Infixes really are (underlyingly) prefixes/suffixes: Evidence from allomorphy on the fine timing of infixation

1. Introduction: Both allomorphy and infixation introduce complexity into morphological systems, in different ways: allomorphy involves a many-to-one correspondence between form and meaning/function, and infixation disrupts the linear integrity of forms. Both are found across the world's languages, and have been the subject of much empirical inquiry and theorizing—on infixation, see e.g. Ultan 1975, Moravcsik 1977, 2000, Halle 2001, Yu 2007, Samuels 2009; on allomorphy, see e.g. Carstairs 1987, Paster 2006, Veselinova 2006, Mascaró 2007, Bobaljik 2012. These studies present a plethora of ideas about how, when, and why infixation and allomorphy take place, and they make (unstated) predictions about how the two phenomena should interact.

This paper presents the results of the first **cross-linguistic study of allomorphy involving infixation**, considering 49 case studies from 40 languages (13 language families). Allomorphy and infixation interact in consistent, systematic ways, suggestive of a universal architecture of the morphosyntax-phonology interface. The findings support the type of serial architecture proposed by Distributed Morphology and related approaches (Halle and Marantz 1993, 1994, Embick 2010, Bye and Svenonius 2012), and run counter to fully parallel models (e.g., McCarthy and Prince 1993a,b) and those that take infixation to be "direct" (e.g., Inkelas 1990, Yu 2007, Wolf 2008).

2. Preliminaries: **Allomorphy** describes a situation where a single morpheme has more than one phonological realization. The present study differentiates two types of allomorphy, **suppletive** (replacive; corresponding to distinct underlying phonological forms) and **non-suppletive** (derived via (morpho)phonological processes from a single underlying form). An **infix** is defined as "a bound morpheme [...] preceded and followed in at least some word-types by non-null segmental strings which, together, constitute a relevant form-meaning correspondence" (Blevins 2014).

The study includes 49 morphemes that have at least one infixal allomorph—31 case studies involve suppletion, and 33 involve an infix with non-suppletive variants. (The two are not exclusive.)

3. An illustrative case study: Consider the two suppletive allomorphs of verbal plural in Hunzib (NE Caucasian; van den Berg 1995:81-82), (1); the allomorph in (1b) is infixal (precedes the last consonant in its stem) and has several non-suppletive variants (not exhaustively demonstrated here).

(1) a. -baa / *aa*-final stems — e.g.: *ʔãqa-baa* 'be thirsty (pl)' (stem: *ʔãqaa*)
b. -*ɑ́*-[1] / elsewhere — e.g.: *ɑ<ɑ́>hu* 'take (pl)' (stem: *ɑhu*); *u<wɑ́>ĉ'e* 'cut (pl)' (stem: *uĉ'e*); *e<yɑ́>k* 'fall (pl)' (stem: *ek*)

This case of allomorphy is illustrative of the study's broader findings in a number of ways. Both suppletive allomorphs are oriented towards the right edge of the stem.[2] The right edge is also crucial for allomorph *choice*: the stem-final segment (namely, whether it is *aa* or not *aa*) conditions which suppletive allomorph is chosen; notably, when the stem is vowel final, the infixal allomorph (in its pre-consonantal infixed position) is not immediately local to this conditioning environment. In addition, suppletive allomorph choice must be made based on the *underlying form* of the stem, as suffixation of *-baa* results in (predictable) shortening of stem-final *aa*, creating opacity. Note that there is no clear optimization-based motivation for choosing between the suppletive allomorphs.

Non-suppletive allomorphy of the infix, unlike suppletive allomorphy, is determined stem-internally and is optimization-driven: when -*ɑ́*- ends up after any vowel other than ɑ, glide in-

[1] This allomorph is underlyingly stressed. Nb. ɑ is "lower and more retracted than IPA [ɑ]" (van den Berg 1995:21).
[2] The infix's position is underdetermined by the data strategically presented here, but clear from a larger data set.

sertion is triggered, based on the first vowel in hiatus (*y* after front vowels, *w* after back vowels). The final segment of the stem has no influence on the infix's non-suppletive alternations.

Finally, though a verb inflected for plural can take further affixes, (2), the infix can't look *outwardly* to less embedded material (*-n* here) to satisfy its positional need to precede a consonant.

(2) r-i<y$\acute{\alpha}$>ƛe-n (nb. *r-iƛe<y$\acute{\alpha}$>-n)
PL.CLASS-kill<V.PL>-PRET.GER
'killed (iterative, plural object)'

Even though -$\acute{\alpha}$- *could* satisfy its positional need without infixing, it still moves into its stem (*iƛe*).

4. Overall findings and their implications: Suppletive allomorphs share an edge orientation, e.g., a left-edge infix may only be in a suppletive relation to a prefix or another left-edge infix. Further, it is the edge identifiable from edge orientation—*and only this edge* (and in particular, only its underlying form)—that can constitute the conditioning environment for phonologically- or prosodically-conditioned suppletion. The surface (infixed) environment of an infix *cannot* condition suppletion. Suppletion involving an infix is often non-optimizing, and may be opaque, like in Hunzib.

