore not count as fusion, and (unlike fusion) violates the faithfulness constraint Max(segment)). Which of the components’ mutually incompatible features is retained in the fused segment is determined by two main principles, which jointly have the effect of maximizing faithfulness. First, the fused segment must have all feature specifications that are shared by its components. For example, the fusion of two stops is itself a stop. Secondly, the fused segment preferentially retains the marked feature specifications of its component segments. For example, in Nez Perce, if only one component of a cluster is a glottal stop or a glottalized consonant and the other is not, their fusion always preserves the glottal feature.[37]

In autosegmental representations, faithfulness constraints must regulate correspondences between three aspects of input and output representations: segmental information (features and feature complexes), skeletal information (syllable structure, C- and V-slots), and associations between them (represented by lines that connect featural information with skeletal slots). A fused segment bears a correspondence relation to each of its input components. In virtue of this correspondence, fusion satisfies such faithfulness constraints as Max(C) and Max(segment), which are violated by outright deletion. However, fusion, like assimilation, incurs violations of Dep(assoc) by adding new affiliations of segmental material

37 On markedness as visibility, see de Lacy (2002).

with syllabic slots. Nez Perce fusion phenomena reveal the interaction of the constraints in (63).

(63) a. Dep(X): An output syllabic position (V or C) has a correspondent in the input (McCarthy 2000)
b. Max(X): An input syllabic position (V or C) has a correspondent in the output (McCarthy 2000)
c. Max(segment): An input segment (feature bundle) has a correspondent in the output (Coetzee 2006).
d. Dep(assoc): An output association (link) has a correspondent in the input (Myers 1997). Violated by fusion and assimilation (but not, let us assume, by metathesis, which is a linearity violation).

Example (64) lists the most important consonant fusion processes of Nez Perce.

(64) a. /n/ and /s/ fuse into *c*, e.g. /hekiNć-see/ → *hekice* 'I see (mine)'
b. /s/ and /, / fuse intoc̓, e.g. /'e-nees-'inipi-see/ → 'enéec̓inpse 'I am arresting them'
c. stops and /, / fuse into ejective stops: /tilláap-'ic/ *tilláap̓ic* 'to be lonesome', /sayaq-'ic/ *sayáq̓ic* 'to be beautiful'
d. /n/ and /y̓/ fuse into n̓
e. / n̓/ and /y/ fuse into y̓

In each case, the fused segment has at least one distinctive feature of each merging phoneme, and retains all features that they have in common. In (64a), c̓ combines the floating nasal at the end of C-class stems with the place features of a following *s*. In (64b), c̓ combines the glottal stop gesture of ' with the place features of *s*. In (64c), fusion superimposes the glottal and supraglottal gestures of adjacent stops. Let us look more closely at case (64d), illustrated in (65b), which makes an intriguing counterpart to the short applicative fusion.

(65)	a.	*wakaykay̓áay̓* (AD 197)	b.	*sepetwen̓éey̓ (*AD 765)
		wee-kayk-ey̓éey̓		sepee-tiweeN-ey̓éey̓
		implement-rinse-not		cause-mix-not
		'unrinsed'		'unmixed'

The output n̓ combines the glottal gesture of y̓ with the place features of *n*. The fused output consonant corresponds to both input consonants in virtue of sharing feature content with both, thereby avoiding the Max violation that would result from complete deletion of one of them. In each case of (64), the fused rendition of the two consonants incorporates the unique maximum possible shared feature content of the components. When the initial vowel of the privative suffix /-ey̓éey̓/ (AD 85) syncopates after a stem in /-N/ (a C-stem), the immediate result *-ny̓-*

violates the constraint (62), which prohibits sonorant clusters whose non-initial member is glottalized. The violation is repaired by fusing the two consonants. Recall that Dep(X) is violated by inserting a new C-slot, while Max(seg) is violated by leaving input segmental information without an output correspondent, and Dep(assoc) by adding a new affiliation between a segment and a slot. The first set of forms in (66) show the derivation of the suffix after a C-stem – a stem with a final floating nasal, whose realization as *n* requires inserting a C-slot for it (violating Dep(X)). The second set of forms in (66) show the derivation of the suffix after a stem with an /-n/ which already comes anchored with a C-slot. It will be seen that the constraint ranking always prefers fusion over deletion if it is possible.

