

Infixation

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1. Definitions: infixation and derivation

A chapter on infixation in a volume on derivation should narrow down the type of word-formation process under study. However, the terms “infixation” and “derivation” have a wide range of meanings in the linguistics literature. For this reason, it will be useful to clarify, from the start, how these terms are used here.

1.1 Infixation

When a word is readily analyzed into subparts with clear form-meaning correspondences, we say that it is morphologically complex. Infixation is morphological complexity of a very specific type, as defined in (1). Under infixation, a base, be it a root, stem or word, is phonologically discontinuous due to the presence of an infix *inside* of it.

(1) Infixation as affixation: a definition

Under infixation a bound morpheme whose phonological form consists minimally of a single segment, is preceded and followed in at least some word-types by non-null segmental strings which, together, constitute a relevant form-meaning correspondence of their own, despite their non-sequential phonological realization.

There are four factors that distinguish this definition from others. Each will be briefly

reviewed and justified here. Following the Leipzig Glossing Rules, infixes and infixed material are enclosed in angled brackets < > in glosses and citations.

First, the definition specifies that an infix is a bound morpheme, falling within the general definition of an affix. While free forms, including multi-morphemic strings, can also split roots, stems and words into discontinuous parts, this process is referred to as tmesis, and is distinct from infixation as discussed here. A canonical instance of true infixation is shown in (2) from Hoava [hoa], an Oceanic language of the Solomon Islands (Davis 2003)¹. The infix in question is <in>, a productive nominalizer that can be used with “virtually any active or stative verb to create a noun”, and which only occurs as a bound form (Davis 2003:39). The infix is consistently placed before the first vowel of the base.

(2) Infixation in Hoava: <in> nominalizer, a bound morpheme

Locus: precedes first vowel of base

	root	stem	infix	glosses
a.	to		t<in>o	alive/life
b.	hiva		h<in>iva	want/wishes
c.	bobe	va-bobe	v<in>abobe	full/fill/filled object
d.	poni	ta-poni	t<in>aponi	give/be given/gift
e.	razae	vari-razae	v<in>arirazae	fight/fight each other/war
f.	asa		<in>asa	grate/pudding of grated cassava

¹ ISO language codes are those of Lewis (2009).

g. edo <in>edo happy/happiness

Compare the inserted bound morpheme in (2) with instances of tmesis, as illustrated in (3) by examples of expletive “infixation” in English (McCarthy 1982) in standard orthography, with primary stress marked in base forms. Under tmesis, a word is split apart by another word (free form).

(3) Tmesis in English: expletives render words discontinuous

Locus: before a stressed trochaic foot

	Base	Tmesis
a.	abso'lutely	abso<damn>lutely
b.	fan'tastic	fan<fuckin'>tastic
b.	rhe'torical	rhe<goddamn>torical
c.	ty'phoon	ty<bloody>phoon

While the split may be phonologically conditioned, and therefore share phonological properties with true infixes, it differs morphologically from true infixation in two important ways. First, the “infix” is not a bound morpheme (e.g. *damn*), and can be a morphologically complex word itself (*god-damn*, *blood-y*, *fuck-in'*). Second, forms derived from tmesis are neither inflected forms of the same lexeme, nor members of the same word-family: they are, in a sense, the *same word*, interrupted, or splattered in speech. Tmesis will not be considered further, though such cases are included in many phonological studies of infixation, most often with reference to the specific locus of the

inserted word (e.g. Yu 2007a, 2007b).

A second notable feature of the definition in (1) is the lack of restriction on a morphological base. Though some definitions of “infix” limit bases to roots, there is good evidence that the base of infixation may be a stem or word. The Hoava examples in (2) illustrate that “root” is too limiting a domain for infixation. In (2c-e), the phonology and semantics are consistent with infixation into a derived stem or word. In (2c) the root is a stative verb, /bobe/ ‘full’, prefixed with causative /va-/ to mean ‘fill’ ; the nominalization of this verb is a ‘filled object’. Likewise, in (2d), it is not the root /poni/ ‘give’ that is the base of infixation, but the derived passive stem /ta-poni/ ‘be given’ that is nominalized, resulting in the compositional semantics of ‘that which is given’, ‘gift’. In (2e), the root /razae/ takes a reciprocal prefix /vari-/, and this prefixed form is nominalized, resulting in the interesting morphotactic of one bound morpheme inside another. While none of these examples allow a clear distinction between stem and word, there is little question that the base of infixation in Hoava is not limited to roots, and must at least include derived stems.

However, in other languages, there is evidence that a single infix may take either a stem or inflected word as its base. In Yurok [yur], an Algic language of northwestern California, an intensive infix <eg> regularly follows the first consonant or consonant cluster of the base, as shown in (4), where *hl* writes /h/, *g* writes /g/, *c* writes /tʃ/ and *y* writes /j/ (Robins 1958; Garrett 2001; Wood and Garrett 2001).

(4) Infixation in Yurok: <eg> intensive, a bound morpheme

Locus: follows first C or C-cluster of base

	root/stem	infixes stem	glosses
a.	laay-	l<eg>aay-	pass/pass regularly
b.	kemol-	k<eg>emol-	steal/be a thief
c.	cwin-	cw<eg>in-	talk/act as go-between in marriage negotiations
d.	hlk-	hlk<eg>-	gather acorns/gather acorns regularly

We will consider the derivational vs. inflectional status of this morpheme shortly. For the moment, what is of interest is the fact that, for Yurok *o*-stem verbs, verbal inflectional suffixes are sensitive to the phonological composition of the base (Robins 1958:34; Blevins 2005). Indicative inflections for subsyllabic verb stems lacking vowels, like /hlk- / in (4d), have long vowels in all but 3sg forms: *hlko:k* '1sg', *hlko:'m* '2sg', *hlko:* 1pl, *hlko:'w* 2pl, *hlko:hl* 3pl, in contrast to other *o*-stems which show short-vowels throughout the paradigm. Since this vowel length difference in the inflected verb depends on the phonological composition of the stem, it allows us to determine whether <eg> can ever take a word as its base. Indeed, this appears to be possible, as illustrated by the two inflected variants shown in (5). (5a) is the expected case, where the infixes base appears to be the stem for inflection; the infix supplies a stem vowel, so the stem is monosyllabic, and the final inflectional vowel is short. In contrast, (5b), which is also attested, is unexpected: here, the infixes 1sg form has the same inflection as the non-infixes subsyllabic stem /hlk-/, with a final long vowel. Since long vowel inflections appear only when the verb stem is vowel-less, the base for inflection must be /hlk-/, meaning the base

for infixation is the inflected word *hlko:k'*.

