Head-marking inflection and the architecture of grammatical theory

Evidence from reduplication and compounding in Hiaki (Yaqui)

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Within generative grammar, noun incorporation and other compounding processes have traditionally been the focus of morpho-syntacticians, while reduplication has been investigated primarily by morpho-phonologists. The interaction of these two phenomena in a single language has significant implications that go beyond the narrow concerns of these two sub-domains, bearing much more broadly on the architecture of grammatical theory. This paper investigates the interactions of reduplication and compounding within one language, Hiaki (Yaqui). Reduplication for aspectual inflection in Hiaki occurs *inside* of compounds and other derived words, marking the head of the word. We demonstrate the major architectural issues resting on the analysis of these phenomena by examining how different theoretical perspectives can (or cannot) accommodate the Hiaki data.

Keywords: inflection; head-marking; reduplication; noun incorporation; Hiaki (Yaqui)

1. Introduction

Two areas that have received an extraordinary amount of attention in contemporary theory-building have been reduplication, at the interface of morphology with phonology, and noun incorporation (NI), at the interface of morphology with syntax. Given the wide cross-linguistic distribution of these two phenomena in addition to their great theoretical importance, it is relatively surprising that the interaction of the two has received extremely little (and in fact, almost no) attention in the literature. The purpose of this paper is to provide extensive empirical documentation of how reduplication interacts with noun incorporation and other types of verb compounding in one language, Hiaki (Yaqui). We will show that V(erb)-V(erb) compounds

allow reduplication to apply to either (or both) of the verbal elements, whereas noun incorporation constructions, which are in essence N–V compounds, only allow for reduplication as a prefix to the verbal element. Inflectional reduplication thus appears *inside* the compound in noun incorporation contexts.

We then go on to address the theoretical ramifications that these data have for a variety of different frameworks in theoretical morphology. The central issue raised by the interaction of reduplication with compounding in Hiaki is word-internal head-marking inflection. As we will show, the Hiaki reduplication + compounding data, and word-internal head-marking more generally, raise interesting problems for competing theories. We will argue that those theories whose architectures contain inflectional and derivational processes in a single grammatical component (e.g. Strong Lexicalism or syntacticocentric theories like Distributed Morphology) fare far better in accounting for these data than those which would separate the two into separate components (e.g. Weak Lexicalist theories). We will also argue that a recent theory designed explicitly to account for head-marking inflection, Paradigm Function Morphology (PFM) (Stump 2001), can straightforwardly account for the basic Hiaki reduplication facts but runs into empirical problems arising from the interaction of reduplication and compounding with yet other aspects of Hiaki grammar.

Before proceeding to our main discussion, however, we would first like to say how thrilled we are to include our paper in this volume in honor of the one and only Jane Hill. She has been an exemplary scholar and wonderful personal friend to both of the present authors (not to mention her service as co-advisor on Haugen's 2004 University of Arizona dissertation). No single paper could hope to encompass all of the many voices of Jane Hill – indeed, it is our belief that no single *person* could match the range of topics that she has covered with the depth and insight that she has contributed to so many branches of linguistics, anthropology, and fields beyond. The particular "voice" of Jane Hill with which we hope to connect our present paper is the one that applies linguistic data collected from the documentation of threatened and endangered languages to empirical considerations crucial to linguistic theorizing – i.e. what Ken Hale (2000) has called the "confirmatory function" of linguistic diversity. Along these lines Jane's own work on prosodic morphology and word derivation in Tohono O'odham (Hill & Zepeda 1992) and the morphology and semantics of reduplication in Tohono O'odham (Hill & Zepeda 1998), as well as her work on the theoretical ramifications of the complex verb morphosyntax of Cupeño (Hill 2003), spring immediately to our minds. We hope that our remarks on the theoretical ramifications of reduplication and compounding in Hiaki will be taken in a similar spirit.

We'd also like to thank Jane for all of the work that she has done to foster at the University of Arizona a unique and exciting research community of scholars working

on all aspects of Uto-Aztecan linguistics, through which we have both profited greatly – intellectually, personally, and otherwise. This one's for you, Jane!

This paper is organized as follows. Section 2 outlines how the two different morphological processes of reduplication and noun incorporation (N–V compounding) each work in Hiaki. Section 3 then discusses the interaction of Hiaki reduplication and compounding processes in several different contexts: NI constructions (§3); in hybrid verb constructions (§3.1); with verbal suffixes (§3.2); and in "pseudo"-compounds (§3.3). Section 4 then focuses on the implications of the word-internal reduplication process that occurs specifically in NI constructions (and pseudo-compounds), in standard theoretical architectures: Weak and Strong Lexicalist approaches and the syntacticocentric approach to incorporation proposed by Baker (1988). We conclude that the order of the inflectional reduplicative morpheme in Hiaki, which appears word-internally marking the verbal head of the compound, cannot be accounted for in the Weak Lexicalist theory or in Baker's theory without additional architectural accommodations.

Section 5 then discusses some architectural accommodations that have been proposed which can account for these data, in both Lexicalist and syntacticocentric frameworks. We argue that while the Hiaki reduplication data specifically are consistent with the predictions of the Paradigm Function Morphology proposed by Stump (2001), its interaction with other cases of inflection violate a crucial principle of PFM – namely, inflectional object clitics exhibit edge-marking behavior in the same forms in which reduplication exhibits head-marking, in violation of PFM's Paradigm Uniformity Generalization. We close by discussing how the Hiaki data can be accounted for in a syntacticocentric framework by amending Baker's theory with the notion of Local Dislocation, within the theory of Distributed Morphology. Section 6 concludes.

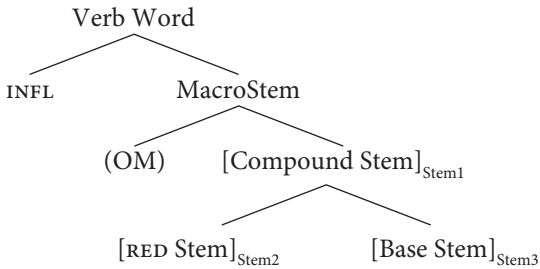
1.1 Background: Reduplication and compounding in the literature

Reduplication interacting with the general phenomenon of compounding has received some recent attention, and we identify two general types of previous research in this area. The first, of particular importance in the present context, is reduplication *plus* compounding. Recent work in this area includes discussion of reduplication in nominal compounds in Pima (Munro & Riggle 2004), a Uto-Aztecan language of the Tepiman sub-group (see Footnote 12 below), as well as Haugen (2010), which provides a more general discussion of reduplication in compounding contexts cross-linguistically.

A second strand of research has examined the process of reduplication itself as a *kind* of compounding (e.g. Zoll 2002; Downing 2003; Inkelas & Zoll 2005).