(66)

Stem level		*RR̓	*V.CV̽.CV	Dep(X)	Max(seg)	Max(X)
Input: /cúukweeN-ey̓éey/						
1a.	cuuk.wee.ne.y̓éey		*	*		
1b.	cuuk.ween.y̓éey	*		*	*	*
1c.	cuuk.ween̓.yéey			*	*	*
1d.	cuuk.wee.y̓éey				**	*
1e. ☞	cuuk.wee.n̓éey				*	*
Input: /c̓inin-ey̓éey/						
2a.	c̓i.ni.ne.y̓éey		*			
2b.	c̓i.nin.y̓éey	*			*	*
2c. ☞	c̓i.nin̓.yéey				*	*
2d.	c̓i.ni.y̓éey				**	**
2e.	c̓i.ni.n̓éey				*	**

Finally, in the short form of the applicative suffix, y̓ combines the glottal gesture of /n̓/ with the place features of /i/, which cannot be realized as a vowel before -CV because it violates (49). Again, Max(seg) causes fusion to be preferred over deletion, dictating that the short form of the applicative of /-én̓i-/ is *-éy̓*, not *-én̓* or *-éy*. Indeed, the short form *éy̓* is the most faithful realization of /-én̓i-/ that the phonetics and phonotactics of Nez Perce allows in the syncope environment -CV. The more faithful *-en̓yCV* is excluded by syllable structure constraints, for codas of rising sonority such as *-n̓y*, onsets of falling sonority such as *yC-*, and any complex onsets for that matter, are all disallowed. Outputs such as *-éỹ or *-éỹ̓ are ruled out because Nez Perce categorically disallows nasalized glides, and the noncontinuant component of /n̓/ cannot merge with /y/ because Nez Perce categorically disallows noncontinuant glides. The bottom line is that y̓ is the most faithful available correspondent of n̓*y*. The relevant syllable structure constraints, all undominated, are:

(67) a. *ComplexOnset (undominated, Golston 1996)
b. Onset: A syllable has an onset (Prince and Smolensky 1993/2004)
c. Sonority Sequencing: The sequence of segments in a coda may not increase in sonority (Bat-El 1996; Selkirk 1984)

They are subsumed under σ -WF in (68). The optimum output under this ranking is *-éý̓-*.

(68)

Stem level	σ-WF	*V.CV̽.CV	Dep(X)	Max(seg)	Max(X)
Input: /-én̓i-see/					
a. -é.n̓i.see		*			
b. -én̓y.see	*				
c. -én̓.ysee	*				
d. ☞ -éy̓.see					*
e. -én̓.see				*	*

The remaining question is why the short form of the applicative before -CV suffixes is required only at the Stem level. The simplest and weakest assumption that will account for this fact is that secondary stress is assigned by default to all penultimate syllables at the Word level, and that secondary stressed vowels do not syncopate. In fact, no penult syllable that initiates the Word-level affix complex ever syncopates, which is consistent with this assumption. This is shown by space+tense combinations such as *-im-e* (cislocative past) and *-kik-e* (translocative past).

(69) a. /hi-teqíik-im-e/ *hitqíikime* (**hitqíixme*) 'he landed (here)' (AD 722)
b. /hi-kuu-kik-e/ *hikúukike* (**hikúuxke)* 'he went on (from a point away from here' (AG 99)
c. /hi-wewíiti-kike/ *hi-wewíiti-kike* 'he went on downstream' (AW 501:24)

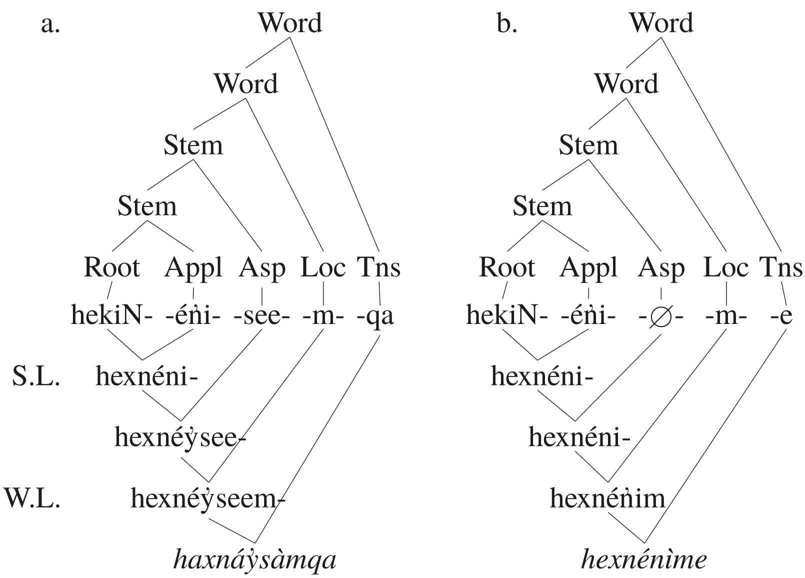
A more general hypothesis would be that the constraint (49) that drives syncope is demoted and inactive at the Word level. We know from *kuu-/kii-* allomorphy (Section 2) and from the applicative morpheme (Section 3.1) that space and tense suffixes are not included in the stem. In fact, open syllables formed by those suffixes not only do not undergo syncope, they also do not trigger it.

