

WHY PREFIXES?

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Abstract

A variety of explanations have been offered for the observed cross-linguistic preponderance of suffixes over prefixes. Many are couched in terms of synchronic advantages, such as the cognitive simplicity of cross-category harmony between syntax and morphology, and preferences for processing the lexical meaning in stems before the grammatical material in affixes. But hypotheses about functional advantages cannot constitute explanations in themselves without accounts of the mechanisms by which the advantages are translated into grammatical structure. Here it is shown that the numerous exceptions to such hypotheses can be explained when the individual histories of the affixes are considered, including both their sources and the steps by which they develop.

It has long been recognized that suffixes outnumber prefixes cross-linguistically. As early as 1921 Edward Sapir remarked,

“Of the three types of affixing—the use of prefixes, suffixes, and infixes—suffixing is much the commonest. Indeed, it is a fair guess that suffixes do more of the formative work of language than all other methods combined.” (1921, 67)

Several kinds of explanations have been offered for the suffixing preference. Some have focused on cross-category harmony, proposing that speakers prefer consistent ordering of heads and dependents across syntax and morphology. Since more languages show head-final syntactic structure (OV), it is natural that they should also show head-final morphological structure (Stem-suffix). Other explanations have focused on processing, proposing that hearers prefer to process stems before affixes, since they contain richer information. Still other explanations have focused on production, proposing that since speakers tend to elide the ends of words, morphemes occurring later in words are more likely to erode into affixes than those occurring earlier.

But these proposals, even in combination, do not account fully for the morpheme orders we find. There are numerous examples of prefixes in languages with robust, head-final (OV) syntactic order. The identification of

speaker preferences is a reasonable first step toward possible explanation, but we cannot claim to explain particular structures if we have not identified the actual mechanisms by which such preferences might shape grammar. As noted by Greenberg (1957), mechanisms might be identified in two areas: (i) origin, that is, circumstances that could lead to the development of certain structures, and (ii) survival, that is, circumstances that could contribute to their stability.

Here we shall examine some situations in which explanations based on cross-category harmony, processing, and production fail to account for morphological structure. These involve prefixes in languages with clear, head-final (OV) syntactic structure. It will be shown that a key to explaining such structures lies first in distinguishing the kinds of affixes involved and then uncovering the different paths by which they develop.

1. Correlations and explanations

In ground-breaking typological work, Greenberg (1963; 1966) observed correlations on the one hand between word order in clauses and the placement of adpositions, and on the other between the placement of adpositions and affixes.

- a. Languages with dominant VSO order are always prepositional. (universal 3)
- b. With overwhelmingly greater than chance frequency, languages with normal SOV order are postpositional. (universal 4)
- c. If a language is exclusively suffixing, it is postpositional; if it is exclusively prefixing, it is prepositional. (universal 27)

A more direct correlation between syntactic and morphological order was reported by Winfred Lehmann (1978, 212).

“A number of morphological characteristics have been identified for specific language types. Prominent among these is the placement of affixes, notably those expressing verbal qualifiers. In VSO languages these precede the central verb; in OV languages, on the other hand, they follow.”

The proposed correlations thus link predicate-initial clause structure (often abbreviated VO) with prefixes, and predicate-final structure (abbreviated OV) with suffixes.

<u>VO</u>	<u>OV</u>
prefixes- <u>Stem</u>	Stem- <u>suffixes</u>

These correlations were generalized in a series of papers by Theo Venneman (1973; 1974, etc.) as the Natural Serialization Principle. According to this

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principle, languages tend to develop toward consistent order between Operator and Operand, also termed *déterminant* and *déterminé*, or Head and Dependent. Operator-Operand order is manifested in Verb-Object, Noun-Genitive, Preposition-NP, and Auxiliary-Verb orders, while Operand-Operator order is the reverse: Object-Verb, Genitive-Noun, NP-Postposition, and Verb-Auxiliary. The prevalence of Operand-Operator order across languages was traced to a cross-linguistic tendency for topical material, usually expressed by subjects, to be placed early in sentences, before predicates. If the notion of Operator or Head is extended to affixes, then the predominance of SOV word order would result in a predominance of Stem-suffix order and explain the suffixing preference.

John Hawkins and associates (Cutler et al. 1985; Hawkins 1988b; Hawkins–Cutler 1988; Hawkins–Gilligan 1988) adopted the Venneman proposal, which they termed the HOP or Head-Ordering Principle, and added a second factor, that of language processing, to explain the prevalence of suffixes.

HEAD-ORDERING PRINCIPLE (HOP)

Heads are identically ordered relative to their modifiers in both syntax and morphology.

PROCESSING PREFERENCE FOR SUFFIXING

Lexical recognition precedes syntactic processing, so language users will prefer to process stems before affixes. Stem-affix order provides the most efficient structure for processing.

These proposals raise several issues. The first pertains to the exact nature of heads in morphology. An extensive literature on the subject indicates that identification of heads in morphology is not straightforward (Williams 1981; Selkirk 1982; Zwicky 1985; Hudson 1987; Scalise 1988; Bauer 1990; Corbett et al. 1993, and others). In early discussions of heads in syntax, the Noun was identified as the head of the Noun Phrase, and the Verb as the head of the Verb Phrase. The Noun and Verb were the essential foundations of their phrases, the more general, modified, subcategorized elements. They determined the syntactic category of the phrase. When the notion of head was extended to morphology, the parallels were not always clear. For some, headedness is primarily a semantic notion: the head is the more general, modified, subcategorized morpheme of a word. In a compound like *newspaper*, the head is the root *paper*, and in an adverb like *unkindly*, the head is the root *kind*. For others, headedness is primarily a syntactic notion: the head is the morpheme that determines the lexical category of the word. The head of *newspaper* is still *paper*, but the head of *unkindly* is identified as the suffix *-ly*, since it is the suffix that determines the lexical category of the word, the element that makes it into an adverb and identifies it as such. Even among

those who view affixes as heads, opinion is not uniform. Some consider only derivational affixes to be heads, since only they can change lexical category. Others, such as Williams (1981), have proposed that the rightmost affix in a word is always the head, even when it is inflectional, since it identifies the lexical category of the word. Such questions about the nature of headedness in morphology render principles of cross-category harmony in this domain somewhat more difficult to evaluate.

Another issue raised by all of these proposals is what constitutes adequate explanation. The identification of recurring patterns is an important step, but it only assembles the material to be explained. Hypotheses about functional advantages to certain patterns or clusters of patterns might lead us closer to an explanation by suggesting motivations for their retention. A consistent head-ordering principle might offer cognitive advantages in ease of acquisition, and stem-initial words might offer processing advantages if speakers do indeed process lexical material before grammatical material. But perceived advantages alone cannot account for the existence of particular structures in languages until we have traced the precise mechanisms by which the structures enter the language and become established.