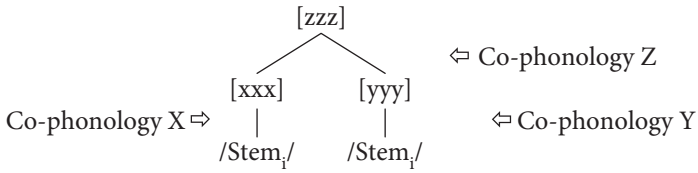
For example, Downing (2003) proposes that reduplicated verb stems in Bantu are composed of a compound stem formed by a reduplicated stem combining with the base stem, as in (1):

(1) **Compound Structure for Reduplicated Bantu Verb Stems**
(Downing 2003, p. 7 [7b])



Inkelas and Zoll (2005) provide a similar representation in Morphological Doubling Theory (MDT), but they propose instead that a reduplicant and its *base* are simply potentially heterogeneous daughters of a morphological mother node. The representation that they give for reduplication structures is shown in (2):

(2) **Schematic for Reduplication in Morphological Doubling Theory**
(Inkelas & Zoll 2005, p. 19 [27])



Our focus in this paper will involve only the first kind of investigation, as we will be examining the interactive processes of inflectional reduplication occurring in the contexts of noun incorporation and other compound verbs in Hiaki.

2. Reduplication and noun incorporation in Hiaki

Hiaki (Yaqui) is a Southern Uto-Aztecan language of the Taracahitic sub-group, and is indigenous to northwestern Mexico (Sonora) but also spoken in southern Arizona, USA. Hiaki allows for the productive compounding of verbal roots to indicate various semantic notions. These compounds do not generally allow for any other constituent or affix to intervene between their components, with one exception: reduplication.

2.1 Reduplication in Hiaki

Reduplication in Hiaki is a productive inflectional process typically marking habitual or progressive aspect (also, in some cases, emphasis) on verbs, and it is generally prefixal. There are several forms of reduplication which can be used for any of the above semantic functions: a light syllable reduplicant; a heavy syllable reduplicant that triggers gemination of the onset of the base into the coda of the reduplicant; a disyllabic reduplicant; and a word-internal pattern of morphological gemination. In general, neither the form nor the meaning of a reduplication type is fully predictable based on the phonological makeup of the stem to which it attached. We will not concern ourselves here with this rampant reduplicative allomorphy; for further discussion see Harley and Amarillas (2003), Haugen (2003), and Harley and Florez Leyva (2009). Examples illustrating the three most common meanings associated with one of the reduplication types, a light syllable, are presented in (3) (the reduplicant will appear in bold in all examples henceforth):[1]

(3) a. **Habitual (HAB)**
Itepo hunum ***ke****-ke'ewe*
1.PL there RED-gather.firewood
'We gather firewood there.'

b. **Progressive/continuative ('in progress'), (PROG)**
Uu hamut totoi kava-m ***bwa****-bwata*
The woman chicken egg-PL RED-stir
'The woman is mixing the eggs.'

c. **Emphatic (EMPH) (often in Imperative (IMP) examples)**
Kat=ee uka soto'i-ta hunum ***ma****-mana*
NEG.IMP=2.SG the.ACC pot-ACC there RED-put
'Don't put that pot there.'

(Harley & Leyva 2009, p. 253 [13])

1. The abbreviations for our glosses are as follows: 1 = 1st person; 2 = 2nd person; 3 = 3rd person; ACC = accusative; AF = unsepecified affix; AG.NOM = agentive nominalizer; APPL = applicative; CAUS = causative; CONT = continuative; DESID = desiderative; DET = determiner; DIR = directive; EMPH = emphatic; FUT = future; HAB = habitual; INCEP = inceptive; INST = instrumental; INTR = intransitive; NEG.IMP = negative imperative; OBJ = object; OBL = oblique; PERF = perfective; PASS = passive; PAST = past tense; PL = plural; PPL = past participle; PRET. AUG = preterite augmentative; PROSP = prospective; RED = reduplication; REV = reverential; SG = singular; SUBJ = subject; TO = directional postposition; TRAN = transitive; WH = question word.

2.2 Noun incorporation in Hiaki

Noun incorporation involves the compounding of a noun with a verb, where in the usual case the noun satisfies the verb's internal argument selectional properties. A typical Hiaki example is given in (4) below:

(4) *Peo maso-peu-te-k*
Peo deer-butcher-INTR-PERF
'Peo deer-butchered' (Jelinek 1998, p. 213 [48])

Hiaki is an SOV language, so objects normally precede their verbs in any case. There are, however, clear diagnostics that distinguish incorporated objects from non-incorporated O–V juxtapositions. First, an incorporated nominal in Hiaki does not indicate number or case, which contrasts with object nouns in verb-external object noun phrases, which must do so – compare the inflection on the nominal stem *maaso* 'deer' in (5) with the absence of inflection on its incorporated counterpart in (4).[2]

(5) a. *Peo maso-ta peu-ta-k*
Peo deer-ACC.SG butcher-TRAN-PERF
'Peo butchered a deer'

b. *Peo maso-m peu-ta-k*
Peo deer-PL butcher-TRAN-PERF
'Peo butchered some deer'

Second, no constituent may intervene between a noun and the verb in an NI construction, as seen by comparing (6a′) with its overtly transitive counterpart in (6b′); the adverbial *aman* in the latter can intervene between the verb and its inflected object, but not between the verb and the incorporated, uninflected nominal in the former.

(6) a. *kuta-siu-te*
stick-tear-INTR
'wood-split'

a′. **kuta-aman-siu-te*
stick-there-tear-INTR
'wood-split over there'

b. *kuta-m siu-ta*
stick-PL tear-TRAN
'split wood.'

b′. *kuta-m aman siu-ta*
stick-PL there tear-TRAN
'split wood over there'

The above examples show that the integrity of the noun-verb complex in Hiaki NI cannot be disrupted by another syntactic constituent, such as a locational adverb.

2. The underlying vowel in *maaso* 'deer' is long and would surface as such in, e.g. the nominative case, which is unmarked; long vowels in Hiaki stems regularly shorten under suffixation.

Third, in some cases, these Hiaki NI constructions involve nominal stems rather than fully free nominals. In Hiaki, some stems have special forms which are used when the stem is subject to derivational affixation; these are distinct from the free stems which are typically used in inflectional affixation (see Tubino Blanco & Harley 2010 for a full discussion). The NI examples in (7) show that these special derivational stems are used in NI constructions, and are hence easily distinguished from the corresponding verb phrases with independent NP objects, which would use the free stem form for the object. The incorporated forms in (7) are derived using the bound stems of the nominals whose free stems are *chichi* 'saliva' and *hipetam* 'bed', respectively:

(7) a. *chit-wat-te* 'spitting'
saliva-throw-INTR derived from *chichi* 'saliva' n. + *watta* 'throw (tr.)'

b. *hipe-teka* 'make bed'
bed-lay.across.TRAN derived from *hipetam* 'bed' + *teéka* 'lay sthg. across'

Fourth, word-internal phonological processes apply inside these NI constructions in Hiaki, showing that they form a single phonological word. For example, they undergo the word-internal phonological rule of /s/ → [h] in word-medial syllable final position. (8) illustrates this process in a normal affixation context, using the verb stem *bwasa/bwase* 'cook (tr./intr.)'; when suffixed with the future suffix *-ne* in (8b)(8), the stem-final /s/ becomes [h]:

(8) a. *Haisa intok* ***bwa****-bwasa'a-wa?*
how and RED-cook-PASS
'And how are they cooked?' (Conversation 8 [15])

b. *abwe, oowa-m ae-t mo-monto-wa hunak veha* <u>*bwah-ne*</u>
well coal-PL it-on RED-pile-PASS then then cook-FUT
'Well, coals are placed on it and then it will cook' (Conversation 8 [16])

This rule also applies in NI constructions, illustrated in (9). The noun stem *lioh* 'God' in (9a) is derived from Hiaki *Lios*, which in turn was borrowed from the Spanish *dios* 'God'. It appears as *Lios* in non-compounded contexts (9b):

(9) a. *lioh-bwania*
God-promise
'giving thanks'

b. *Lios enchi ania.*
God you.ACC help
'(May) our creator help you' (a traditional greeting)

Fifth, these N–V compounds are conducive to idiomatic interpretation, and are often used for common, culturally-relevant activities, as is characteristic of compounding NI

constructions more generally (Escalante 1990, p. 105; Dedrick & Casad 1999, p. 161) (cf. Mithun 1984):

(10) a. *tekil-maka* 'commissioning, making responsible' (< *lit*. 'work-giving')
b. *kuchu-sua* 'fishing' (< *lit*. 'fish-kill.PL.OBJ.')