(5) Yurok: <eg> intensive variants: base = stem *or* inflected word

	base	infix	base	1sg indicative inflection
a.	hlk-	hlk<eg>-		hlkegok' (-ok' w/ bases of at least one syllable)
b.	hlko:k'	hlk<eg>o:k'		hlkego:k' (-o:k' w/subsyllabic bases only)

A third component of the definition in (1) which needs to be specified is the phonological requirement that infixes be minimally mono-segmental. A single vowel or consonant is not only a feature matrix, but one anchored in the timing tier, however this is represented in one's phonological model. Floating features, floating feature complexes, and unanchored segmental melodies do not satisfy the definition of full-blown segments, as they lack timing units, and so, cannot constitute proper infixes in the sense defined here.²

Finally, though it is a minor point, note that the definition in (1) states that the discontinuity of the base, being broken into parts which themselves do not constitute sound-meaning correspondences, need only hold for "some word-types". For Hoava, word-types (2f,g) are vowel-initial, and therefore do not involve base-discontinuity, but this does not rule out <in> affixation as true infixation because C-initial words like (2a-d)

² Floating features and feature-complexes, sometimes referred to as featural affixes, include labialization ([+round]) marking 3rd person masculine singular objects in Chaha and palatalization ([+high,-back]) marking 3rd person singular in Ithmus Mixe (Akinlabi 2011; Blevins 2012). Unanchored segmental elements include the well studied consonantal roots of Semitic languages (McCarthy 1981).

do show discontinuous bases. This wording also allows for chance word-types where an infix appears between two distinct morphemes as in Yurok (5a,b); the critical observation is that in some Yurok word types (4a-c) the same affix gives rise to discontinuous meaningful units.

Infixes, like other bound morphemes, need not have a clear meaning associated with them, as discussed further in section 5, and may qualify as “empty” morphs. They should not be confused interfixes, also referred to as linking elements, connectives, linkers, or linking morphemes. Interfixes are meaningless morphemes that consistently occur between, not inside of, other morphemes (for examples, see Štekauer et al. 2012: 199-200).

1.2 Derivation

As this volume focuses on derivational morphology, we will limit discussion, for the most part, to instances where the infix in question is “derivational” as opposed to “inflectional” in the sense outlined in, for example, Stump (2005) and the Introduction and Chapter 2 of this volume.

Stump (2005) speaks to practical criteria for distinguishing derivation from inflection, and we use these throughout in a fairly conservative manner. If infixation imposes part-of-speech membership, then we treat it as derivational. If an operation is complete and semantically regular, it is usually inflectional, not derivational. If it is syntactically determined, it is also inflectional, not derivational. The one practical criterion we do *not* use is the structural one, which suggests that in general, marks of inflection are peripheral to marks of word-formation; or in operational terms, derivational operations apply before inflectional ones. Because infixes, by their nature, require

phonological locus-placement information about the relevant base as part of their lexical entries, they may have different structural properties from affixes that are aligned at the beginning or edge of a base.

As already shown for Yurok <eg> intensive illustrated in (4) and (5), there appear to be cases where an infix takes an inflected word as its base. If <eg> is derivational, this is a clear counter-example to the structural generalization, since, operationally, derivation follows inflection. But is Yurok <eg> an instance of derivation or inflection? As Stump (2005) illustrates, there are problems with the practical criteria at every step, and the Yurok intensive is no exception. While it is often used in the formation of deverbal nouns, its primary function is linked to repetition of an active verb or intensity of statives (Wood and Garrett 2001). Since there are semantic irregularities, specialized meanings (e.g. 4b, 4d) and a wealth of lexicalized deverbal nouns (e.g. *na'aw-* 'to catch surf fish', *nega'* 'surf-fish net', *swehllk-* 'to burst', *swegehl* 'gunshot'), and since <eg> is not syntactically determined, derivation remains an option. In this case, like many others, however, it is a holistic view of Yurok grammar including its history, that may be more informative than practical criteria: as the inflectional system has undergone significant changes in line with clearly defined paradigms, <eg> has led a life of its own, suggesting, indeed, that it serves as a unique form of derivation in this language (Blevins 2005; to appear; Garrett 2001).

Though many infixes identified fail to satisfy all of the practical criteria for classification as inflection or derivation, I have tried, as far as possible, to eliminate these from discussion. Unless otherwise noted, in this chapter, an infix is classified as derivational when: (i) it does not express inflectional features of tense/aspect/mood,

agreement, and/or case; and (ii) it may involve a change of grammatical category; and/or (iii) it is, for these and/or other reasons, classified by language specialists as a clear case of derivational morphology in a particular language.

2. Phonology and morphology interactions: A brief summary

Detailed cross-linguistic studies of infixation include Ultan (1975), Moravcsik (2000), Yu (2007a, 2007b), and most recently, the typological overview in Štekauer et al. (2012:197-203). None of these studies focuses exclusively on infixation as defined in (1) above, nor is there a clear focus on derivation, as opposed to inflexion, but as many of the generalizations noted in these works cover derivational infixes as defined here, they are worth summarizing.