The recognition that the diachronic dimension should be considered is not new. It has been known since the nineteenth century and before that the most common source of affixes is independent words. On this basis, Givón (1971; 1979; 1984) proposed a general principle that the position of affixes within words mirrors the earlier order of words within clauses. Like Venneman, he hypothesized that all languages originated with head-final (OV) syntax, due to the general tendency for speakers to place topical information, expressed by subjects, early in the clause. He maintained that affixes are always descended from syntactic heads, so languages characterized by head-final clause structure (OV) will show head-final word structure (Stem-suffix). The proposals that all languages were originally head-final (OV), and that all affixes are descended from heads, have not met with general acceptance, but the idea that explanation must incorporate the diachronic dimension is a crucial one. Though explicitly discussed in Greenberg (1957), it is still overlooked by many seeking explanations for cross-linguistic tendencies. Still, it is an implicit foundation of the work of many others and explicit in some, such as Bybee (1988) and Hall (1988; 1992). In work discussing explanation in morphology, Hall considers at length the kinds of factors that might favor the suffixing preference. After detailed surveys of formal models of the lexicon and results of psycholinguistic experiments involving affixes, he argues for an integration of psycholinguistic factors (both processing and production) and

diachronic considerations (the mechanisms by which psycholinguistic factors are incorporated into the grammar).

“The hypothesised universal psycholinguistic dispreference for prefixing must, it seems, be instantiated in particular languages word by word by a mechanism which, given the right conditions, ‘blocks’ the fusion of potential prefixes with free stems. The essential triggering conditions are present at the point where the first tentative reanalysis of a pair of free forms as one bound + one free form takes place in the mental lexicon. This phase, I suggest, is characterised by a ‘flirting’ process, in which a semantically and phonologically decayed free form attempts to become bound to (i.e., ‘flirts’ with) a full free form on which it depends and with which it is habitually contiguous. When the dispreference is triggered with sufficient strength, the pressure for a bound analysis is challenged and the form does not reduce as far as affix status.” (Hall 1992, 166)

Bybee et al. (1990) undertook the task of untangling the respective roles of the original position of grammatical markers in syntax and differential resistance to the fusion of potential prefixes and suffixes. They surveyed 71 languages for the relative positions of a small set of verbal morphemes to determine whether the predominance of suffixes might be due to a general preference for postposed grammatical morphemes, or a greater tendency to affix morphemes that are already postposed. Their results showed both.

GRAMMATICAL MARKERS	ALL	FREE	BOUND
Preposed	34%	48%	52%
Postposed	66%	20%	80%

In their sample, grammatical markers appear after the verb twice as often as before the verb (66% after to 34% before), suggesting a general preference for postposed grammatical morphemes. Among the grammatical markers that followed the verb, there are four times as many affixes as independent words (80% bound to 20% free), while among those that preceded the verb, the proportions were about the same (52% bound 48% free). Together these two sets of figures suggest a greater tendency to fuse postposed morphemes. Bybee et al. did find some correlation between affix order and syntactic order. Among the languages in their sample with basic predicate-final (-V) syntactic order, there were strong tendencies for both postposing and fusion. Among those with predicate-initial order (V-), tendencies for postposing and fusion were slight. Among those with predicate-medial order (-V-), there was a slight tendency toward preposing but none for fusion. They conclude that the suffixing preference in their sample comes primarily from the prevalence of

predicate-final order languages. Of the 71 languages, 32 were predicate-final (-V), 31 predicate-medial (-V-), and just 8 predicate-initial (V-).

At least some of the forces proposed so far, that is, cross-category harmony, processing efficiency, erosion due to production, a preference for postposed grammatical morphemes, and a greater tendency to fuse postposed morphemes, undoubtedly contribute to the structures we find, but they do not account for the full range, even when considered together. We could simply accept the fact that languages are full of exceptions. Alternatively, we could try to refine our predictions by a closer examination of the cases where current explanations appear to fail. These cases are the prefixes that occur in languages with clear head-final (OV) syntactic structure.

Such cases are actually not rare. Prefixes regularly occur in languages with otherwise clear, head-final (OV) typological profiles. Navajo, for example, a language of the Athabaskan-Eyak-Tlingit family spoken in the American Southwest, shows clear, basic SOV constituent order, along with a robust inventory of postpositions but no prepositions. It is exclusively prefixing, however, with an inventory of over a hundred prefixes. Samples of these structures can be seen in (1).

(1) Navajo: Dolly Soulé, speaker p.c.

- (a) Nihijish biihdahohnííł.
 nihi-jish b-iih-da-hw-oh-l-nííł
 2.pl-suitcase 3-into-distr-indefinite.object-2.pl.subject-tr-propel.several.imprf
 your suitcases you all put things into them
 ‘Pack your suitcases.’
- (b) Nihil dahat’iilwod.
 nih-il da-ha-d-²-ii-l-wod
 1.pl-with off-away-distr-indefinite.subject-completive-detr-flex.(legs).prf
 with us something ran off
 ‘It [the bus] just left with all of us.’
- (c) Athanéíít’aash.
 a-l-ha-ná-iiid-’aash
 reciprocal-with-seriative-around-1.dual.subject-several.walk.prog
 ‘We’ll get together now and then.’

The interest of this morpheme order was noted by Keren Rice in her book on morpheme order in the Athabaskan languages. She treats it essentially as an aberration and posits an underlying structure in which all affixes are suffixes.

“A primary idiosyncrasy of the Athapaskan verb is that the verb stem is located in the ‘wrong’ place in the surface string. In the remainder of this book, I assume a movement-based account along the lines proposed in Speas 1990, 1991, and Rice

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1993, 1998. [...] The verb stem originates as a sister to the preverbs, both of which are within the scope of, and therefore enter into semantic composition as a unit with, quantificational elements [...]. What is unusual about the verb is the surface position of the stem—it moves from its position within the verb phrase to the right of the functional morphemes.” (Rice 2000, 78)

“The greatest idiosyncrasy in the verb is the position of the verb stem and the markers of voice/valence. Given the scope hypothesis, one expects these to occur within the verb phrase. I have treated their actual placement as a quirk of the Athapaskan verb, achieved through the raising of verbs.” (Rice 2000, 414)

We can refine our understanding of the morpheme orders that occur, and the reasons behind them, by peeling apart the various diachronic forces that shape them. In most work so far, generalizations have been made over prefixes and suffixes considered as two homogenous groups. But affixes with different functions develop from different kinds of sources, by different kinds of diachronic routes. If we consider them individually, we may be able to develop a finer-grained understanding of the processes that shape grammar, and ultimately arrive at more accurate generalizations.

2. Pronominal affixes

Among the most common kinds of verbal affixes are pronominal affixes. More often than not, these morphemes run counter to the prediction that languages with head-initial (VO) syntactic structure should have prefixes, and those with head-final (OV) order should have suffixes. Navajo shows basic OV constituent order, but it contains pronominal prefixes.

(2) Navajo pronominal prefixes: Dolly Soulé, speaker p.c.