Hiaki noun incorporation, then, appears to produce normal N–V compounds, exhibiting all the appropriate word-like properties expected from the result of a derivational process. Mithun (1984) differentiates two sub-types of what she calls *Type 1 NI*: true compounding NI, which creates a single verbal word, and composition by juxtaposition, which exhibits a much looser morpho-phonological connection between the two elements of the compound. Hiaki NI constructions must be regarded as of the former type, since NI compounds meet all the identificational criteria laid out by Mithun.

2.3 Hiaki NI as detransitivizing?

Rosen (1989) proposes a major distinction among NI types along the lines of transitivity – i.e. intransitive versus transitive NI constructions (*compound* vs. *classifier* NI, in her terminology). Hiaki NI has generally been taken to be intransitivizing (Escalante 1990; Jelinek 1998), as illustrated in the following contrasting examples presented by Jelinek (1998 p. 213 [48]), repeated from (4) and (5) above:

(11) a. *aapo maso-ta peu-ta-k*
3SG deer-ACC butcher-TRAN-PERF
'He butchered a deer.'

b. *aapo maso-peu-te-n*
3SG deer-butcher-INTR-PAST
'He was deer butchering.'

c. **aapo bwe'uu-k maso-peu-te-n*
3SG big-ACC deer-butcher-INTR-PAST
[*'He was [big deer]-butchering.'] or [*'He was deer-butchering a big one.']

(11a) presents a transitive sentence with an accusative case-marked direct object nominal (*masota* 'deer-ACC') and a verb marked with the transitive suffix *-ta*. (11b) provides the corresponding NI example, where the nominal is compounded with the verb (and is no longer marked with the accusative marker), and the verb takes the intransitive suffix *-te*. That such NI verbs are truly intransitive is further demonstrated in (11c), which illustrates the ungrammaticality of external modifiers (adjectives, numerals, determiners, etc.) with incorporated nominals.

However, in contrast to Jelinek's data, in some cases it appears to be possible to have "stranded" or ("null-head") modifiers with incorporated nominals in Hiaki.

Molina et al. (1999) list *pan hoa* as an intransitive verb meaning 'to make bread' (< *pan* 'bread' + *hooa* 'make'). In (12) we present new empirical evidence that this is actually a transitive NI construction:

(12) a. *Irene panim am-hoo-ria*
Irene bread-PL 3.PL-make-APPL
'Irene is making bread for them.'

b. *Irene am=pan-hoo-ria*
Irene 3.PL=bread-make-APPL
'Irene is making bread for them.'

c. **Irene pan am=hoo-ria*
Irene bread 3.PL=make-APPL

d. *Irene oficiom sii kiam pan-hoo-ria*
Irene oficio very delicious-PL bread-make-APPL
'Irene is making very delicious bread for the ceremonial officials'

(12b) and (12c) show that the nominal root *pan* 'bread' must be incorporated onto the verb, given both the inability of the third person plural agreement clitic *am=* (which specifies the benefactee argument introduced by the applicative suffix *-ria*) to intervene between it and the verb *hooa*, and the absence of inflection on *pan*. However, in (12d), the intensifier and adjective modifying *pan* show that the incorporated nominal can still be externally modified in some instances, which is a sign of the transitivity of this construction in Rosen's (1989) typology.

In theories which posit that an incorporated nominal forms a constituent with its external modifiers, either through movement (e.g. Baker 1988) or co-analysis (Sadock 1991), such modifiers are considered to be "stranded". Indeed, such "stranding" of modifiers is presented as a motivation for these theories. Theories like that of Rosen 1989, on the other hand, regard incorporation as a (non-syntactic) morphological compounding process, and regard the modifiers in the external NP to be "null-head" phrases. We'll return to the differing predictions of these two contrasting approaches below. In any case, the evidence suggests that Hiaki NI is at least sometimes transitive NI, in Rosen's terms, though often intransitive NI in other cases.

We now turn to illustrate the interaction of NI and reduplication in the language: What happens when a compound V is inflected for habitual aspect by means of reduplication?

3. Reduplication with noun incorporation in Hiaki

Above we saw that nothing could intervene between the nominal and the verb stem in Hiaki NI. The only exception to this generalization is the case of reduplication,

when reduplication is used as the means to express a verbal inflection, as illustrated in (13):

(13) *Peo maso-**peu**-peute*
Peo deer-RED-butcher
'Peo is always butchering deer'

Here, inflection appears to disrupt the lexical integrity of the N–V compound. In NI in Hiaki, reduplication cannot target the left edge of the compound:

(14) **Peo* ****ma**-maso.peute* / *Peo ***maso**-maso.peute
Peo RED-deer.butcher
'Peo is always butchering deer'

A number of cases of reduplication in Hiaki noun incorporation (NI) constructions are listed in (15). These examples all involve a nominal stem being compounded with an identifiable verbal stem, i.e. a verbal element that can also appear as a free verb without an incorporated nominal.

(15)

	Verb	Meaning	Reduplicated Form
a.	chit-wat-te saliva-throw-INTR	'spitting'	chit-**wat**-watte
b.	hiavih-muke breath-die (SG. SUBJ.)	'gasping, short of breath, suffocating'	hiavih-**mu**-muke
c.	hipe-teka bed-lay.across (t.v.)	'make bed'	hippe-**te**-teka
d.	kuchu-sua fish-kill (PL.OBJ.)	'fishing'	kuchu-**su**-sua
e.	kova-hamti head-broken	'deep in thought, concentrating, thinking'	kova-**ham**-hamti
f.	kupi-tomte eye-blossom	'lose sight temporarily'	kupi-**tom**-tomte
g.	lioh-bwania God-promise	'giving thanks'	lioh-**bwa**-bwania
h.	lio-noka God-talk	'praying'	lio-**no**-noka
i.	Mao-noka Mayo-speak	'speaking in the Mayo language'	Mao-**no**-noka
j.	masa-vaite wing flap	'flapping wings'	masa-**vai**-vaite

In particular, note that this process applies to cases in which the N–V compound involves a bound nominal stem, as in (15a) and (15c); that no inflection appears on the

nominal half in the reduplicated form; and that word-internal phonological processes still apply to the entire N–V compound with intervening reduplication, as in (15g).