The definition of infix presented in (1) requires that an infix constitute at least one full-blown segment, be it a vowel or consonant. Infixes then, unlike morphemes generally, have a minimal size. The minimal form of an infix, then will be a single segment, and indeed infixes of this type, like Semai [sea] <r> causative, Quileute [qui] <j> diminutive, or Tausug [tsg] <i> nominalizer are common. As with other bound morphemes, infixes tend to be short, but there seems to be no clear phonotactic upper limit on size.

One phonological variable that infixes share with other bound morphemes is whether their segmental content is fully specified, partially specified, or unspecified. In the last two cases, reduplication is involved: language-specific mappings will determine the base and direction of melodic matching/copying for the unspecified reduplicative infix. There are many languages with reduplicative infixes that lack other infixes, a fact that is simply explained by their origins: historically, reduplicative infixes are reanalyses

of reduplicative adfixes that have mutated over time (Yu 2007a:165-70).

A unique feature of infixes, is that, by definition, there must be a specification in their lexical form of their precise infixation site with respect to the base. Where a prefix aligns with the beginning of a base, and a suffix with the end, more needs to be said for infixes. For example, in (2), the infix precedes the first vowel of the base, in (3) it precedes a stress-foot, and in (4) it follows the initial consonant or consonant cluster. An over-arching generalization is that all infixes align themselves in some way to the beginning or end of the base, - what Yu (2007a,b) terms the “Edge-Bias Effect”, and that at each edge a set of phonological pivots define infixation sites. Within Yu’s model, there are two basic kinds of pivots: edge pivots and prosodic pivots. The edge pivots include the initial and final C, V or syllable of the base; while the prominence pivots are the stressed vowel, syllable or foot.

Within Optimality Theory, however, it has been argued that infixes and infixation are derivative notions: the only adfixes are prefixes and suffixes, aligned with beginning and end of the base (Prince and Smolensky 1993; McCarthy and Prince 1993). When an infix surfaces, it is due to phonological constraints dominating morphological specifications, essentially driving the adfix inside the base, to a position where phonological constraints are best satisfied. For example, the Hoava infix <in> in (2), would be treated as a simple prefix on the basis of forms like (2f,g), with apparent infixation in (2a-e) accounted for by phonological constraints like ONSET, which would give preference to well-formed *ti.no* ‘life’ where both syllables have onsets, over unattested **in.to*, with an initial onsetless syllable. Counter-evidence to this position from Leti [l̥ti] is found in Blevins (1999), and further evidence for infixes as bound

morphemes distinct from prefixes and suffixes is offered in Yu (2007a,b). The most persuasive argument for infixes as true infixes, are languages in which homophonous strings constitute distinct prefix/infix or suffix/infix pairs. Atayal [tay] <m> actor focus, and /m-/ reciprocal/reflexive prefix, may be just such a pair, as illustrated in (6), though it should be noted that both the morphological status of /m-/ as marker of reciprocal/reflexive and the phonological status of <m> may be contested.³

(6) Atayal <m> vs. /m-/ : a minimal infix/prefix pair (Egerod 1965:266-7)

Root	Gloss	<m> Actor focus	/m-/ Reciprocal/Reflexive
kaial	‘talk’	kmaial	mkaial
qul	‘snatch’	qmul	mqul
siuk	‘give back’	smiuk	msiuk
sbil	‘leave behind’	smbil	msbil

Another argument against infixes as phonologically optimally placed adfixes comes from languages where infixes trigger phonotactic repairs. One of the most remarkable cases of this kind is found in Arara [arr], a Cariban language of Brazil, where special forms of speech are used to talk to pet animals of different types (De Souza 2010). These special forms include regular prefixation and infixation, and depend on the type of pet one is talking to. Words uttered to pet squirrel monkeys are infixed with

³ One could analyze /m-.../ as underlying /p(ə)<m>.../ with (irregular) cluster reduction; and the infix itself could be analyzed as underlying <əm>, not <m> (Rau 1992; Kaufman 2003).

<pt>, as illustrated in (7), with this infix following the first vowel of the base. Arara maximal syllables are CVC, with V, CV, and VC all possible. While infixated forms like (7a,b) result in well-formed syllables, those in (7c-f) do not, and repair strategies are in evidence. In (7c,d) a copy vowel is inserted to break up the illicit word-final cluster, while in (7e,f) the medial cluster undergoes reduction from $C_1C_2C_3 > C_1C_2$.

(7) Infixation in Arara: <pt> in pet squirrel monkey talk

Locus: follows first vowel of base

	base	infixated	gloss
a.	ae	a<pt>e	wasp
b.	pou	po<pt>u	small peccary
c.	nu	nu<pt>u (*nupt)	small tumour
d.	wot	wo<pt>ot (*woptt)	fish
e.	pitot	pi<pt>ot (*pipttot)	a fruit
f.	abat	a<pt>at (*aptbat)	manioc bread

While one might argue that pet talk in Arara is a speech disguise, and therefore, not subject to grammatical constraints ranking phonological over morphological conditions, the fact remains that a word-formation process exists in this language where a specified phonological string is inserted *inside a morpheme*, with no phonological motivation. Furthermore, this infixation results in poor phonotactics, which are remedied by repair strategies suggesting that words of the special language do indeed have high-

ranking phonological constraints. Since similar instances of word-formation are found in common language (Blevins 1999; Yu 2007a,b), infixes must be posited as primary morpheme types, and infixation must exist as a derivational process distinct from adfixation.

In the rare cases where multiple infixes occur within a single word, derivational infixation appears to precede inflectional infixation and be closer to the stem. One example of this is found in Begak [dbj], a language of Sabah, where derivational <ər> reciprocal (8a,b), can co-occur with the inflectional completive aspect <ən> (8c), (Goudswaard 2005). Since both infixes take as pivot the first vowel of the base, it is clear that in *sənəratu*, inflectional <ən> is infixed to the derived reciprocal stem *s<ər>atu*. However, although this expected structural relationship holds of derivational and inflectional infixes, other structural relationships are found for derivational <ər> and inflectional prefixes: (8d) is again the expected case, where derivational <ər> derives a stem to which /gə-/ a dynamic transitive actor voice marker is prefixed; but in (8e), derivational <ər> appears unexpectedly inside the actor voice non-volative prefix /kə-/, suggesting that the base for reciprocal formation can be an inflected form.