Implication 1: **Infixes really are (underlyingly) prefixes/suffixes**—affixal morphemes are linearly concatenated with respect to their stem (as preceding it, as a prefix, or following it, as a suffix) prior to suppletive allomorph choice and infixation. If infixation were "direct" (without a step of prefixation/suffixation), there would be no explanation for the edge effects. ***Implication 2:*** **The choice among suppletive allomorphs is made from a morpheme's prefixal or suffixal position, prior to both infixation and the phonological computation.** If suppletive allomorph choice could be made at a derivationally later point, then (i) the surface (infixed) environment of an infix should be able to influence suppletive allomorph choice, and (ii) there should be cases of suppletive allomorphy that are not analyzable via conditioning at the stem edge. Neither type of case is found. (I argue that apparent counterexamples (e.g., Yu 2017) do not hold up to scrutiny.)

In contrast to suppletive allomorphy, *non*-suppletive allomorphy of an infix is determined *only by the infix's surface (infixed) environment* (which may of course include the stem edge, if the stem edge is in the infix's surface environment). ***Implication 3:*** **Infixal allomorphs take their infixal position immediately after suppletive allomorph choice**, prior to (or perhaps sometimes simultaneous with) (morpho)phonological operations, which in turn derive non-suppletive alternations.

Finally, infixes must satisfy their need for a particular placement with respect to a pivot by looking/moving *inward* into their stem, and never *outward*. Infixation (like suppletive allomorphy) may be non-optimizing, and may involve opacity. ***Implication 4:*** **Exponence, infixation, and (morpho)phonology are cyclic**, applying in that order within each cycle, starting from the most embedded morpheme. At the point when a particular morpheme is exponed, material that is *more embedded* than that morpheme must itself have already been exponed and prosodified: both phonological form and prosodic structure are robust conditioning factors in suppletive allomorphy involving infixes, and infixes may have phonological or prosodic pivots. If infixation were not immediate, and/or outer morphemes could be exponed before or simultaneous with inner morphemes, we'd expect infixes that could stay at the edge of their stem when an outer morpheme supplies their pivot (cf. (2)), or even move *away* from their stem to find their pivot. No such cases are found.

6. Conclusions: The intersection of infixation and allomorphy affords a uniquely informative window into the inner workings of the morphosyntax-phonology interface. In particular, the patterns found (and not found!) differentiate among theoretical approaches to morphology and phonology.

References

van den Berg, Helma. 1995. *A grammar of Hunzib (with texts and lexicon)*. Munich and Newcastle: Lincom Europa.

Blevins, Juliette. 2014. Infixation. In *The Oxford Handbook of derivational morphology*, ed. Rochelle Lieber and Pavol Štekauer. Oxford: Oxford University Press.

Bobaljik, Jonathan. 2012. *Universals in comparative morphology*. Cambridge: MIT Press.

Bye, Patrik, and Peter Svenonius. 2012. Nonconcatenative morphology as epiphenomenon. In *The morphology and phonology of exponence: The state of the art*, ed. Jochen Trommer, 427–495. Oxford: Oxford University Press.

Carstairs, Andrew. 1987. *Allomorphy in inflexion*. London: Croom Helm.

Embick, David. 2010. *Localism versus globalism in morphology and phonology*. Cambridge, MA: MIT Press.

Halle, Morris. 2001. Infixation versus onset metathesis in Tagalog, Chamorro, and Toba Batak. In *Ken Hale: A life in language*, ed. Michael Kenstowicz, 153–168. Cambridge, MA: MIT Press.

Halle, Morris, and Alec Marantz. 1993. Distributed morphology and the pieces of inflection. In *The view from building 20*, ed. Kenneth Hale and Samuel Jay Keyser, 111–176. Cambridge, Massachusetts: MIT Press.

Halle, Morris, and Alec Marantz. 1994. Some key features of Distributed Morphology. In *MITWPL 21: Papers on phonology and morphology*, ed. Andrew Carnie, Heidi Harley, and Tony Bures, 275–288. Cambridge, MA: MIT Working Papers in Linguistics.

Inkelas, Sharon. 1990. *Prosodic constituency in the lexicon*. New York/London: Garland.

Mascaró, Joan. 2007. External allomorphy and lexical representation. *Linguistic Inquiry* 38:715–735.

McCarthy, John, and Alan Prince. 1993a. Generalized alignment. *Yearbook of Morphology* 12:79–153.

McCarthy, John, and Alan Prince. 1993b. Prosodic morphology: Constraint interaction and satisfaction. University of Massachusetts, Amherst and Rutgers University.

Moravcsik, Edith. 1977. *On rules of infixing*. Bloomington, IN: Indiana University Linguistics Club.

Moravcsik, Edith. 2000. Infixation. In *Morphology: an international handbook on inflection and word-formation*, ed. Geert Booij, volume 1, 545–552. Berlin: Walter de Gruyter.

Paster, Mary. 2006. Phonological conditions on affixation. Doctoral Dissertation, University of California, Berkeley.

Samuels, Bridget. 2009. The structure of phonological theory. Doctoral Dissertation, Harvard University, Cambridge, MA.

Ultan, Russell. 1975. Infixes and their origin. *Linguistic Workshop* 3:156–205.

Veselinova, Ljuba N. 2006. *Suppletion in verb paradigms: Bits and pieces of the puzzle*. Amsterdam: John Benjamins.

Wolf, Matthew. 2008. Optimal interleaving: Serial phonology-morphology interaction in a constraint-based model. Doctoral Dissertation, University of Massachusetts Amherst.

Yu, Alan. 2007. *A natural history of infixation*. Oxford: Oxford University Press.

Yu, Alan. 2017. Global optimization in allomorph selection: Two case studies. In *The morphosyntax-phonology connection: Locality and directionality at the interface*, ed. Vera Gribanova and Stephanie Shih, 1–27. Oxford: Oxford University Press.