The resulting complex reduplicated NI form continues to behave as a V with respect to other inflectional processes of the language. To illustrate, consider the following example, which shows that the preverbal object clitics attach to the left edge of the compounded N–V form at the same time that reduplication is marked internal to the compound (16a); reduplicating at the left edge of the compound N–V form is ungrammatical (16b). Similarly, attaching the object clitic to the reduplicated V, between the incorporated N and its sister V, is ungrammatical (16c):

(16) a. Irene am=pan-**ho**-hoo-ria
Irene 3.PL-bread-RED-make-APPL
'Irene is always making bread for them.'

b. *Irene am=**pa(n)**-pan-hoo-ria
Irene 3.PL- RED-bread-make-APPL

c. *Irene pan-am=**ho**-hoo-ria.
Irene bread-3.PL=RED-make-APPL

Reduplication in combination with NI in Hiaki, then, applies to the head V within the otherwise apparently completely atomic N–V compound.

We next turn to illustrate extensively the interaction of reduplication with other verbal compounding and derivation processes in Hiaki, first in derivations with "verb-affix hybrids" (§3.1); then in other cases of verb-derivation, such as occurs with the affixation of derivational suffixes on verbs (§3.2); and finally in words with unidentified word-internal structure ('pseudo-compounds'; §3.3).

3.1 Reduplication and verb-affix hybrids

In addition to the reduplication of N–V compounds that occurs in NI constructions, Hiaki has a small, closed class of free verb roots that can also be used as verbal suffixes. Under one possible analysis, such constructions could be considered to be verb-verb compounds. We refer to this closed class of verbs as "verb-affix hybrids".[3] Examples showing both free and compounded uses of *maachi* 'appear' are presented in (17), and a pair illustrating free and bound uses of *siime* 'go' are presented in (18):

(17) a. *Hai=sa* ***maachi*** *huu'u 'em sa'awa*
how=WH appear that your sore
'How does your sore seem?' Or 'how is your sore?'
(Dedrick & Casad 1999, p. 67 [39])

3. These behave identically to verbal affixes (suffixes) with respect to binding and the assignment of case in subordinate clauses (see Tubino et al. 2009 for discussion).

b. *Kaita-e* *mo'iti-**machi***
nothing-INST plow-appear
'There is nothing with which to plow'
(Dedrick & Casad 1999, p. 67 [40])

(18) a. *Yoko=ne* *potam-meu* ***sim**-ne*
tomorrow=I Potam-TO go-FUT
'I'm going to Potam tomorrow.' (Dedrick & Casad 1999, p. 293 [1])

b. *Inepo* *ili* *hu'unee-**sime***
I little know-go
'I'm beginning to understand a little bit.'
(Dedrick & Casad 1999, p. 294 [7])

These V–V compounds exhibit properties similar to those illustrated above for N–V compounds with respect to the use of bound stem forms for the left-hand member, word-internal phonological alterations, and absence of internal inflectional material; they show no evidence of being derived by a distinct word-formation process from the NI cases.

Reduplication with such verb-affix hybrids functions in the same way as with the NI compounds: it appears word-internally, reduplicating the rightmost member of the V–V compound. We illustrate the word-internal, head-reduplication pattern with our example hybrid verbs *maachi* 'seem, appear' and *siime* 'go' in (19) below; Escalante (1990, p. 78) also emphasizes similar cases:

(19) a. *Vempo* *si* *kuhti-**ma**-machi*
3PL EMPH angry-RED-seem
'They really seem like hateful people'.

b. *Hita=sa* *empo* *hoo-**si**-sime*
what=WH you do-RED-go
'What are you going around doing?'

Unlike the case for reduplication with NI, however, reduplication in these V–V compounds can target *either* member of the compound, so long as the semantics of reduplication can be applied to either member. An example of reduplication applying to the first verbal element of a verb-affix compound is given in (20), and an example with *both* members reduplicating is given in (21).

(20) *Vempo* *si* **kuh**-*kuhti-machi*
3PL EMPH RED-angry-seem
'They seem like really hateful people.'

(21) ***Vempo*** ***si*** ***kuh*-kuhti-*ma*-machi**
3PL EMPH RED-angry-RED-seem
'They really seem like really hateful people.'

3.2 Reduplication and verbal affixes

We see the same word-internal, head-reduplication pattern on certain affixes, where reduplication occurs between a verb stem and a derivational suffix. In these cases, it is the suffix which receives the reduplication, despite the suffix being a bound element which otherwise does not occur as an independent verb in the language. Some examples are presented in (22):

(22) a. **Directive (-*sae*)** (Escalante 1990, p. 78 [41])
inepo a=nok-sae → *inepo a=nok-**sas**-sae*
1SG 3S=talk-DIR 1SG talk-RED-DIR
'I am telling him to speak up' 'I tell him to speak up'

b. **Desiderative (-*'ii'aa*)** (Escalante 1990, p. 78 [42])
inepo a=nok-'ii'aa → *inepo a=nok-'**ii**-'ii'aa*
1SG 3S=talk-DESID 1SG 3SG=talk-RED-DESID
'I want him to talk' 'I would like him to talk (more)'

c. **Inceptive (-*taite*)** (Escalante 1990, p. 79 [43])
aapo nok-taite → *aapo nok-**tai**-taite*
3SG talk-INCEP 3SG talk-**RED**-INCEP
'She is starting to talk' 'S/he repeatedly starts to talk (hesitates)'

d. **Prospective (-*vae*)** (Escalante 1990 p. 79 [44])
aapo nok-vae → *aapo nok-**vav**-vae*
3SG talk-PROSP 3SG talk-**RED**-PROSP
'He feels like talking' 'From time to time he gets the urge to talk'
'S/he gets the desire to talk a lot'

These verbal affixes are always bound, and cannot appear as independent verbs at all, at least in the synchronic grammar. That such affixes may not occur independently as the main verb in a sentence is illustrated for a subset of them in (23) below:

(23) a. **Inepo apo'ik ii'aa*
1.SG 3.SG.ACC want.
Intended reading: 'I want it.'

b. **Aapo taite-k.*
3.SG begin-PERF
Intended reading: 'S/he began.'

c. **Aapo a=vae.*
3.SG 3.SG =PROSP
'Intended reading: 'He'll do it/He feels like doing it.'

When reduplication applies to such suffixes, as above, it takes scope over the whole complex verb form. In (24a), for example, the meaning is one of habitual wanting-him-to-talk, not one about habitual talking. If the speaker wishes to indicate habitual

semantics for just the leftmost member of the compound, reduplication applies to that leftmost member and takes scope only over the lower verb; in (24b), the speaker wants him to habitually talk, but doesn't habitually want anything. If the situation warrants it, habitual semantics and reduplication can apply to both the stem and the suffix of the complex verb form (24c):

(24) a. *Inepo aa=nok-**ii**-'ii'aa ne vetchi'ivo*
I him=speak-RED-want me for
'I always want him to speak for me.'

b. *Inepo aa=no-nok-ii'aa*
I him=RED-speak-want
'I want him to be the speaker/the one who habitually speaks.'
[e.g. at a council meeting]

c. *Inepo aa=no-nok-**ii**-'ii'aa*
I him=RED-speak-RED-want
'I always want him to be the speaker.'