(8) Begak double infixation: derivation inside inflection

Locus: <ər> reciprocal, follows first vowel of base

Locus: <ən> completive aspect, follows first vowel of base

	base	reciprocal	inflected reciprocal	glosses
a.	kanut	k< ə r >anut		pull/pull each other
b.	kati	k< ə r >ati		tease/tease each other

c.	satu	s<ər>atu	s<ən><ər>atu	be one/be together/ put together (completive aspect)
d.	tabang	t<ər>abang	gə-t<ər>abang	help/help each other/ help each other.AV
e.	kə-nnik	k<ər>ə-niik	(k<ər>ə-niik)	AV.NV-ascended/ascended together

Generalizations have also been made about the origins of infixes. Some derivational infixes, like deverbal Hoava <in> (2), are reflexes of infixes that have persisted across thousands of years (see section 5), while others, like Yurok intensive <eg> appear to be relatively recent innovations (Garrett 2001). Where infixes are not directly inherited, a limited number of evolutionary pathways have been proposed for their evolution from adfixes, including entrapment, phonological metathesis, and reduplicative mutation. For further details, see Yu (2007a, 2007b).

3. Meanings associated with derivational infixes⁴

Cross-linguistically, derivational morphemes are known to express a wide range of meanings, from the nuanced difference between English *green/greenish*, to category-changing functions like nominalization, and highly lexical meanings like Halkomelem /-wət/ ‘canoe’.⁵ The same is true for derivational infixes. Table 1 provides representative examples of non-reduplicative derivational infixes organized in terms of their semantic content. At the top of the table are infixes with negligible, bleached or intangible

⁴ Data sources and ISO codes for languages mentioned in this section are: Alabama [akz](Martin and Munroe 2005); Arara[ara] (De Souza 2010); Chamorro [cha] (Topping 1973); Halkomelem [hur] (Gerds 2003); Jeh [jeh] (Gradin 1976); Khmer [khm] (Huffman 1986); Klallam [clm](Charles 2012); Mangarayi [mpc](Merlan 1982); Pingding Mandarin [cmn] (Lin 1989); Semai [sea] (Kruspe 2004:134); Shuswap [shs] (Kuipers 1974); Tetun [tdt] (Williams-van Klinken 1999); Thai [tha](Huffman 1986).

⁵ For an overview of lexical affixes in Salish languages, see Czaykowski-Higgins and Kinkade (1998:25-27)

meanings, followed by those with grammatical meanings, and finally, a few with lexical meanings.

The majority of derivational infixes are grammatical morphemes, - most commonly nominalizers, verbalizers, causatives, diminutives, and intensives. When these morphemes become lexicalized, the semantic value of the infix in derived words moves towards the intangible end of the spectrum. The Jeh forms in Table 1 illustrate common lexicalization of a once-productive infix. The two other examples of infixes are very different in nature. As discussed in section 7., Thai acquired infixes via contact with neighboring Mon-Khmer languages, but with semantic change. Where the infix <amn> functioned as a nominalizer in Khmer (used with bases beginning in single consonants), the same infix in Thai is used to create a stylistic variant of the base (Huffman 1986:201-02). Another unique infixation, partly illustrated in (7), is that found in Arara pet animal talk (De Souza 2010). Recall that words uttered to pet squirrel monkeys are infixed with <pt>, as in (7) and Table 1, but in speech to a pet capuchin monkey, the partial reduplicative infix <gV> is used instead, and a range of prefixal forms are used for other pet animals, e.g. /pi-/ for words spoken to pet agoutis.

At the other end of the scale, there are very few reported derivational infixes with lexical meanings. This is not altogether surprising, since lexical affixes of the kind found in e.g. Salish and Eskimo-Aleut are rare cross-linguistically to begin with. As the majority of non-reduplicative infixes evolve from prefixes or suffixes via entrapment or metathesis (Yu 2007a, 2007b), lexical infixes are expected in languages with lexical affixes from which they can originate. It is not surprising then that Klallam, a Salish language with a wealth of lexical suffixes, has a least one instance of a derivational infix,

<a?> ‘person’, with a highly lexical meaning.

The other example provided in Table 1 of a lexical infix comes from the scientific vocabulary of English, where a chemical, *picoline*, for example, is related to a derived form *pipecoline*, by infixation of <pei> meaning ‘completely hydrogenated’. The source of this word-formation process seems to be analogy with the pair *pyridine/piperidine*, since *piperidine* is produced by the hydrogenation of *pyridine*, though, historically, *piperidine* is derived from Latin *piper* ‘pepper’.

Table 1. Semantics of derivational infixes: from intangible to lexical

	Language/Family/	Infix	Form/gloss
Intangible	Jeh/Austro-Asiatic	<an>	kriem ‘crossbow’ kadriem ‘crossbow’
	Thai/Tai-Kadai	<amn>	?uay ‘to bestow’ ?amnuay ‘to bestow’ (elegant)
	Arara/Cariban	<pt>	ae ‘a wasp’ apte ‘a wasp’ (when talking to a pet squirrel monkey)
Grammatical	Alabama/Muskogean		hocca ‘shoot’ holicca ‘be shot’ (MEDIOPASS)
	Chamorro/Austronesian	<in>	hasso ‘think’

			hinasso ‘thought’ (NOM)
	Semai/Austro-Asiatic	<r>	kdey ‘not to know’ krdey ‘cause not to know’ (CAUS)
	Pingding Mandarin/Sino-Tibetan	<ɿ>	xua ‘flower’ xɿua ‘little flower’ (DIM)
Lexical	Klallam/Salishan	<aʔ>	čə́səʔ- ‘two’ ‘čáʔsaʔ ‘two people’
	Scientific English/Indo-European	<pe>	lutidine lu<pe>tidine