- (a) Éí shizhé'é' shíí nléí
 éí shi-zhé'é' shíí nléí
 that 1.sg.possessor-father probably there
 ‘My father had probably
 Fort Wingatedi shaajiniíyá
 Fort Wingate=di sh-aa-ji-ní-yá
 Fort Wingate=at 1.sg-to-4.subject-one.go.perfective
 at Fort Wingate he came to me
 gone to Fort Wingate to visit me.’
- (b) Áádi nishinltí.
 áá=di ní-shi-ní-0-l-tí
 there=at down-1.sg.object-term-3.subject-tr-handle.animate.object.pf
 over there he put me down
 ‘He took me there.’

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(The Navajo ‘fourth person’ category, is used for generic mentions much like English ‘one’, for respect, and often for the protagonist in narratives. In (2a) the speaker used it to refer to her father. When basic third person subjects and objects cooccur in transitive verbs, the object pronominal prefix shows a distinction between proximates, the more topical of the two, and obviatives, the less topical.)

The reason for this apparent exception is clear. These pronominal prefixes simply continue the earlier syntactic order of their sources. With predicate-final word order, independent pronouns would have preceded the verb. When they fused with the verb, they became prefixes.

There are numerous examples of the same apparent exception on the other side as well. All languages of the Salishan family of northwestern North America show clear predicate-initial (VO) order, so this order is easily reconstructed for their common ancestor Proto-Salish. Yet pronominal suffixes are common, as in Halkomelem.

- (3) Halkomelem (Salishan family, British Columbia; Galloway 1993, 176):

lé ^m -cəl	lé ^m -cəx ^w
go-1.sg.subject	go-2.sg.subject
‘I go.’	‘You go.’
meyθ- <u>amə</u> -cəl	meyθ- <u>áx^y</u> -cəx ^w
help-2.sg.object-1.sg.subject	help-1.sg.object-2.sg.subject
‘I help <u>you</u> .’	‘ <u>You</u> help <u>me</u> .’

As in Navajo, the modern morpheme order continues the earlier syntactic order. But it would be premature to assume that modern morphological structure always echoes earlier syntax. Within the Salishan family we also find pronominal prefixes.

- (4) Coeur d’Alene (Salishan, Idaho; Reichard 1938 cited in Kroeber 1999, 106):

Lute <u>hi</u> -s- <u>tap</u> -sčént.
not 1.sg-nominalizer-shoot-intransitive
‘I did not shoot.’

It is easy to explain the position of these prefixes once we uncover the route by which they developed. In all of the Salishan languages (and presumably Proto-Salish), dependent clauses can be formed by nominalization. The result is similar to English *Arriving late is always a mistake* or *I love walking along the beach at night*. The subjects of the nominalized clauses are expressed with possessive pronominal prefixes, not unlike English *My arriving late was a mistake* or *I resent his walking along the beach at night*. Salish nominalized

- (6) Some adverb sources of Navajo directional prefixes: Dolly Soulé, speaker p.c.

PREFIXES		ADVERBS	
ada-	'downward'	adah	'downward'
da-	'up'	dah	'up'
a-	'away out of sight'	áá	'there, remote'

- (a) Adáh náánadá.
adáh nááná- \emptyset -dá
 down reverse-3.sg.subject-sit.perfective
 'He came back down again.'
- (b) T'ah dah nléí
 still up there
 'He was still up there
 ndíshchí' bii'nji'ná'o.
 ndíshchí' b=ii'-ni-ji-d-na'=go
 tree 3.proximate-in-around-4.subject-detr-crawl.cont.prf=subordinate
 climbing around in the tree.'
- (c) Áádi sidá léí.
áá=di si- \emptyset -dá léí'
there=at durative.sequel-3.subject-one.person.sit.prf mirative
 'He was sitting back there!'

- (7) Some noun sources of Navajo directional prefixes: Young (2000)

PREFIXES		NOUNS	
yá-	'up into the air'	yá	'sky'
a'á-	'into a hole or burrow'	a'áán	'hole, burrow'
dá'ák'e-	'into the field'	dá'ák'eh	'cornfield, field'
łe-	'into the ashes (to cook)'	łeezh	'dirt, soil'
tá-	'out of the water, to shore'	tó	'water'
tsá-	'in the belly'	-tsá	'belly'
za-	'into mouth'	-zée'	'mouth'

But not all directional affixes have developed by this route.

Kawaiisu, a Uto-Aztecan language of California, shows the same basic head-final (OV) syntactic structure as Navajo, and this order can be reconstructed for its parent language as well. Kawaiisu also contains directional affixes, but these are suffixes. A basic translocative suffix *-kwee-* 'thither' indicates motion away from the speaker or other deictic center, and a cislocative suffix *-ki-* 'hither' indicates motion toward it.

- (8) Kawaiisu directional suffixes: Zigmond et al. (1991)

ʔjga-	‘enter’
ʔjga- <u>kwee</u> -	‘go in’
ʔjga- <u>ki</u> -	‘come in’
huʔma-	‘carry several’
huʔma- <u>kwee</u> -	‘take several’
huʔma- <u>ki</u> -	‘bring several’
yaa-	‘carry one’
yaa- <u>kwee</u> -	‘take one’
yaa- <u>ki</u> -	‘bring one’

The contrast in position is easy to explain if we consider the paths by which these directional markers made their way into the grammars. Kawaiisu, like other Numic languages, shows extensive compounding of many kinds, including the combination of two verb roots to yield a new, compound verb.

- (9) Kawaiisu Verb-Verb compounds: Zigmond et al. (1991, 163)

kaʔa-pagi-	kaa-havi
eat-walk	sing-lie
‘walk along eating’	‘lie singing’
yaa-pidj	piʔaa-ʔabigi
carry-arrive	be.pretty-talk
‘bring’	‘say in a pretty voice’

The directional suffixes *-kwee* ‘away’ and *-ki* ‘toward’ originated as the second members of Verb-Verb compounds. The first still persists as a verb root in the modern language, that still occurs on its own.

- (10) Kawaiisu verb root
- kwee*
- ‘go’: Zigmond et al. (1991, 83)

Hanaʔoko samamj ko- <u>kwee</u> -dj-mjʔ
when they reduplication- <u>go</u> -realized-indicative-pl
‘When did they <u>go</u> ?’

The source of the cislocative suffix *-ki* ‘toward’ no longer persists as an independent verb root in Kawaiisu, but a probable ancestral verb root is reconstructed for an earlier stage of the language, Proto-Uto-Aztecan **kim* ‘come’ (Miller 1987). Descendants of this verb still appear as independent roots in a number of related languages.

The best explanation for the fact that directional affixes appear as prefixes in Navajo but suffixes in Kawaiisu thus cannot be the cross-category harmony principle, since both languages have developed from ancestors with basic OV clause structure which continues in the modern languages. It is

probably also not attributable to processing preferences. It is, however, easily explained by the different kinds of sources from which the markers developed.

4. Aspect

Among the most frequent verbal affixes are aspect markers. For languages with head-initial (VO) clause structure, the cross-category harmony principle would predict that they should be prefixes, while processing and production hypotheses would predict suffixes. The head-initial Salishan languages show numerous aspectual prefixes, among them the Bella Coola stative-progressive $ʔa\acute{l}$ -.

