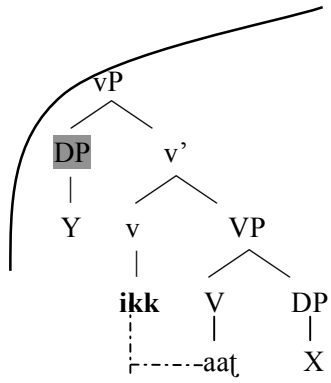
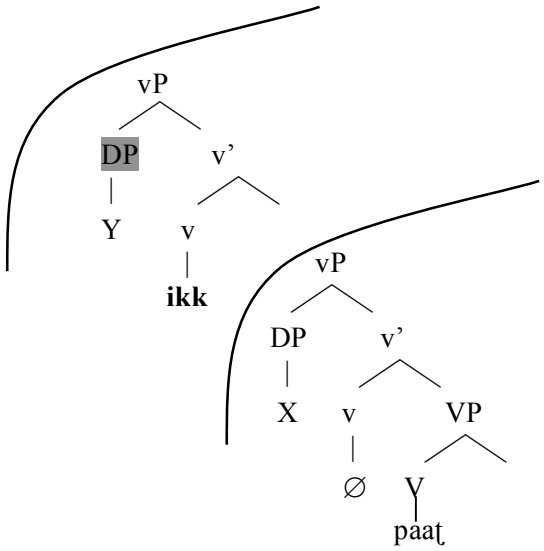
To Alternate or Not to Alternate: What is the Boundary?

In order to avoid having to arbitrarily stipulate the domain of phonological processes within the word, a number of recent phonological analyses have made use of the syntactic component of grammar to provide boundaries for constraint satisfaction under different types of affixation (Marantz 2006, Piggott & Newell 2006, Killimangalam & Michaels 2007, Michaels 2007). The proposal is that syntactic spell-out domains that are independently motivated in above-word syntax can be used to condition phonology within the word, helping to explain the differences in behavior between inner and outer word formation (Halle & Marantz 1993, Marantz 2001, Marvin 2002, Svenonius 2005). An issue that arises once these boundaries are in place is how to handle constraint violations that occur across spell-out domains. Are these violations visible to the phonology or invisible? Additionally, if the violations *are* visible, how is their repair limited by the already spelled-out material?

The formation of causatives in Malayalam has been analyzed as a case where the phonological shape of the suffix is argued to vary based on where it is merged in the syntax (Killimangalam & Michaels 2007, Michaels 2007). If the causative affix /ikk/ is introducing the first external argument to the verb (being added to an unaccusative) it is added in the same phase as the verb; if the affix is introducing a subsequent external argument to the verb (being added to a transitive or unergative), it is added in a subsequent phase. There is a process by which the affix can undergo coalescence with the last consonant of the root, making the consonant geminate (Sadanandan1999). This process can only occur when the affix is introducing the first external argument to the verb and being added in the same phase as the root (1a), not when it is being added in a subsequent phase (1b).

(1a) Same Phase: Coalescense	**(1b) Subsequent Phase: No Coalescense**
aaṭ- 'X shakes' aaṭṭ- (aaṭ+ikk) 'Y shakes X'	paaṭ- 'X sings' paaṭikk- (paaṭ+ikk) 'Y makes X sing'





Thus, the claim is that coalescence is blocked from occurring across a phase boundary—the syntactic boundary prevents phonological merger. The complication that arises from these proposed boundaries is that violations of some phonological constraints are visible across them (Michaels 2007). For example, violations of hiatus (*V-V) across the boundary are resolved through subsequent glide epenthesis (2), and violations of OCP Place (e.g. *dorsal-dorsal) are resolved though subsequent place dissimilation (3).

(2) kara] 'X cries'
kara] + ikk] ⇒ kara**y**ikk- (*kar**ai**kk-) 'Y makes X cry' (Hiatus Resolved)

(3) paaʈ] ‘X sings’
paaʈ] + ikk] ‘Y makes X sing’
paaʈikk] + ikk] ⇒ paaʈi**pp**ikk- ‘Z makes Y makes X sing’ (OCP Place Resolved)

Yet, even though these constraint violations are visible across the phase boundaries, the manner in which the violations are resolved is limited: the modification of previously spelled-out material is minimal. For instance, to satisfy Hiatus (*V-V), no change is made in the previously spelled-out material; epenthesis occurs in the newer (not yet spelled-out) phase. To satisfy OCP Place, the only change made in the previously spelled-out material is the place specification of the final geminate. What is not seen in the satisfaction of phonological constraints is coalescence with previously spelled-out material, and there is no deletion of previously spelled-out material.

In my analysis regarding constraint satisfaction across word internal phase boundaries in Malayalam I propose that (1) constraint violations across phase boundaries are visible to the phonology, but (2) the modifications of previously spelled-out material which can be made to resolve these violations is limited in a very specific manner: timing slots established in previous phases cannot be deleted or re-linearized. If every segment which is spelled-out receives a timing slot, this means that repairs such as coalescence are blocked. This is because for the affix to undergo coalescence with the final consonant of a spelled-out root would require it to be simultaneously realized with previously ordered elements of the earlier phase.

(4) paaʈ] ‘to sing’ + ikk ⇒ * paaʈ] √ paaʈ] ikk ‘Y makes X sing’
| | | | | | | | | | | |
xxxx xxx xxxx xxxx xxx
kk
| |
xx
*paaʈʈ- √ paaʈikk- (No Coalescence)

Repairs such as epenthesis in later phases are allowed, because adding an element in a new phase has no effect on the timing slots established in the previous phase (5).

(5) kara] ‘to cry’ + ikk ⇒ kara] **y**ikk ‘Y makes X cry’
| | | | | | | | | |
xxxx xxx xxxx **x**xxx
√ kara**y**ikk- (Hiatus Resolved)

Although repairs such as place dissimilation affect the quality of a previously spelled-out segment, they do so within the bounds of a previously established timing slot, and thus are allowed (6).

(6) paaʈikk] + ikk ⇒ paaʈi**pp**] ikk ‘Z makes Y makes X sing’
| | | | | | | | | | | |
xxxxxxx xxx xxxxxxx xxx

√ paaʈi**pp**ikk- (OCP Place Resolved)

To sum, I propose that in Malayalam there is some type Phase Impenetrability Condition (Chomsky 2001) active in the below the word syntax: previously spelled-out material is impervious to any phonological processes that would modify (e.g. delete) established timing slots. However, phonological violations are visible across the word internal phase boundaries and are resolved if possible. In this the analysis of Malayalam differs from the analysis of Ojibwa by Piggott & Newell (2006). In their analysis, Piggott & Newell posit *Phase Integrity*, which states that well-formedness only holds for a sequence if it is entirely contained in a phase. However, the constraint they use to illustrate *Phase Integrity* in Ojibwa, *V-V, is a constraint that must be satisfied *even across phase boundaries* in Malayalam.