It is worth noting, however, that not all derivational verbal affixes can reduplicate. There are some affixes that only allow reduplication to apply to the verbal stem. These include the applicative *-ria* (25a), the causative *-tua* (25b), and a morpheme (*-te*) that derives verbs of creation from nominal stems (25c):

(25) a. **Applicative (*-ria*)**
***lu**-luuta-ria* **luuta-**ri**-ria*
RED-finish-APPL
'(habitually) use up on someone'

b. **Causative (*-tua*)**
*ma**h**hai-tua* **mahai-**tu**-tua*
"RED"(μ-INFIX)-afraid-CAUS
'really scare someone'

c. MAKE (***-te***)
***hi**-hipe-te* **hipe-**te**-te*
RED-mat-MAKE
'(habitually) make mats'

We return to these in Section 5.2 below in which we discuss available theoretical treatments.

In sum, many complex verbs in Hiaki can exhibit word-internal reduplication, as with the N–V compounds illustrated above. However, unlike the complex verbs created by noun incorporation, reduplication of verb stems with certain verbal suffixes allow three possibilities for reduplication, with the reduplication taking scope over the morphological target: i.e. the verb stem, the suffix, or both.

3.3 Word-internal reduplication in pseudo-compounds

There are also a variety of forms which display the pattern of internal reduplication, but which do not involve otherwise free nominal or verbal stems. In fact, the synchronic internal make-up of these forms is not known to us, since we only find the morphological elements in these "pseudo-compound" contexts. In other words, these constructions are composed of *cran*-morphs. A list of such pseudo-compounds is given in (26), along with the reduplicated form, and in some cases, a possible etymological connection:[4]

(26)	**Verb**	**Meaning**	**Reduplicated Form**	**Possible etymology**	
a.	bwah-suma	'braid'	bwah-**su**-suma	<*suma*	'tie'?
b.	bwal-wotte	'feel weak'	bwal-**wot**-wotte	<*bwala*	'sheep'?
c.	bwal-wotta	'make to feel weak'	bwal-**wot**-wotta	<*bwala*	'sheep'?
d.	chiki-pona	'tickling someone'	chiki-**po**-pona	<*poon a*	'strike, knock'
e.	le-siki-le	'itching, tickles'	ele-**si**-sikile	<*siki*	'red'?
f.	ha'a-chih-te	'sneezing'	ha'a-**chih**-chihte	<*chitei*	'mash'?
g.	haawahsa'a-te	'steaming'	haa-**wa**-wahsa'ate	<*haawa*	'steam'
h.	hun-hiawa	'make fun of, tease'	hun-**hi**-hiawa		
i.	hu'u-nakte	'created deliberately'	hu'u-**na**-nakte		
j.	iva'a-chaka	'embrace, hugging'	iva'a-**cha**-cha'e	<*iva'a*	'hug'?
k.	iva'a-nama	'cradling, embracing'	iva'a-**na**-nama	<*iva'a*	'hug'?
l.	kuhtiachi	'Hateful, mean, awful person or animal'	kuh-**ti**-tiachi		

4. While the majority of these forms may only reduplicate on the rightmost member, with left-edge reduplication ruled flatly ungrammatical, our consultant felt that a couple of these forms could also accept reduplication at the edge when prompted, e.g. (26h). However, there was no semantic differentiation between the two reduplicated forms (as expected given their semantic opacity) and the most natural, spontaneously produced form was always the internal reduplication of the rightmost member. One possibility is that those which accept leftmost edge reduplication have a V–V compound as their historical source (rather than an N–V compound), although etymological information is not available which would allow us to confirm this hypothesis.

m.	kutsaite	'dusk, early evening'	kut-**sai**-saite	<*kut-*	'dark'?
n.	machu'unama	'hold in hands, grasp'	machu'u-**na**-nama		
o.	maukaroa	'rise in the early dawn or before dawn'	mau-**ka**-karoa		
p.	naamuke	'drunk, dizzy'	naa-**mu**-muke	<*naamu*	'cloud'?
q.	tekipanoa	'work'	teki-**pa**-panoa	<*tekil-*	'job'?

Reduplication in these pseudo-compounds appears to target an internal head, but our native speaker consultants, queried about the possible sources of these expressions, indicated that they were fixed forms with no internal analysis. When further asked about the potential partial etymologies noted above (which we proposed based on phonological relatedness and semantic plausibility) they explicitly denied the relatedness of the forms.

It is important to note that while most of the words in (26) are composed of three or four syllables, this kind of internal reduplication is not required for all words above two syllables; i.e. this internal reduplication is not strictly phonological. Verbs ending in the derivational suffixes illustrated in (25) above frequently reach lengths of 4–5 syllables but nonetheless reduplicate on the left edge; some other trisyllabic forms with initial reduplication are illustrated in (27):

(27) a. *Itepo aman si* ***hu****-hu'uwaasu*
3.PL there very RED-freeze
'Over there we really freeze!'

b. *A'apo siime taewata* ***hi****-hiwihte*
3.SG always day RED-saw
'S/he saws (wood) all day long.'

c. *Uu uusi muni-m* ***chive****-chivehta*
The child bean-PL RED-spread.out
'The child is spreading out the beans.'

As shown in (27), the initial reduplicant can vary between one syllable and two syllables, which for the most part is a stem-specific lexical choice.

With the above considerations in mind, we conclude that the internal reduplication in the examples in (26) indicates some kind of complex morphological structure, where the reduplication process apparently targets the head of an opaque compound. As in the NI cases from the beginning of Section 3, the edge of the phonological word/derived stem is not itself the domain for the attachment of the reduplicative morpheme.

3.4 Interim conclusion: Head-marking

Above we have seen the interaction between reduplication and a variety of compounding and derivational processes creating complex verb forms in Hiaki. In each case, we have seen that reduplication targets the rightmost member of the complex verb. We propose that this internal inflection is a type of head-marking, in which the reduplicative affix applies to the head of a complex morphological form, even within a single phonological word. We now turn to consider the theoretical implications of this phenomenon, as well as discussions of similar data in other languages.

4. Implications for standard theoretical architectures

The empirical evidence surveyed above represents a case in which lexical integrity appears to be violated. The Hiaki compound and derived forms we have surveyed are indubitably single phonological words, exhibiting many characteristics which both language-internally and cross-linguistically are canonical hallmarks of wordhood.[5] Nonetheless, a regular inflectional process appears to target a subconstituent within these derived forms – a process which would normally target the left edge of a verb, but which in this case targets the left edge of the rightmost element in a derived verb. This results in an inflectional affix which intervenes between the components of the derived form.