(11) Bella Coola stative-progressive prefix $ʔa\acute{l}$ -: Nater (1984, 96)

- (a) $ʔa\acute{l}ʔayucmtim$
 $ʔa\acute{l}$ -ʔay-uc-m-tim
 stative-progressive-exchange-speech-detransitivizer-3.pl.passive
 ‘somebody was telling them to ...’
- (b) $ʔa\acute{l}puyaa\acute{x}$
 $ʔa\acute{l}$ -puy-aax
 stative-progressive-fall.over-tree
 ‘[tree] lies fallen’

We could conclude that the force toward cross-category harmony is more powerful than processing and production factors, or we could look more closely at the paths through which such markers develop. Common diachronic sources of aspect markers are verb roots. These verbs may first erode in shape to become verbal auxiliaries, then subsequently fuse with associated verbs to become affixes. Alternatively they may first fuse with other verbs to form compounds, while their full shapes are still intact, then subsequently erode into affixes. In either case, in languages with basic predicate-initial clause structure (VO), matrix verbs precede their complements, so we would expect the aspect markers that descend from higher verbs to be prefixes, just as in Bella Coola. The origin of this stative-progressive aspect prefix can in fact be traced to the verb root *ati*- ‘to be located, stay somewhere’, which still survives as a root in the language.

(12) Probable source: root *ati*- ‘to be located, stay somewhere’: Nater (1984, 49)

- $ʔa\acute{l}ic$ $ʔa\acute{l}asu\acute{l}ʔac$
 $ʔa\acute{l}i-c$ $ʔa\acute{l}=su\acute{l}=ʔac$
 stay-1.sg in=house=this
 ‘I am staying in this house’

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(The same root also developed into a locative preposition [?]*at* ‘in, at’, another common path.)

For languages with head-final (OV) syntax, all proposed principles would predict suffixes: cross-category harmony, production, and processing, as well as the recognized path of development from higher verbs to aspect markers. We might accordingly expect that in a language like Navajo, with the head-final patterns throughout its syntax and that of its ancestor, aspect markers should be suffixes. Navajo does exhibit an unusually rich inventory of aspectual distinctions, but there are no suffixes. Aspect is expressed by complex combinations of verbal prefixes and stem ablaut. An example is the Iterative in (13), formed with the prefix *ná-* and the Repetitive form of the verb stem ‘ask’.

- (13) Navajo iterative aspect prefix *ná-*: Dolly Soulé, speaker p.c.

Ná’adishkido.
ná-’a-di-sh-kid=go
 iterative-indefinite.object-orally-1.sg.subject-ask.repetitive=sub
 ‘I kept asking questions.’

The Iterative prefix evolved from a prefix of the same shape with a slightly more concrete meaning: *ná-* ‘again’.

- (14) Navajo prefix *ná-* ‘again’: Dolly Soulé, speaker p.c.

Hastiin adanáátsaad.
 hastiin ada-ná- \emptyset -tsaad
 man down-again-3.subject-scoot.momentaneous.perfective
 ‘The man came down again.’

This prefix can in turn be traced to an independent adverb *nááná* ‘again, once more’.

- (15) Earlier source: adverb *nááná* ‘another, again’: Young–Morgan (1987, 583)

Nááná yéego dílkos
nááná yéé’=go di-l-kos
again extremely=adv orally-detransitivizer-cough.imperfective

shihní
 shi-l-0-ní
 1.sg-to-3.subject-transitivizer-say.imperfective
 ‘He told me to cough hard once more.’

The modern prefix simply continues the position before the verb of its adverbial source. The development of aspectual prefixes in Athabaskan lan-

guages again illustrates the point that grammatical morphemes, even those with comparable functions, can develop from a variety of sources. Although there are no suffixes in modern Navajo, the stem ablaut that contributes to the aspectual marking probably originated from earlier combinations of roots and aspectual suffixes. The stem ablaut for aspect never affects the initial consonant of the stem, but it can involve changes in the color, length, and nasalization of the vowel, and add final consonants. The various forms of the stem used above for ‘ask’, for example, are *-keed*, *-ki’*, *-kit*, and *-kííd*.

5. Manner and means

A large number of genetically unrelated languages in North America contain verbal affixes that indicate the means or manner by which an activity takes place. Both the cross-category harmony principle and proposed processing preferences predict that such markers will be suffixes in languages with head-final (OV) syntax. But this prediction is violated more often than not. Some examples can be seen in Navajo.

(16) Navajo adverbial prefixes: Dolly Soulé, speaker p.c.

- (a) dineezjéé’o
dini-s-Ø-jéé’=go
 relaxing-term-durative.sequel-3.subordinateject-multiple.recline.prf=subordinate
 ‘when everybody was in bed’
- (b) t’óó baayániizjǫ’o
 t’óó b-aa-yá-n-í-zǫ’=go
 just 3-about-ashamed-mentally-completive.1.sg-think.prf=subordinate
 ‘I got so embarrassed about it.’
- (c) t’ah baa ntsídzikees
 t’ah b-aa ntsi’-ji-kees=go
 still 3-about mentally-4.subordinateject-ponder.imperfective=subordinateordinate
 ‘he was still thinking about it’
- (d) yiskáq
yi-s-Ø-ká=go
dawning-durative.sequel-3.subordinateject-move.in.open.container.prf=subordinate
 ‘tomorrow’
- (e) hádazhntáo
 há-da-j-ni-tá=go
 for-distributive-4.subordinateject-visually-search.continulative.imprf=subordinate
 ‘they were searching for it’

- (f) Náhodíiltj.
 ná-ho-dí-yi-0-l-tj
 upward-4.obj-extending.long.object-cmpl-3.subj-tr-handle.anim.obj-mom.prf
 'He picked him up.'

Again there is a simple explanation. Many of these prefixes can still be seen to be related diachronically to noun roots that would have preceded the verb in predicate-final clauses.