One meaning-based generalization that does appear to hold of infixation is that reduplicative infixation is more likely to have the semantics associated with reduplication more generally, than with semantics of non-reduplicative morphemes. In other words, reduplicated infixes show higher frequency associations with plural, pluractional, intensive, repetitive, iterative, distributive, and augmentative/diminutive meanings than non-reduplicated infixes (cf. Rubino 2011). This association undoubtedly stems from the fact that reduplicated infixes result from historical reanalysis of earlier reduplicative prefixes and suffixes (Yu 2007a, 2007b). Since most of these meanings are those associated with inflectional features of number and tense/aspect/mood, the majority of

reduplicative infixes are non-derivational. When only derivational reduplicative infixation is considered, the database of languages is greatly reduced, but one still finds a range of meanings including: Chamorro <CV> adjectival intensifier; Tetun <aC> deadjectival nominalizer; Shuswap <C> diminutive; and Mangarayi <VC> intensive.

Since, overall, infixes are less common than prefixes and suffixes (Ulan 1975), it is not surprising that meanings associated with derivational infixes are a subset of those found for derivational prefixes and suffixes.

4. Some questionable universals

Infixes are less common than prefixes and suffixes, but given their common occurrence in Austronesian (Blust 2009), a family with approximately 1,000 languages, and their attestation in at least 25 other phyla and isolates (Yu 2007a), they cannot be considered rare. Nevertheless, early proposals regarding their cross-linguistic distribution seem to assume that, along with circumfixes and templatic morphology, infixation is particularly marked.

One implicational universal along these lines that is often repeated is Greenberg's (1963:73) claim that the presence of "discontinuous affixes" (=infixes, circumfixes or intercalated morphemes) in a language implies the presence of suffixes and/or prefixes; where affixation is at issue, there are no languages that employ infixation exclusively. In Greenberg's (op cit.) words, "If a language has discontinuous affixes, it always has either prefixing or suffixing or both", and a modern typological restatement "Variation is reined in by this implicational constraint: If there are infixes, there will also be affixes (= suffixes and/or prefixes)" (Plank 2007:58).

While there appear to be very few languages that have infixation, but lack other

affixation types, such languages do exist.⁶ Pingding Mandarin appears to have only one affix, a diminutive/hypochoristic infix, <ɿ>, with pairs like *xua* ‘flower’, *xɿua* ‘little flower’ (Lin 1989, 2004, 2008). There are no other clear affixation processes in the language; all other word-formation appears to involving compounding or cliticization. In this case, an earlier stage of the language is represented by Standard Mandarin, where the cognate morpheme is /-r/, a suffix with similar function, and phonological metathesis is responsible for the evolution of the infix (Yu 2004, Yu 2004, 2007a).

Another newly described language that seems to counter-exemplify this universal is Kri, a Vietic language within the greater Austroasiatic/Mon-Khmer family (Enfield and Diffloth 2009).⁷ Though Proto-Mon-Khmer had derivational prefixes and infixes (see section 5), sound changes have rendered prefixal derivations opaque in Kri, limited to a few scattered word pairs with similar initial consonants. However, inherited infixal

⁶ Štekauer et al. (2012:201) suggest counter-examples to this universal as well, however it seems that the universal is misinterpreted. They say “...if a language makes use of infixation, it may also be expected to employ prefixation and/or suffixation in word-formation... Exceptions to this assumption include Yoruba, which uses infixation but not suffixation, and Tatar, which uses infixation but not prefixation.” Neither language is a true exception to the statement with “and/or”, since Yoruba has many prefixes, and Tatar has many suffixes.

Furthermore, in each language the claim that infixes exist seems unfounded. Yoruba has a reduplicated construction where /-ki-/ is inserted between reduplicated stems (ilé ‘house’ ilé -ki-ilé ‘any house’), and though /-ki-/ is referred to as an “infix”, (Bamgbose 1966:153), it is clearly an interfix, - an affix placed between two stems, which is semantically empty. The Štekauer et al. (2012:201) reference to a Tatar infix (more specifically “-t-“ on p.202) does not correspond with standard morphological analyses of this language, which includes a range of mono-consonantal interfixes or linking elements (see 1.1) appearing between root and stem-forming suffixes none of which are /-t-/ (Ganiev 2006:140).

⁷ Kri also has reduplication which could be regarded as suffixing: *careew* ‘green’, *careew-reew* ‘greenish’, though this is not evident with monosyllabic bases like *tanq* ‘to chop up (meat)’, *tanq-tanq* ‘to chop up (meat) into tiny pieces. If reduplication is productive, and is included as a case of affixation as opposed to compounding, then Kri would not be considered a counter-example to Greenberg’s universal.

derivational relations remain transparent: *kooq* ‘to live’, *krnooq* ‘a house’; *keep* ‘to pince’, *krneep* ‘tongs, pincers’; *sat* ‘to get one’s foot stuck’, *srnaat* ‘a foothold’, etc. In fact, the only transparent derivational relations appear to be infixal! These include nominalizing <rn> just exemplified (infixal after the first C of a verb stem), as well as causative <a> and verbalizing <a> (infixal after CC- of CC-initial stems) (Enfield and Diffloth 2009:44). Where segmentally specified bound morphemes are involved, then, morphological systems with infixation, but no prefixation or suffixation are possible.

As all the infixes in both Kri and Pingding Mandarin are derivational, and there are no other productive affixes, we also see that languages can have more derivational infixes than inflectional ones. In fact, it has been claimed that there is a strong cross-linguistic tendency for infixes to be derivational (Ultan 1975:168f; Bybee 1985:97, 110). Based on a survey of 70 infixing languages, Moravcsik (2000:548) puts the generalization in these terms:

...there is a broad tendency: the base-internal positioning of infixes tends to be iconically reflective of the fact that their meanings are closely tied to that of the base ... *infixes are generally derivational, rather than inflectional* reflecting the closer semantic link between base and derivational affix than what holds between base and inflectional affix...