This situation is not unique to Hiaki, of course. Similar facts are observed for inflectional reduplication in four languages that we know of. In two other Uto-Aztecan languages, Hopi and Classical Nahuatl, examples analogous to the Hiaki cases are attested, as illustrated in (28). Example (28a) shows reduplication inside a nominalized N–V compound from Classical Nahuatl; (28b) shows reduplication on the head of a V–V compound from Hopi:

(28) a. *ix**mj**mjqujnj*
*Ø-ix-**mi**-miqui-ni*
3.SG.SUBJ-eye-RED-die-AG.NOM
'It is one which is blinded (by strong light)' (*lit.* 'It is one whose eyes die'), (re: the gopher/*toçan*)
(Classical Nahuatl, *Florentine Codex*, Book 11, p. 16)

5. There is a large literature on the issue of "wordhood". With respect to the notion 'phonological word', see the review in Hall 1999. For relevant discussion about the relationship of the phonological word to the lexeme and/or syntactic terminal 'word', see among many others such works as Haspelmath 2011; Aronoff 1976; Lieber 1980; Williams 1981; Selkirk 1981; Farmer 1980; Lapointe 1980, 1981; Newmeyer 1986; DiSciullo & Williams 1987; Carstairs-McCarthy 1992; and Marantz 1997.

b. *lavay-**ho**-honaq-lawu*
talk-RED-be.erratic-CONT
'He was just jabbering' (Hopi, Hopi Dictionary 1998, p. 202)

Both of these language also allow internal reduplication of certain suffixal heads of complex forms:

(29) a. *Auh in jtlaqual mjchtepi**tzi**tzin mjch**co**cone*
auh in i-tlaqual mich-tepi-**tzi**-tzin mich-**co**-cone
and DET its-food fish-offspring-RED-REV fish-RED- child
'(and) its food is small fish, baby fish' (re: the *tlacamichin*, a type of fish)
(Classical Nahuatl, *Florentine Codex*, Book, 11 p. 58)

b. *ööqa-**to**-to-yna*
bone-RED-CAUS-CAUS
'She fastens a new stem [in a basket]'
(Hopi, Hopi Dictionary 1998, p. 362)

Outside Uto-Aztecan, similar instances of reduplication appearing inside derived forms are analyzed for Sanskrit by Stump (2001); similar cases are discussed from Bahasa Indonesia by Sato (2010). A Sanskrit example is presented in (30):

(30) *pary-a-**da**-dhat* < pari-dha- 'put around'
around-PRET.AUG-RED-put
'S/he was putting (it) around (something)'
(Stump 2001, p. 110; our translation)

These internal reduplication cases are a sub-case of the larger phenomenon of internal inflectional head-marking of derivationally complex forms, which, although uncommon, are far from unattested cross-linguistically; see the extensive documentation in Stump (2001, pp. 96–137), as well as related discussion by Harris (2000, 2002), Sato (2010), and others. Here, we will specifically consider the theoretical implications of the Hiaki data described above, but many of the issues raised will of course be relevant to the analysis of head-marking generally; we do not, however, propose to consider the whole range of head-marking facts here.

First we explore the possibilities within established standard frameworks, both Lexicalist and syntacticocentric, and conclude that neither family of approaches can implement head-marking without supplementation by additional mechanisms.[6] We

6. We will mainly discuss theories for which we can find specific proposals dealing with the relationship of inflection, derivation and compounding in the architecture. Lieber and Scalise (2006) propose a revised Lexicalist architecture to allow the morphology limited access to the output of phrasal syntax, but we are unclear on whether their architecture implements any strict restrictions on the interaction of derivational and inflectional processes, so we do not

then go on to consider what such supplementation might consist of for each approach, reviewing the proposal of Stump (2001) within a word-based approach, and exploiting the mechanisms available in Distributed Morphology to propose an account within a syntacticocentric framework.

We will assume below, without argument at this point, that reduplication involves the affixation of a morpheme ("RED") that triggers some kind of copying process on a stem. In this we follow many others working within a variety of different theoretical frameworks: e.g. Moravcsik (1978); Marantz (1982); McCarthy and Prince (1986, 1993, 1995); etc. Other views are possible, e.g. reduplication occurring as a phonological rule (e.g. Aronoff 1976; Raimy 2000; Frampton 2009). For a defense of the piece-based view of reduplication over process-based views, see Haugen (2008), among others. We think that our ultimate conclusions do not ride on this particular assumption; see our further discussion in Section 6 below for what is ultimately at stake, and how theories such as those proposed by Raimy (2000) and Frampton (2009) could be compatible with the analyses that we present in the sections to follow.

4.1 Weak Lexicalist architectures

In Lexicalist theories (e.g. Sapir 1911; Mithun 1984, 1986; DiSciullo & Williams 1987; Rosen 1989; Mithun & Corbett 1999), NI is the morphological ("lexical" or pre-syntactic) process of compounding a nominal root onto a verbal stem. Under such a view, this morphological process creates a noun-verb compound that names some culturally-significant concept and which is stored as its own listeme in the lexicon (see e.g. Mithun & Corbett 1999, p. 68).

Given a division of labor between morphology and syntax like that of Aronoff (1976) or Anderson (1982), where derivation is lexical and inflection is syntactic (the "Weak Lexicalist Hypothesis"), the conception of NI as a pre-syntactic lexical process makes a strong prediction about how NI should interact with an inflectional process of reduplication: this inflectional process, like others, should not be able to operate inside this compound. The Weak Lexicalist Hypothesis derives peripherality of inflectional affixes as a natural consequence, and thus predicts that inflectional reduplication will apply to the edge of a compound. Under the Weak Lexicalist Hypothesis, reduplication of NI structures should only operate on the edges of a compound stem (i.e. on the left-edge for prefixes, or on the right-edge for suffixes), rather than targeting some sub-constituent of the N–V compound (e.g. the noun or the verb only). This theory thus incorrectly predicts that Hiaki NI will yield ****ma**-maso-peute* '*RED-deer-butcher' rather than the actual attested form, *maso-**peu**-peute* 'deer-RED-butcher'.

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discuss it here. Insofar as Lieber and Scalise's approach is strongly Lexicalist, as is DiSciullo and Williams (1987), the remarks about the latter may be relevant to the former as well.

One language that potentially illustrates this expected interaction of reduplication with NI is Paiwan, an Austronesian language spoken in Taiwan. Chang and Wu (2006) argue that Paiwan has two types of NI, lexical and syntactic, which are identified by two independent diagnostics. Incorporated nominals undergoing lexical NI do not have case-markers, and such noun-verb compounds *can* undergo reduplication (31). In syntactic NI, on the other hand, case-markers are incorporated with the incorporated nominal, and the noun-verb compound *cannot* undergo reduplication (32).[7] Both of these diagnostics make the first type look like a lexical process: case-inflection cannot occur inside the N–V compound, cf. (31b), and the process of reduplication appears to target the edge of the compound, cf. (31b) and (33):

(31) a. *s⟨em⟩a-'uma=aken*
go.to-⟨AF⟩-home=1.SG.NOM
'I went home'

b. *s⟨em⟩a-'uma-**'uma**=aken*
go.to⟨AF⟩-home-RED=1.SG.NOM
'I am going home'

(32) a. *s⟨em⟩a-tjaj-palang=aken*
go.to⟨AF⟩-OBL-Palang=1.SG.NOM
'I went to Palang's place'

b. **s⟨em⟩a-tjaj-palang-*palang =aken*
go.to⟨AF⟩-OBL-Palang-*RED=1.SG.NOM
'I am going to Palang's place'

(33) *s⟨em⟩a-pana-**pana**=aken*
go.to⟨AF⟩-river-RED=1.SG.NOM
'I am going to the riverbank'

An important observation about the data provided by Chung and Wu (2006) is that the reduplicant seems to always be co-extensive with the nominal root, which in turn seems to always be disyllabic. Chung and Wu do not present cases of monosyllabic nominal roots, with which we might expect to see the reduplication of the monosyllabic nominal and the last syllable of the verb (assuming that the progressive reduplicant in Paiwan is consistently a disyllabic foot). For example, with a hypothetical nominal stem *ba* in the present progressive motion constructions above, we would expect a reduplicated form something along the lines of (34), where underlining indicates the hypothetical nominal stem, and where brackets indicate the portion of the compound verbal stem that is copied by the reduplicant (in bold):

7. An unusual trait of NI in Paiwan is that it only occurs with spatial verbs (e.g. verbs of motion or location). Reduplication that occurs with such verbs indicates progressive aspect, and appears as a suffix.