(17) Navajo noun sources of prefixes: Young–Morgan (1987)

- (a) Chadilwáá'.
 cha-dí-0-l-wáá'
 crying-orally-3.subject-detranstivizer-snore.imperfective.durative
 'It (a puppy) is whimpering, whining.' YM 270
- | | | |
|------------------|------|-------------------|
| PREFIX | cha- | 'weeping, crying' |
| INDEPENDENT NOUN | cha | 'weeping, crying' |
- (b) Baa jé'ímíshná.
 b-aa jé'-yini-0-sh-ná
 3-with carefully-toward-3.object-1.sg.subject-do.right.handedly.neuter.imprf
 'I handle it carefully.' YM 488
- | | | |
|------------------|-----|-----------------|
| PREFIX | jé- | 'carefully' |
| INDEPENDENT NOUN | jéi | 'pleura, heart' |
- (c) K'ad dził gháá'di
 k'ad dził gháá'=di
 now mountain top=at
- kééhasht'í.
 kéé-ha-sh-d-'í
 residing-area-1.sg.subject-detr-animate.be.at.rest.durative.imprf
 'I live on top of the mountain now.' YM 493
- | | | |
|------------------|-------|--------------------|
| PREFIX | kéé- | 'living, residing' |
| INDEPENDENT NOUN | kéyah | 'land' |
- (d) Bjih k'ayíłk'eh.
 bjih k'ay-ii-l-k'eh
 deer wounding-3.object-3.subject-tr-cut.momentaneous.prf
 'He wounded a deer.' YM 502
- | | | |
|------------------|-------|------------|
| PREFIX | k'a- | 'wounding' |
| INDEPENDENT NOUN | k'aa' | 'arrow' |

6. Causatives

Among the most frequent derivational affixes are causatives. As with aspectual markers, hypotheses about cross-category harmony would predict

such markers to be prefixes in languages with head-initial (VO) syntax, but hypotheses about processing and production would predict suffixes. If we consider their usual origins, the most obvious prediction would be prefixes. Causatives often evolve from matrix verbs such as ‘make’ or ‘cause’, associated with a complement clause describing the event or state caused. Since matrix verbs precede their complements in languages with head-initial (VO) syntactic patterns, we expect causatives to appear as prefixes. Just this situation can be seen in Bella Coola. The causative is a prefix *tam-*.

(18) Bella Coola causative prefix: Nater (1984, 93); Nater (1990, 123)

- (a) tam[?]ulx
tam-[?]ulx
 causative-be.silly
 ‘to make somebody (look) silly > to fool, cheat somebody’
- (b) tamqnk
tam-qnk
 causative-deep
 ‘to make somebody low > to ridicule somebody’
- (c) [?]altamstl’x^w
[?]al-tam-stl’x^w
 stative.progressive-causative-behave.well
 ‘to make somebody behave well > to give somebody sound advice’

The source of the causative prefix still survives in the language as the root *tam-* ‘make, construct’.

(19) Source of Bella Coola causative prefix: root *tam-* ‘make, construct’

- (a) tamsutuminu
tam-suł-tu-mi-nu
 make-house-benefactive-1.sg.subject-2.sg.object
 ‘I will build a house for you’
- (b) tamyayaxiitum
tam-yaya^{xii}-tu-m
 make-toy-benefactive-detransitivizer
 ‘somebody made him a toy’

For languages with head-final (OV) syntactic patterns, all principles would lead us to expect causative suffixes. Lakhota, a language of the Siouan family of the Great Plains of North America, shows a basic SOV constituent order, an order which can be reconstructed for its parent, Proto-Siouan. As predicted, it contains a causative suffix, presumably descended from a higher verb, though this verb no longer exists in the language as such.

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(20) Lakhota expected causative suffix *-ye*: Stanley Redbird, speaker p.c.

- (a) k^higlé
 k^higle
 go.home
 'he went home'
- (b) k^higléye
 k^higle-ye
 go.home-causative
 'he sent him home'

But Lakhota also contains some causative prefixes, among them *yu-*.

(21) Lakhota unexpected causative prefix *yu-*: Stan Redbird, speaker p.c.

- (a) páya
 pəya
 drunk
 'he's drunk'
- (b) yupáya
 yu-pəya
 causative-drunk
 'he got him drunk'

The existence of the Lakhota causative prefixes goes against all predictions.

Again an explanation comes from a more detailed look at the steps by which the causative prefixes entered the language. Lakhota contains a set of means/manner prefixes.

(22) Lakhota means/manner prefixes

- yu- 'involving pulling'
 pa- 'involving pushing'
 ka- 'involving sudden impact'
 ya- 'involving the mouth, biting, talking'
 na- 'involving the foot or leg'
 wa- 'involving a sawing motion or knife'
 wo- 'involving action from a distance, shooting, blowing, pounding with the end of a stick'
 na- 'involving an inner force, heat, cold'
 pu- 'involving pressure' (no longer productive)

Some examples of their use can be seen below.

- (23) Lakota verbs with means/manner prefixes: Stan Redbird, speaker p.c.; Buechel (1970)

<u>yu</u> -bláya	‘to spread out, unfold, make level’
<u>pa</u> -bláya	‘to spread out, as dough: to make level; to iron (clothes)’
<u>ka</u> -bláya	‘to make level by beating’
<u>yu</u> -yá	‘to open, e.g. a door’
<u>pa</u> -bléc ^h a	‘to crunch by pressing, pushing, or sitting on, as glass’
<u>ka</u> -bléc ^h a	‘to break something brittle by striking, as a glass’

These prefixes are old and can be reconstructed for Proto-Siouan. It is still possible to trace their origins, however. In all of the Siouan languages, roots can be combined to form new, compound stems.

- (24) Lakota compounds: Boas-Deloria (1941, 70, 73)

NOUN-NOUN	č ^h á-hąpa	wood-moccasin	=	‘shoe’
NOUN-VERB	č ^h á-lé	firewood-gather	=	‘(s/he) gathers firewood’
VERB-VERB	ų [?] ima-màni	sleep-walk	=	‘(s/he) is a somnambulist’

The modern means/manner prefixes have developed from the first element of such compounds. The source of at least one of the prefixes, *pa-* ‘by pushing’, can be traced to a verb root, *pa* ‘push’, which still persists in the language.

- (25) Lakota verb root
- pa*
- ‘push’: Buechel (1970, 422)

Mayá <u>pa</u>	šni kįhą, wašté yelo.
ma-ya- <u>pa</u>	šni kįhą wašté=yelo
1.sg.patient-2.sg.agent- <u>push</u>	not if good=assertive
‘It’s good if you don’t <u>push</u> me.’	

(Pronominal prefixes in Lakota, like those in Mohawk and Choctaw discussed below, categorize core participants as grammatical agents and patients, rather than subjects and objects. The basis of the systems is semantic rather than discourse-pragmatic, but it is fully categorical and lexicalized, learned with each verb, and in some cases the rationale behind certain categorizations is no longer transparent.)

Verbs formed with means/manner affixes in Lakota and other languages often include an element of causation as part of their meaning. The causation is not an explicit feature of the prefix. The prefix *ya-* ‘orally’ does not necessarily add causation, as can be seen in (26a) ‘deceive/tell a falsehood’, but stems derived with it can have a causative sense, as in (26b) ‘be angry/make angry’.

- (26) Lakota occasional causative effect: Buechel (1970)

(a)	gnáyą	‘deceive, cheat’
	<u>ya</u> -gnáyą	‘tell a falsehood’

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- (b) č^házéka 'be angry'
 ya-č^házeka 'make angry by talking to'

The causative interpretation comes about through inference. Many situations described with means/manner affixes involve causation. If someone dies through beating, for example, it can be inferred that he or she was caused to die by the beater. If someone is knocked down by kicking, it can be inferred that she or she was caused to fall by the kicker.