Is this true? Do derivational infixes far out-number inflectional infixes cross-linguistically? Clearly, a great deal depends on precisely how one classifies inflection vs. derivation, but even under a conservative approach, where only nominal agreement features of person/number/case and verbal tense/aspect/mood features are included in the category of inflection, languages with inflectional infixes seem to be just as common as

those with derivational ones, and single languages can show a strong preference for inflectional over derivational infixes. Yu (2007a) includes a database of 154 infixation patterns from 112 languages representing 26 different phyla, with languages chosen on the basis of having any infix whatsoever. Of the 87 examples of non-reduplicative infixation included, 35, approximately 40%, are inflectional. In some languages, like Alabama, inflectional (person-marking) infixes outweigh derivational (comparative) ones 2:1, and in other languages, like Archi (Nakh-Daghestanian), all recorded infixes are inflectional. This same database of non-reduplicative infixation includes only two Papuan languages, Hua and Yagaria, both of the Trans-New Guinea phylum, and both with only inflectional infixes.

While one might argue that languages of New Guinea are under-represented in Yu's survey, as well as other studies of infixation, additional scouring of the literature has only turned up more instances of inflectional infixation: Eipo, and other Mek languages of Irian Jaya show inflectional tense/aspect and object-agreement marking infixes (Heeschen 1978); Au, a Torricelli language has verbal agreement infixes (Scorza 1985:226); Yeri, another Torricelli language, has imperfective <m> and mirative <p> (Wilson 2011); and in Barupu of the Skou family, an inflectional <C> infix is part of the verbal person/gender/number marking system (Corris 2008). Manambu, a Ndu language, has a single derivational infix /-ka/, intensive, used with non-agreeing adjectives (Aikhenvald 2008). At present, then, it appears that among the 800 or so non-Austronesian languages of New Guinea, at least one percent show infixation, and inflectional infixes out-number derivational ones by a wide margin.

While on the topic of areal tendencies, Moravcsik's (2000:548) remark that "No infixes seem to have been reported from (non-Semitic) Africa and Australia" should be updated. Yu (2007a) includes seven Australian languages in his survey, all with infixing (internal) reduplication. To date, however, there are no known cases of non-reduplicative infixes in Australian Aboriginal languages.⁸

Within Africa, infixation is rare outside of the Afro-Asiatic family but attested.⁹ In both Birom and Noni, Niger-Congo languages, a noun-class infix <w> appears to have evolved via historical metathesis from earlier prefixes (Blevins and Garrett 1998). Overall, eight Niger-Congo languages are included in Yu's (2007a) survey, most with inflectional infixes. In addition, Bole (Gimba 2000), an Afro-Asiatic language, has a pluractional infix <ki> and Hadza, thought to be an isolate, also has a pluractional infix <kV> (Miller 2008).¹⁰

Another commonly held view of infixation, and, in particular, derivational infixation, is that it is less stable than other affixation types (cf. Ultan 1975:185). The question of infix stability is taken up in the following section.

5. The stability of infixes

A strange feature of popular writing on language is the common practice of referring to a

⁸ The "verb-splitting" described by Henderson (2003) for Arrernte, a Pama-Nyungan language, inserts whole words, and even phrases, in the middle of other words, respecting prosodic, but not morphological boundaries. As outlined in 1, this process is designated as tmesis, since the inserted morpheme is free, not bound.

⁹ Within Afro-Asiatic, infixation is attested for Semitic, Cushitic, and Omotic languages.

¹⁰ See section 5 on the stability of infixation over time, and section 6 on the borrowability of infixes in intense contact situations. Both of these factors suggest that potentially cognate infixes make good starting points for hypotheses of genetic relatedness or extensive contact in pre-historic times.

modern spoken language as “ancient” or “one of the oldest languages on earth”. In some cases, authors are clearly referring to a culture that appears to have existed with little change for millennia, but in other cases, the claim that some languages are much older than others is clear:

The last speaker of an ancient tribal language has died in the Andaman Islands, breaking a 65,000-year link to one of the world's oldest cultures...Bo is one of the 10 Great Andamanese languages, which are thought to date back to pre-Neolithic human settlement of south-east Asia. (Watts 2010)

Since spoken languages are constantly changing, no modern language is entirely ancient, in the sense of reflecting precisely the same sound, word, and sentence structures as the language from which it descended, and Aka-Bo of the Andamans is no exception.¹¹

However, the field of historical linguistics certainly provides cases of words and morphemes whose form and meaning have remained relatively stable across time. And in these cases, modern words are indeed “ancient” as they have essentially the same properties as those used in pre-historic times.

One of the best examples of a language family with ancient words and morphemes is Austronesian (Greenhill, Blust and Grey 2008; Blust 2009; Blust and Trussel 2010). Proto-Austronesian (PAN), the reconstructed mother language of more than 1,000 modern Austronesian languages, is thought to have been spoken approximately 6,000 years ago on the island of Formosa, present-day Taiwan. By use of the comparative method, aided by high quality data from hundreds of Austronesian

¹¹ In fact, historical reconstruction of this family has only just begun (Blevins, to appear b).

languages, hundreds of lexical reconstructions are widely agreed upon. Remarkably, many of these proto-forms are reflected without change in modern languages as a consequence of stable sound patterns and cultural continuity. For example, the PAN verb *bilan̄ ‘to count, calculate; hold valuable’, has many modern reflexes which appear to be nearly identical to the word as spoken 6,000 years ago: in Taiwan, Kavalan *biran̄* ‘to count’; in the Philippines, Bontok *bilan̄* ‘to count; the importance or worth of people’; and from the island of Flores in eastern Indonesia, Manggarai *bilan̄* ‘to count, calculate’ (Blust and Trussel, 2010).