(34) **Hypothetical Paiwan Monosyllabic Nominal Reduplication**
s⟨e[m⟩a-**ba**]-**ma<u>ba</u>**=aken
'I am going to ⟨whatever is denoted by √BA⟩)

Forms like the hypothetical example in (34) would provide strong evidence in favor of the view that the N–V compound behaves as a unified stem that gets inflected after syntax, therefore supporting the idea that it was created prior to syntax, in the lexicon. In the absence of such data, however, the possibility that reduplication in Paiwan is only targeting the nominal root cannot yet be ruled out (though its progressive meaning implies that it must at least semantically apply to an eventive verbal concept, not a stative nominal one).[8] In any case, the interaction of reduplication with NI in Paiwan looks like a reasonable candidate for a Weak Lexicalist analysis.

On the other hand, the interaction of reduplication and NI in Hiaki, as noted above, is a problem for a theory which predicts edge-marking as a consequence of its architecture. In order for this critique to have teeth, it is particularly important to establish that the Hiaki derived forms which exhibit head-marking do count as 'lexical' in the relevant sense. We therefore pause here to comment on two established criteria for distinguishing lexical processes from syntactic ones: (non-)productivity (4.1.1) and non-compositionality (4.1.2).

4.1.1 *Productivity*

Smirniotopoulos and Joseph (1998) "take the *absence* of (a high degree of) productivity as a clear indicator of a lexical rule" (p. 452, emphasis in original). On these grounds, Hiaki NI should clearly be considered to be a lexical process, since N–V compounding in that language is relatively restricted (as noted by, e.g. Jelinek, p.c.), being not nearly as productive as in some other Uto-Aztecan languages, e.g. Nahuatl (Merlan 1976) or Hopi (K. Hill 2003).

In contrast, the reduplication patterns that we see in Hiaki compound verbs conform to the otherwise regular and productive morpho-phonological patterns of prefixal reduplication in the language, in terms of both form and function. In terms of function, reduplication in Hiaki (in compound verbs and otherwise) typically has a habitual aspectual meaning, which is usually characterized as verbal inflection, cross-linguistically as well as in Hiaki itself. Like other inflectional processes, reduplication

8. Of course, just because the stem to which the RED affix attaches morphosyntactically is verbal, it need not be the case that the entire stem with its internal morphological complexity is therefore defined as the Base for the morphophonological process of reduplication which the RED affix triggers. We can distinguish between the "Target", i.e. the stem to which the RED affix attaches, and the "Base", i.e. that potential sub-set portion of the stem which is delimited as the morphophonological sub-domain marked as available for copying (for further discussion, see Haugen 2008).

is fully productive, and it can be applied to any verb that is compatible with the resulting meaning. In terms of form, reduplication in Hiaki usually involves syllabic reduplication (Haugen 2003, 2008; Harley & Leyva 2009), e.g. *kupi-**tom**-tom.te* (15f) vs. *lioh-**bwa**-bwa.ni.a* (15g).[9] In addition, we also see distinct patterns of reduplicative allomorphy, e.g. morphological gemination (cf. 17). This kind of allomorphy is also attested with other verb forms, and it appears to be the case that which reduplicative morpheme (or *dupleme* in the terminology of Spaelti 1997) goes with which verb stem is unpredictable and often must be lexically listed (Haugen 2003, 2008; Harley & Leyva 2009); this is similar to other irregular inflectional processes cross-linguistically.

By the productivity criterion, then, Hiaki NI, which is not productive, is clearly lexical, and reduplication, which is productive, is clearly inflectional.

4.1.2 *Compositionality*

Similarly, Smirniotopoulos and Joseph (1998) write, "The output of a syntactic rule should show compositional semantics, so that the meaning of the whole is composed from the meaning of its parts. By contrast, the output of a lexical rule can be noncompositional in its semantics and thus can show meanings that differ in ways that are unpredictable in relation to the meanings of the individual parts composing it" (p. 452). On this criterion, too, these Hiaki compound forms which exhibit head-marking, are clearly noncompositional; as we have shown above, many of them have idiomatic meanings – see, for example, (15d), (15e), and (15f) above – and some are even composed entirely of cran-morphs, whose sub-parts do not contribute any detectable independent meaning to the meaning of the whole, as illustrated in (26) above.[10] This point is also made by Dedrick and Casad (1999, p. 161) in their discussion of lexicalization and non-predicability of meaning in N–V compounds.

In contrast, the semantic contribution of reduplication to these compound forms is entirely consistent with the contribution of reduplication to verb forms elsewhere in the language. As emphasized in Section 2.1, the pluractional semantics of reduplication on verbs is identical in compound and non-compound forms, with three primary interpretations, the most common being that of habitual aspect. There is no significant idiomaticity involved in interpreting productively reduplicated verbs in the language.

Hiaki noun incorporation, then, is clearly lexical by the compositionality criterion as well, while reduplication is just as clearly inflectional.

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9. Just as is also the case with other instances of verbal reduplication in Hiaki, we never see copy into the second syllable to create a coda for syllabic reduplication; e.g. *li.oh.-<u>bwan</u>-bwa.nia.

10. Anticipating some discussion below, we would like to point out here that much recent work within Distributed Morphology (DM) does not take the notion of (non)compositionality (nor that of (non)productivity) to be indicative of syntactic vs. lexical processes (see e.g. Marantz 1997).

4.1.3 *Interim conclusion for weakly lexicalist frameworks*

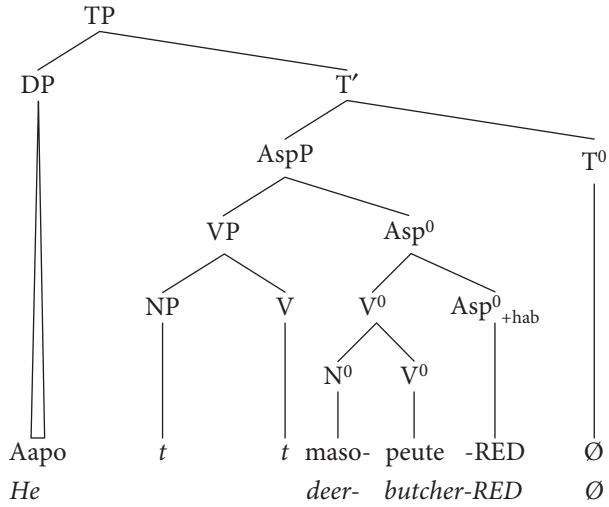
In sum, theories involving a strict division between lexical derivational processes and syntactic inflectional processes would strongly predict edge-marking behavior, in contrast to the facts described above. We conclude that without supplemental mechanisms such frameworks are not equipped to account for the interaction of reduplication and noun incorporation in Hiaki.