Because verbs are derived only as needed, the prefixes do not appear in the lexicon and in use in equal numbers. Verbs involving hand action are especially pervasive, since so many more actions are carried out with the hands than by shooting or by sawing, for example. As is well known, the meanings of morphemes often become more general and abstract with extensive use. Several kinds of processes can be involved. An important one is the metaphorical extension of common, concrete, lexical items to new, more abstract contexts. In English, for example, we easily say *it's out of my hands*, or *the chance just slipped through my fingers*, even when no actual hand or finger action is involved. The basic, concrete meaning of the prefix *yu-* 'by hand action, pulling' can still be seen in a number of derived verbs, including many with causative meaning.

- (27) Lakota causative *yu-* 'with discernible hand action'

yuglólo
 yu-glo-glo
 by.pulling-reduplication-grunt
 'make grunt' (a buffalo calf by catching it)

But in some derived verbs, the causative element has been reinterpreted as the central meaning of the prefix. What was originally only inferred is now felt to be asserted. As a result, new causative verbs have been formed with this prefix which show no element of hand action.

- (28) Lakota extension to abstract causation without physical hand action: Buechel (1970, 656)

Tokša, bluwíč^hak^hktelo
 tokša wa-yu-wíč^hak^ha=kte=lo
 before.long 1.sg.agent-causative-be.true=future=assertive
 'In time, I will prove it.'

Evidence that the original means/manner prefix *yu-* 'by pulling' has been fully reanalyzed as a causative in some uses can be seen in the fact that it can now be used with verbs already containing another means/manner prefix.

- (29) Evidence of reanalysis: co-occurrence with other manner prefixes

yunáci
yu-na-či
 causative-on.foot-be.stiff
 'lift up'

Similar developments of causative prefixes from earlier means/manner prefixes in head-final (OV) languages are discussed in Mithun (2002). The existence of both causative prefixes and causative suffixes within the same language shows again that a full explanation of affix positions will ultimately require exploration of the complete range of possible histories of each kind of grammatical marker.

7. Applicatives

Many languages contain derivational affixes called 'applicatives' that add a core argument to the argument structure of verbs. The most common kinds of applicatives add a recipient or beneficiary ('cook' > 'cook-for'), an instrument ('write' > 'write-with'), a companion ('sing' > 'sing-with'), or a location ('jump' > 'jump-over'). The added participant is usually a direct object, absolutive, or grammatical patient. Examples of applicative suffixes can be seen in the Iroquoian languages of eastern North America. Among the applicatives in Mohawk, for example, are the benefactive applicative suffixes *-awi* and *-ni*.

- (30) Mohawk benefactive applicative suffixes

(a)	wakenatahré:nen	rinatahrená:wí
	wake-natahren-en	ri-natahren- <u>awí</u>
	1.sg.patient-visit-stative	1.sg/m.sg-visit- <u>ben</u> .stative
	'I've visited'	'I've visited <u>him</u> '
(b)	khthárha'	rihthará:ni
	k-hthar-ha'	ri-hthar-a- <u>ni</u>
	1.sg.agent-talk-imprf	1.sg/m.sg-talk-ep- <u>ben</u> .imprf
	'I'm talking'	'I'm talking <u>to him</u> '

The origins of both of these applicative suffixes can be seen in verb roots which still survive in the language: *-awi* 'give' and *-ni* 'lend'.

- (31) Lexical sources of Mohawk applicatives: verb root
- awi*
- 'give',
- ni*
- 'lend'

(a)	koniá:wíhs	koniá:wí
	koni- <u>awí</u> -hs	koni- <u>awí</u>
	1.sg/2.sg- <u>give</u> -imperfective	1.sg/2.sg- <u>give</u> .stative
	'I give it to you'	'I've given it to you'

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- | | |
|--------------------------|-------------------------------------|
| (b) tákeni | wahákeni |
| take- <u>ni</u> | wa-hake- <u>ni</u> -' |
| 2.sg/1.sg- <u>lend</u> | factual-m.sg/2.sg- <u>lend</u> -prf |
| ' <u>Lend</u> it to me!' | 'He <u>lent</u> it to me' |

Modern Mohawk does not have a syntactically-defined constituent order. The order of words in sentences reflects their pragmatic status within the discourse rather than their grammatical role. A basic SOV order can be reconstructed for the ancestral language, however. The Mohawk applicatives, like those of related languages, are descended from the matrix verbs of complex sentences. Since matrix verbs usually follow their complements in languages with head-final (OV) syntactic patterns, it is no surprise that the applicatives are suffixes.

Navajo contains numerous applicative affixes. Given the strong head-final (OV) syntactic patterns of both Navajo and its ancestor, and the recognized development of applicatives from matrix verbs, there is every reason to expect that the Navajo applicatives should be suffixes. But again, Navajo runs counter to expectation. All applicatives are prefixes. One example is the locative applicative prefix *k'i-* 'on'. Added to the intransitive verb root 'gaze', it forms the transitive verb 'gaze on' > 'watch'.

- (32) Navajo -'íí 'gaze' with applicative *k'i-* 'on': Dolly Soulé, speaker p.c.

-'íí 'gaze' k'i-'íí 'on-gaze' > 'watch'

- (a) Nléígo desh'íí'.
 nléí=go de-sh-'íí'
 yonder=to thematic-1.sg.subject-gaze.imperfective
 'I'm just gazing over there.'
- (b) Awéé' bik'idésh'íí'.
 awéé' bi-k'i-dé-sh-'íí'
 baby 3-on-thematic-1.sg.subject-gaze.imperfective
 'I'm watching the baby.'

Added to the intransitive verb 'run' (actually based on a root meaning 'flex', referring to the flexing of legs) the applicative derives the transitive verb 'run on' > 'attack'.

- (33) Navajo -*wod* 'run' with applicative *k'i-* 'on': Dolly Soulé, speaker p.c.

-wod 'run' -k'i-wod 'on-run' > 'attack'

- (a) Eelwod.
 ee-l-wod
 completive-3.subject-detransitivizer-run.perfective
 'It ran.'

- (b) Náshdóitsoh shik'iilwod.
 náshdoi-tsoh shi-k'i-i-∅-l-wod
 wildcat-big me-upon-completive-3.subject-detransitivizer-run.prf
 'A mountain lion attacked me.'

Again a consideration of the diachronic development of the markers provides an explanation. They evolved from separate words that occurred before the verb, postpositions with pronominal prefixes representing their arguments. The language still contains a large inventory of postpositions. Some of these show suggestive resemblances in form and meaning to applicative prefixes.

- (34) Postposition origin of Navajo applicatives: Dolly Soulé, speaker p.c.

Shik'i de' dahníyeeh
 shi-k'i de' dah-∅-ni-yeeh
 me-on hither up-3.object-2.sg.subject-handle.burden.imprf
 'Put it on me' = 'Put it (a heavy sack of potatoes) up on my back.'

The direction of the evolution from postposition to applicative prefix is clear. Where the postposition sources of modern applicative prefixes still persist in the language, they are often more substantial in form. One can compare, for example, the postposition -'qá 'over' with the prefix -'q-, or the postposition -lááh 'beyond' with the prefix -lá-. The development of the prefixes has been accompanied by phonological attrition.