Of interest to this study is the fact that two productive derivational infixes are reconstructed for PAN: *<um>, a marker of actor focus, and *<in>, a past/perfective marker and a marker of deverbal nouns.¹² Blust (2009:370-88) details the history and synchronic status of both of these. Though the status of *<um> as a derivational infix could be debated, since it serves a role similar to that of case and topic markers, there is little question that *<in> had a derivational function in PAN, deriving nouns from verbs, and that the form and function of this infix has been maintained in the majority of languages in which it was directly inherited. Among the Formosan languages, we find Atayal <in>, marker of deverbal nouns, and the same deverbalizing infix is found in different subgroups, e.g. Toba Batak (Western Malayo-Polynesian), Wetan (Central Malayo-Polynesian), and Raluana (Oceanic).(Blust and Trussel, 2010).

The ancient status of PAN *<in>, a derivational infix, allows us to evaluate a widely held view about infixes: that they are unstable and short-lived. This view was first put forth by Ultan (1975:185), and later repeated by Moravcsik, (2000:549), who

¹² A plural infix /-ar-/ is also reconstructed but has far fewer reflexes in modern languages. See Blust (2009:377-80).

associates the historical devolution of infixes with fossilization and/or externalization of infixes as prefixes or suffixes. However, within Austronesian, the picture is not one of instability, but of stability. More than 200 languages show reflexes of PAN *<in>, and in the great majority of these (approximately 75%), the morpheme remains an infix.¹³ Though some languages have lost this infix (e.g. Puyuma), the same language has a reflex of PAN *<um>, suggesting that the loss of the nominalizing infix is not a consequence of infix instability. Further, while the same language, Puyuma, does show fossilized instances of <in>, as expected with highly lexicalized forms (e.g. PAN *C<in>apa ‘smoked meat or fish’ < *Capa ‘to smoke meat or fish’, Puyuma T-in-apa ‘what is grilled or roasted; smoked millet’, from Blust and Trussel (2010)), externalization of *<in> as a prefix or suffix is not found, suggesting that where a derivational infix is lost, its loss may be no different from a range of other bound and free morphemes which simply fall out of use. In the case of PAN *<in>, a factor contributing factor to loss may be the existence of other deverbil/nominalizing morphology.

If Austronesian is representative of languages with productive derivational infixation, then, based on a well known history of 6,000 years, we can conclude that a derivational infix with high functional load is stable in terms of its morphological form as

¹³ In support of infixes as morphological adfixes, Plank (2007:60) notes the “re-externalization” of <um> in Tagalog as a prefix. However, of the 34 languages in Blust (2009:383-84) with productive reflexes of PAN *<um> ‘actor focus’, only Pazeh, Cebuano and Makah Melanau show externalization of the infix. Further, in the case of Tagalog, contact with non-infixing languages like Spanish and English may play a role.

an infix, and in terms of its derivational function, as a deverbalizer.¹⁴

Austro-Asiatic, which includes Mon-Khmer and Munda languages, also appears to show modern reflexes of an ancient system of infixation (Shorto et al. 2006). However, there is less agreement among specialists in this area as to the nature of proto-Austro-Asiatic reconstructions, the place of the homeland, the approximate age of the proto-language, and the internal subgrouping of the family. Nevertheless, these infixes also show great stability over time, and, as discussed in the following section, have been the target of borrowing from neighboring unrelated languages.

Following Sidwell (2008:257-64), Proto-Mon-Khmer has at least three productive derivational infixes, all nominalizing: *<n>; *<m> (agentive); and *<p> (instrumental). If Proto-Mon-Khmer and Proto-Munda diverged approximately five to six thousand years ago, then reflexes of these derivational infixes could be as old as the Austronesian infixes mentioned above. Though this is a smaller language family than Austronesian, with several hundred languages, the fact that the nominalizing *-n-* infix is found in most Austro-Asiatic languages (Diffloth and Zide 1992:159) is consistent with the view of derivational infixes as stable morphemes.

6. Borrowed (derivational) infixes

Bound morphemes have often been claimed to be the least likely elements to be borrowed in a contact situation (Whitney 1881; Haugen 1950; Weinreich 1953; Van Hout and Muysken 1994). Nevertheless, a growing inventory of this type of borrowing is slowly being amassed along with ways of assessing the type of contact situation facilitating it

¹⁴ Recall that the same morpheme had an inflectional role in PAN as well, marking past tense or perfect aspect on verbs. This inflectional function has been lost in some languages that show a reflex of nominalizing *<in>.

(Sanchez 2005). As far as infixes are concerned, outside of specialist literature on problems in historical morphology of particular languages in Southeast Asia, very little has been written on the topic of infix borrowability.

Since, by definition, infixation is more complex than prefixation and suffixation in requiring a phonologically-defined locus for placement within a base, one might imagine that infixes are less often transmitted laterally via language contact than other affixes.¹⁵ A stronger position, that infixes are unborrowable altogether, has been taken, most recently by the anonymous author of a column entitled “Significant Activity in Linguistics” in the Summer, 1995 Issue 25 of *The Long Ranger* (formerly *The Mother Tongue* Newsletter of the Association for the Study of Language in Pre-History).¹⁶ In this short column, which discusses possible cognacy of the Proto-Austro-Asiatic and Proto-Austronesian derivational infixes discussed in section 6, the author implies that borrowing of this kind is impossible:

What about borrowing?...We will offer a prize to the first person who can demonstrate the borrowing of a true infix between any languages of the world. If some of us think that the borrowing of pronouns is rare or non-existent, that is still inherently more likely than the case of the Austric infix. Who will take up my wager?

Who will win?

¹⁵ The Optimality Theory analysis of infixes as morphological adfixes reviewed in section 2 predicts that infixes cannot be borrowed, since they do not exist. Rather, under borrowing, a prefix or suffix is expected, with placement of that affix dependent on the differing phonological constraint-ranking of the target language. The data in this section, then, provides another argument for infixes as morphological primitives.

¹⁶ There is no attribution of this column, nor, as far as I can tell, mention of a newsletter editor in the on-line version or documentation at <http://www.people.fas.harvard.edu/~witzel/aslip.html>.