Our analysis requires that words are built from the stems they contain, and that the stem-level phonology applies to stems before the Word-level morphology is added. This can be illustrated by the contrast between the applicatives in (70):

(70) a. /hekin-én̓i-see/ *hexnéy̓see* ‘I see (someone else’s)’
b. /hekiN-én̓i-see-m-qa) *haxnáy̓sàmqa* ‘I saw (someone else’s) recently’
c. /hekin-én̓i-m-e/ *hexnén̓ìme* ‘you saw (for me)’

Example (71a) is built by adding to the Stem-level aspect-marked verb the Word-level cislocative suffix *-m* followed by the recent past tense, and (71b) is built by adding to the aspectless (or null-aspect) verb the Word-level cislocative suffix *-m* followed by perfective *-e*, which patterns as a tense. It is clear from the derivational history in (71) that the correct context for the short form of the applicative is present at the Stem level, and no longer at the Word level.

(71)



More indirect evidence that the short form is phonologically derived comes from the variant with *n* which is reported for the Downriver (Cayuse) dialect (AD 109–110).

(72) a. *’e-exn-éy̓-se* ‘I see someone else’s’ (Upriver dialect)
b. *’e-exn-én-se* ‘I see someone else’s’ (Downriver dialect)

As far as I can make out, the two dialects are otherwise very similar, and the underlying form for both (71a) and (72b) can be assumed to be the same, namely /’e-hekiN-én̓i-see/. The nasal short form of the Downriver dialect could be derived from /-én̓i/ by a high-ranking Ident-(nasal) or Max(+nasal) constraint, with delaryngelization driven by phonotactic restrictions; at least the Upriver dialect does not have clusters like n̓s, *n̓c*, *n̓t* (Aoki 1970: 27).[38]

3.6 Conclusion

Of the two cases of outward-sensitive allomorphy in Nez Perce that Deal and Wolf (2017) present, one involves a vanilla root-suffix dependency of the type (7) which is not outward, and poses no problems for MM or other theories that limit outward dependencies in morphology. The other would involve phonologically conditioned outward-sensitive allomorphy of type (6), which is intractable in MM as currently understood, and incompatible with otherwise well-supported constraints proposed in DM. So it should be good news all around that it is actually not allomorphy but a *phonological* alternation, which duly obeys the applicable phonological locality constraints. Since phonology *can* be both inward and outward sensitive – subject only to phonological locality – Nez Perce does not threaten the generalization (6) that allomorphy cannot be outward sensitive, nor theories such as Minimalist Morphology, from which that generalization follows in a principled way.

To conclude with a methodological point: in reaction to Chomsky and Halle (1968), many researchers argued that what looks on the face of it like phonology is sometimes really allomorphy. This paper shows that the reverse is also sometimes the case. What looks on the face of it like allomorphy can really be phonology. The upshot is that you cannot situate a process in the grammatical system just by casually eyeballing instances of it. To determine its nature you have to delve into it to find out what formal operation it involves, whether it obeys phonological or morphological locality constraints, and how it interacts with other processes in the grammar.

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38 Also intriguing are two Upriver verb forms in which the short applicative *-éy̓* behaves as a C-class stem: /pée-'inek-weecee-én̓i-síix/ *pée'nehwec**éy̓cix*** 'they are dancing, carrying someone else's' (AD 845), /hawaq-én̓i-see/ *hawaq**áy̓ca*** 'I miss someone else's' (AD 101). Unfortunately the former has the regular S-class ending *-six* in the actual texts (AW 146: 85, 147:109, 148:118), and I am unable to find the source of latter. If these data should be correct, however, they would corroborate an etymological relationship to the dative/benefactive noun suffix *-'ayn* 'for (the purpose of)', especially in view of the glottal shift discussed at (28), and perhaps to the verb *'enii, 'inii* 'give', as Rude (1985) conjectures.

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