8. Headedness

We have seen a number of failures of the hypothesized match between suffixes with head-final (OV) syntax, and there are many more. It is not unlikely that observed cross-category harmony is more often an artifact of regular processes of language change than the product of a synchronic force. We might find, as proposed by Givón, that affixes are descended from syntactic heads, but that if syntactic structure shifts, it may no longer coincide with morphological structure. But can we be certain that affixes always develop from syntactic heads? In fact they do not. Both prefixes and suffixes can develop in a language from the same construction.

The ancestor of Kawaiisu, Proto-Uto-Aztecan, is reconstructed with basic head-final (OV) syntax, which has been passed down to most of its daughters. Both the parent and the daughters show extensive compounding of various kinds. The compounds, like the syntax, would be considered right-headed (head-final) by all accounts.

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(35) Kawaiisu right-headed compounds: Zigmond et al. (1991)

sana- [?] oocozi	pitch-bottle	'pitch bottle'
cjga-roci	rough-head	'tangle-haired'
hɨ [?] i-kama-	be.good-taste	'to taste good'
mo [?] o-zigi-	hand-wash	'to wash one's hands'
[?] ataasiniya-kwee-	slowly-go	'to go slowly'
nazipi-kwee-	urinate-go	'to go to the bathroom'

Some suffixes have indeed developed from the heads of such compounds, the right-hand members. As seen earlier, the directional suffix *-kwee* developed from a verb root which still persists as such in the language.

(36) Root *kwee* 'go': Zigmond et al. (1991, 83)

Hana [?] oko samamj ko- <u>kwee</u> -dj-mj?
when they reduplication-go-realized-indicative-pl
'When did they <u>go</u> ?'

It also appears as the right-hand member, or head, of verb-verb compounds. From constructions of this type ('crawling-go') it has been reinterpreted as a directional suffix *away*.

(37) *-kwee* 'away': Zigmond et al. (1991, 100)

Togowa	čirjgwi- <u>kwee</u> -dj	kahni-rukwa
rattlesnake	crawl- <u>away</u> -indicative	house-under
'The rattlesnake is crawling <u>away</u> under the house.'		

It is in paradigmatic opposition to the cislocative suffix *-ki* 'hither, toward', which exists only as a suffix in modern Kawaiisu.

(38) Translocative suffix *-kwee* 'away': Zigmond et al. (1991)

[?] jga-	'enter'
[?] jga- <u>kwee</u> -	'go in'
yaa-	'carry one object'
yaa- <u>kwee</u> -	'take one object'
hu [?] ma-	'carry several objects'
hu [?] ma- <u>kwee</u> -	'take several objects'

The translocative has in turn given birth to another suffix with slightly more abstract meaning, an inchoative with the meaning 'become'. Added to the verb 'be loose', for example, it derives the verb 'come loose', or 'loosen'.

(39) Inchoative suffix *-kwee*: Zigmond et al. (1991)

hayimi-	'to be loose'	hayimi- <u>kwee</u> -	'get loose'
ʔjpii	'to sleep'	ʔjpii- <u>kwee</u> -	'go to sleep'
hja-ye-e	'to be aged, elderly'	hja-yeʔe- <u>kwee</u> -	'get old, to age'
cabi-	'to smash, dent'	caba- <u>kwee</u> -	'go flat (of a tire)'

It has also come to be used as a resultative. Added to the verb 'break', it yields 'broken'.

(40) Resultative suffix *-kwee*: Zigmond et al. (1991, 97)

kokapi- <u>kwee</u> -dj	ʔuusu	pogo-wa=ika.
break.mom- <u>resultative</u> -indicative	already	branch-possessed=its
'The tree limb is broken off.'		

The verb root *kwee* 'go' has thus evolved, in its position as the right-hand member or head of verb-verb compounds, from a root to a translocative suffix 'thither, away' then to an inchoative and resultative. The counterpart of the translocative suffix, the cislocative suffix *-ki* 'hither', can be traced to a different verb root **kim* 'come' that apparently appeared in the same head position of compounds. This root no longer survives as such in Kawaiisu, but it is reconstructed for Proto-Uto-Aztecan. The cislocative suffix has in turn evolved still further into another kind of aspect marker, a durative. Similarly, a third Kawaiisu directional suffix *-mi* 'along' can be traced to a Proto-Uto-Aztecan verb root **mi* 'walk' which has not survived as such in Kawaiisu. The Kawaiisu suffix *-mi* has also evolved further into an aspect marker, a habitual. There is thus robust evidence in Kawaiisu of the heads of verb-verb compounds, the word-final roots, evolving into suffixes serving a variety of functions.

But that is not the whole story for Kawaiisu. The very same root-root compound structures that gave rise to suffixes also gave rise to prefixes. Among the verbs that can occur in the initial, non-head position of compounds is a root *ʔaaga* 'be stealthy'.

(41) Kawaiisu *ʔaaga* 'be stealthy': Zigmond et al. (1991, 79)

- (a) sɲaʔa-vi ʔaaga-huziʔa-n-pɲadɨ=ina
Coyote-abs be.stealthy-look-momentaneous-perfective=him
'Coyote stealthily peeked at him.'
- (b) ʔaaga-ʔabigi-
be.stealthy-talk
'whisper'

This non-head root has given rise to a prefix *ʔaa-* 'quietly, stealthily'.

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(42) Prefix *ʔaa-* ‘quietly, stealthily’: Zigmund et al. (1991, 79)

- (a) Neeziči kardj.
 girl sit
 ‘The girl is sitting.’
- (b) Neeziči *ʔaa-gari*dj.
 girl quietly-sit
 ‘The girl is sitting quietly.’

Kawaiisu, like other Uto-Aztecan languages, shows both additional prefixes and additional suffixes descended from the same compound constructions. Similar examples from Salishan languages are discussed in Mithun (1997). It is thus clear that headedness does not determine which roots will become affixes: both the heads and the dependents of compounds can evolve into affixes. Other factors must enter into the formation of prefixes and suffixes. One of these factors can be surmised from the Kawaiisu examples just seen, a factor that has been recognized for some time. This is generality of meaning. Verbs with general meanings like *go* and *come* will appear in large numbers of compounds, setting the scene for grammatical evolution.

9. Frequency

The generality of meaning of verbs like ‘go’ and ‘come’ ensures that they are likely to be used more often than verbs like ‘smash’ and ‘sleep’. As discussed at length by Bybee–Hopper (2001), a crucial factor which enters into the formation of affixes from roots is frequency of use. The role of frequency is illustrated in an interesting way in Choctaw, a language of the Muskogean family of Alabama, Mississippi, and Oklahoma, in the southern United States.

Choctaw verbs contain pronominal affixes referring to the core arguments of clauses. Grammatical agents, patients, and datives are represented. Third persons are zero. The forms of the affixes can be seen below.