Well, it seems the prize should probably go to Franklin E. Huffman, whose 1986 paper, “Khmer Loanwords in Thai” makes a very strong case for the borrowing of Khmer infixes into Thai, with documented productivity in native Thai roots.¹⁷ As would be expected under Thomason and Kaufman’s (1988:46) borrowing scale, language contact between Khmer and Thai speakers was intense and long-lasting, extending from the 13th to 18th centuries, with Khmer culture dominant at the start, but Thai culture dominating in the later stages. Given this, identification of direction of borrowing is difficult, but Huffman uses morphology as a key: once Indic loans are eliminated, Thai is essentially a mono-syllabic isolating language. Khmer, on the other hand, has a wealth of derivational prefixes and infixes, including a nominalizing instrumental /-n-/, causative /-Vm-/, and abstract nominalizers /-VN-/ (with initial CC clusters), /-Vmn/ (with initial singleton C) (Huffman 1986:200). On this basis, Huffman is able to identify loans like those in (9), where Thai appears to have borrowed an infixated Khmer form, along with its base.

(9) Infix borrowing, from Khmer into Thai (Huffman 1986:201)

	Khmer	Thai	
a.	kaət	kəət	‘to be born’
	k<əmn>aət	k<əmn>əət	‘birth’
b.	trəŋ	trəŋ	‘straight’
	d<əmn>rəŋ	d<əmn>rəŋ	‘to straighten’

¹⁷ Huffman’s collected works, including his comparative lists and field notebooks are available via the SEALANG archive at: <http://www.sealang.net/archives/huffman/>

However, demonstrating borrowings with infixes is not the same as showing that infixation as a derivational process has been incorporated into Thai grammar. To do this, it must be shown that the infixes have been extended to non-Khmer stems, or that the process has taken on distinct properties in Thai grammar.

Huffman (1986) provides highly suggestive evidence for both productivity in Thai, and distinct semantics. Productivity makes the task of finding true Khmer loans difficult: the assumption that infixed Thai words in (9) are loans “is complicated by the fact that Thai may have borrowed so many derivatives of this kind that it perceived this derivational process as a subsystem in Thai and infixed some basic Thai roots by analogy.” (op cit., p.201) And, since some Thai roots have also been borrowed back into Khmer, one must find some way of distinguishing Thai roots infixed in Khmer (and borrowed back into Thai) from Thai-internal cases of infixation. In this instance, differences in meaning between base and non-infixed forms in the two languages are probative: “The most common function of infixation in Khmer is the derivation of a disyllabic noun from a monosyllabic verb, while in Thai the derivative is typically a stylistic variant of the base verb, or a semantically specialized noun” (op cit.), as illustrated in (10).

(10) Infix borrowing, with Thai semantic innovation in bold (cf. Huffman 1986:202)

	Khmer		Thai	
a.	qaoy	‘to give’	ʔuay	‘to bestow’

	q < amn > aoy ‘gift’	ʔ < amn > uay ‘to bestow (elegant)’
b.	daə ‘to walk’	dəən ‘to walk’
	d < amn > aə ‘trip’	d < amn > əən ‘to proceed (royal)’
c.	-----	sǎŋ ‘sound, voice’
	s < amn > iəŋ ‘ sound, voice	s < amn > iaŋ ‘ pronunciation, accent
	pronunciation’	

Since the semantics of Thai infixation as a productive process appear to differ from that in Khmer, a Thai base with this pattern would be indicative of the productivity of infixation in Thai. The pairs in (10c) illustrate just this: *sǎŋ* ‘sound, voice’ is a Thai root, showing both the derived form and meaning expected under productive Thai infixation. The derived Thai form has apparently been borrowed into Khmer, as shown by the semantics associated with it.¹⁸ This example of apparent nativization of derivational infixation is striking, not only in light of the rarity of infix borrowing, but also because Thai is historically an isolating language.

A second well documented case of infix borrowing is described by Thurgood (1999) for Proto-Chamic, the ancient Austronesian language associated with the Champa Kingdom, and known from inscriptions dating back to the fourth century. This example of infix borrowing is perhaps less striking than the Thai case, since infixation already

¹⁸ Though Huffman (1986) states that the non-derived Thai root has also been borrowed, Khmer *sǎŋ* ‘sound, voice’ has not been found in the SEALang lexical database (<http://www.sealang.net/monkhmer/dictionary/>).

existed as a derivational process in the target language. On arrival in coastal Vietnam approximately 2000 years ago, Chamic people came in contact with speakers of Mon-Khmer languages, with clear effects on Proto-Chamic phonology, morphology, and lexicon. The classic proto-Austronesian disyllable was rendered iambic, with significant reduction of the first syllable, and explosion of vowel qualities in the second; consonant clusters evolved, along with new laryngealized consonants; and Mon-Khmer loans constituted as much as 10% of the Proto-Chamic lexicon. In the area of borrowed morphology, Thurgood's reconstruction of Proto-Chamic includes the deverbal instrumental infix * $\langle \text{ən} \rangle$, a clear instance of borrowing from neighboring Khmer languages (Thurgood 1999:239). Though this infix appears to have fallen out of use in most modern languages, it is attested in inscriptions, and in transparent derivational relationships in some modern languages, e.g. Chru *phà* 'to plane', *p* $\langle \text{ən} \rangle$ *hà* 'a plane' (Fuller 1977:78).

In sum, the productivity of derivational infixation in Mon-Khmer languages has given rise to at least two clear instances where derivational infixes were borrowed into unrelated languages via intensive contact. Modern Thai reflects this exchange, while infixation of instrumental * $\langle \text{ən} \rangle$ in Proto-Chamic has lost its productivity in modern Chamic languages. Infixes can indeed be borrowed, and the two best supported cases of this in the linguistics literature involve derivational infixes whose lineage in Austro-Asiatic, as summarized above, is long and robustly attested.

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