(43) Choctaw pronominal affixes (Muskogean family): Ulrich (1986)

	AGENTS	PATIENTS	DATIVES
1.sg	<u>-li</u>	sa-	sam-
2.sg	iʔ-	či-	čim-
1.pl	il-	pi-	pim-
2.pl	haʔ-	hači-	hačim-

Normally paradigmatic sets of markers all appear in the same area of the grammar. The Choctaw pronominal affixes show a surprising arrangement. All of them are prefixes except for one, the first person singular agent *-li*.

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- (44) Choctaw first and second person pronominal affixes: Ulrich (1986)

písalitok	saillaaci
pisa-li-tok	sa-illi-a:ci
see-1.sg.agent-past	1.sg.patient-die-future
'I saw it'	'I am going to die'
issassotok	ciča:ha
is-sa-sso-tok	ci-čaaha
2.sg.agent-1.sg.patient-hit-past	2.sg.patient-be.tall
'You hit me'	'You're tall'

Once again, the surprising positions of the affixes can be explained by investigating the events that led up to their development, this time observing the role of frequency in use. The parent language Proto-Muskogean, like the modern daughter languages, contained auxiliaries. As would be consistent with basic head-final (SOV) constituent order, the auxiliaries followed the content verb in sentences. The auxiliaries were presumably descended from higher verbs. In modern Choctaw some of these auxiliaries have evolved into verbal suffixes. The Choctaw past tense suffix *-tok*, visible above in 'I saw it' and 'you hit me' for example, apparently developed from an auxiliary which itself developed from a Proto-Muskogean verb **tah* 'finish, complete'. This verb also survives as an independent verb root in modern Choctaw.

- (45) Choctaw verb
- tah*
- 'finish': Jacob et al. 1977 cited in Booker (1980, 138)

nípi	ba ² -li-t	i ² -tah-li-tok	q.
meat	cut-active-same.subject	2.sg.agent-finish-active-past	q
'Did you finish cutting the meat?'			

Third person pronominal affixes are usually zero in the Muskogean languages. There was thus often no overt pronominal prefix on either verb in complex sentences with the matrix verb 'finish'. As the construction became tighter, and the 'finish' verb developed into an auxiliary, it would be easy for learners to reanalyze the position of the pronominal prefixes, when they did occur, from before the verb to before the verb phrase. In most cases the two analyses would yield the same result. But first person singular agent prefixes were probably considerably more frequent in daily conversation than plurals or second persons. For the most part, inflected verbs, and especially inflected auxiliaries, would not be assembled online as speakers spoke, but rather remembered and selected as units. The first person agent prefix was apparently so firmly attached to the auxiliaries that it remained there after the auxiliary had evolved into a tense suffix. The result is a surprising paradigm, in which only the first person singular agent reflects the earlier order of morphemes. The only explanation for its position is frequency of use.

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10. Conclusion

The search for explanations of the suffixing preference has resulted in a diverse set of hypotheses about the forces that shape grammars. Many are couched in terms of synchronic advantages, such as the cognitive simplicity of cross-category harmony, and the efficiency of processing lexical material before grammatical material. Certain issues remain unresolved in these accounts, however. A compelling definition of the notion ‘head’ in morphology has not yet been established. The extent to which laboratory experiments on lexical recognition accurately model language processing in context remains to be demonstrated. They also leave numerous unexplained exceptions, even when considered together.

But hypotheses about functional advantages cannot constitute explanations in themselves, without accounts of the mechanisms by which the advantages are translated into grammatical structure. If we hope to explain why grammatical structures take the shapes they do, it makes sense to unpack the steps by which they come into being.

Very often the position of affixes within words simply continues the syntactic position of the lexical items from which they are descended. But the development of affixes is often more than a simple process of formal fusion. In order to explain the position of individual affixes, we first need to identify their sources. In some cases this is straightforward, because their functions have remained little changed. Independent subject and object pronouns may develop into pronominal affixes, for example, as apparently happened in Navajo and Halkomelem. In many cases, however, the path of development is less straightforward. Sometimes the sources of pronominal subject prefixes were not independent subject pronouns at all. In a number of languages, including some of the Salishan languages seen here, they originated as possessive prefixes on nominalized clauses.

The formal evolution from independent word to affix is typically accompanied by functional change. Navajo and Kawaiisu directional adverbs were seen to evolve first into directional affixes and then into aspect markers. A single lexical source may spawn a variety of grammatical markers. The Bella Coola root ‘be located, stay’, for example, has yielded both a locative preposition and an aspect prefix. Some kinds of affixes may develop from any one of several kinds of sources. The Bella Coola causative prefix developed from a verb root ‘make’, while the Lakhota causative prefix developed from a means/manner prefix ‘by hand’. Causatives from both kinds of sources may even coexist within a single language, as in Lakhota. The Mohawk applica-

tives have developed from matrix verb roots, while the Navajo applicatives have developed from postpositions. The relative timing of particular functional and formal changes may vary. Lexical roots may develop first into independent grammatical words, such as auxiliaries, adverbs, or adpositions, before they fuse with hosts to become affixes, like the Navajo directional prefixes. Alternatively, roots may first fuse with other roots in compounds, then undergo the functional abstraction and phonological reduction that make them into grammatical affixes, as seen in Kawaiisu directional suffixes. So far most careful studies of suffixing preferences have involved a very limited inventory of inflectional categories.

The case for cross-category harmony as a motivating force behind the patterns we find might be strengthened if historical language changes were identified whereby prefixes shifted position, hopping over stems to suffix position, in response to a syntactic shift to head-final clause structure. So far, however, such situations are not well known. In Navajo we saw the creation of verbal prefixes from postpositions, but there was no shift in order. The postpositions, along with their pronominal object prefixes, simply fused with the verbs that immediately followed them: baby it-on gaze > baby it-on-gaze 'She is watching the baby'. In Choctaw we saw a first person singular pronominal suffix that developed from a prefix, but the marker itself never actually moved.

Without an awareness of the individual histories of affixes, attempts at general explanations for their positions are bound to fail much of the time. But generalizations are not impossible. Some of the seemingly idiosyncratic developments seen here reflect deeper, general principles. The development of adverbial prefixes and adverbial suffixes in Kawaiisu from different members of the same compound construction shows that headedness does not determine which roots will develop into affixes. But the same development suggests that semantic generality and frequency in speech might. The frequency factor has also shaped the Choctaw pronominal affix paradigm in a complex way, resulting in pronominal prefixes for the entire paradigm except for the first person agents. Explanations of both the observed suffixing preference and the occurrence of prefixes are surely not beyond our grasp. Our generalizations will suffer, however, if we fail to take into account the individual histories of the affixes we are seeking to describe.

Abbreviations

abs	absolute	mom	momentaneous
adv	adverbializer	obj	object
cmpl	completive	pl	plural
cont	continuative	prf	perfective
detr	detransitivizer	prog	progressive
distr	distributive	q	question
du	dual	sg	singular
dur	durative	sub	subordinate
ep	epenthetic vowel	subj	subject
imprf	imperfective	term	terminative
m	masculine	tr	transitivizer

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