4.2 Syntacticocentric architectures: Baker (1988) on noun incorporation

We now turn to consider the predictions concerning the interaction of incorporation and reduplication made in a basic syntactic analysis of incorporation, like that initially proposed by Baker (1988). Baker argued that noun incorporation was simply syntactic head-movement, by which the internal object nominal head-adjoins to the verb that is its sister, and is then carried with the verb through the syntactic tree in any further head-movements in which the verb may participate. In such an approach, head-movement is assumed to create a syntactically complex head which corresponds to a single phonological word at Spell-Out. What would such a theory predict concerning the interaction of reduplication and noun incorporation?

If the incorporated element, when nominal, originates in the object position (i.e. sister to the verb, as proposed by Baker), it will be closer to the verb, structurally, than any higher functional morpheme, such as we assume RED to be, since it is an aspectual morpheme denoting a plurality of eventualities. Thus, RED likely heads an Aspect projection in the inflectional complex. If the usual incorporation via head-to-head movement is the only mechanism assumed (al a Baker 1988), it will be impossible to situate RED linearly *within* the N–V compound which adjoins to it. The problem for a entirely syntactic analysis using only head-to-head movement is illustrated in (35) below, using our original example of reduplication with NI in (13) above:

(35) a.



Here, the habitual Asp^0 head, which is spelled out by RED, forms part of the complex verbal head resulting from syntactic head-to-head movement. The sister to Asp^0 is the complex N–V constituent formed by incorporation of the N^0 into the V^0. If RED is morphophonologically specified to be a prefix, and hence is 'flipped' to appear to the left of its sister at linearization (or alternatively simply triggers right-adjunction of the N^0–V^0 complex to Asp^0), it should be prefixed to that complete N–V constituent. On that analysis, barring further assumptions, RED would not be able to intervene between the verb and its incorporated object under the head-movement analysis. That is, just as is the case in the weakly lexicalist account, the basic syntacticocentric approach predicts edge-marking inflection for Hiaki inflectional reduplication. This is clearly inconsistent with the facts shown above, and we conclude again that such a framework, absent supplemental mechanisms, is also unable to account for the interaction of noun incorporation and reduplication in Hiaki.

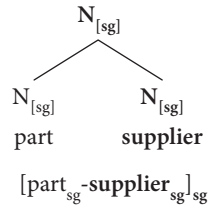
4.3 Strong lexicalist architectures: DiSciullo and Williams (1987)

Interestingly, the strongly Lexicalist framework articulated by DiSciullo and Williams (1987) provides the tools to accommodate head-marking phenomena within compounding more easily than the frameworks described above. In contrast to the Weak Lexicalist architecture described in Section 4.1, in the strong lexicalist architecture all word-formation operations, both inflectional and derivational, are contained within a single module of the grammar. This allows the framework to more easily accommodate apparent interleaving of these processes; indeed, the apparent inflection/derivation distinction is argued to be epiphenomenal within the framework.

DiSciullo and Williams (1987, p. 25) write, "The real generalization about inflectional affixes is that they must appear in head position, not that they must appear 'outside' all other word formation – the latter is partly a consequence of the former, although there are cases in which the former holds but the latter does not." The Hiaki data would appear to be one such case. Let us consider how it might be treated in this framework.

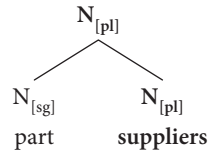
In the Strong Lexicalist architecture proposed by DiSciullo and Williams (1987), compounding involves the creation of a morphological unit that derives its features from the percolation of the features of the head. For example, consider the underlying structures for the meaning contrast inherent to the English compounds *part-supplier* vs. *parts-supplier* (36a–b), on the one hand, and *parts-supplier* vs. *parts-suppliers* (36c–d), on the other (following Di Sciullo & Williams 1987: 24–5):

(36) a.

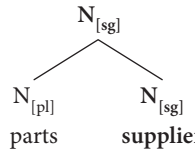


[part$_{sg}$-**supplier**$_{sg}$]$_{sg}$ vs. [part$_{sg}$-**suppliers**$_{pl}$]$_{pl}$

b.

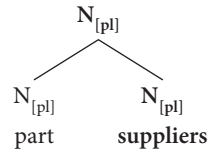


c.



[parts$_{pl}$-**supplier**$_{sg}$]$_{sg}$ vs. [part$_{pl}$-**suppliers**$_{pl}$]$_{pl}$

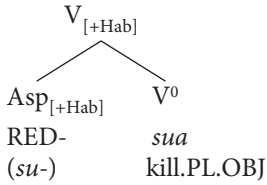
d.



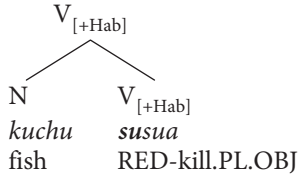
Fully inflected nominals, already bearing number features, are the input to the compounding process; this is possible because of the non-segregated nature of the lexical module in this architecture. Verbal inflection will agree with the number of the entire compound, based on the number inherited from the head of the compound. In no case should a verb be able to "see into" the compound to note that there is a second nominal with a potentially conflicting number specification; however, such inflection-within-derivation is perfectly legitimate in the framework. For the purposes of the syntax, the feature specifications for the non-head of the compound are completely irrelevant.

We can see how such an analysis could approach the case of reduplication in N–V compounding in Hiaki. The rightmost component of the compound, the verb, would enter the compound already inflected for habitual aspect, i.e. reduplicated; the non-head would then compound with the inflected verbal head to produce the head-marked compound V^0. The aspectual features of the head would then determine the aspectual properties of the whole by percolation, appropriately.

(37) a. **Step 1: Inflection for habitual aspect:**



b. **Step 2: N–V compounding:**



Despite the ability of the framework to generate the relevant form, however, we see at least two significant problems with the approach. First, the framework does nothing to prevent the non-head element in a compound from exhibiting inflectional affixation,

thereby permitting the generation of examples like *parts-supplier* or *parks commissioner*.[11] Such affixation cannot affect the featural properties of the whole compounded word, of course, since it is on the non-head element, but no mechanism for outlawing such affixation is provided or, presumably, desired. This leaves us without an account for the strictly uninflected character of the left-hand member of the Hiaki N–V compounds: incorporated forms like **kuchu-m-sua* 'fish-PL.OBJ-kill' are always ungrammatical.

The second question that the Hiaki data raise for the DiSciullo and Williams approach has to do with the fact that reduplication is prefixal in Hiaki, and yet it behaves as a head, contributing its features to the complex form in which it is contained. This contravenes the Right-Hand Head Rule of both Williams (1981) and DiSciullo and Williams (1987, p. 26 & 81). We take the Right-Hand Head hypothesis to be counter-exemplified by the Hiaki data as well as numerous other cases from languages around the world, but we will not consider the implications of this further here.

4.3.1 *Interim conclusion for standard architectures*

In this section we have argued that two standard theoretical architectures, the Weak Lexicalist approach and the syntactic approach of Baker (1988), are unable to appropriately place Hiaki aspectual reduplication inside of the word formed by NI and other compounding processes. These architectures would need some kind of supplemental machinery to account for these phenomena. In the next section we will discuss some architectural accommodations that have been proposed which can better model the Hiaki data.

The Strong Lexicalist architecture designed by DiSciullo and Williams (1987), on the other hand, is able to account for these data since it does not posit a strict separation of derivational and inflectional processes. However, the Hiaki data raise other problematic issues for the Strong Lexicalist Hypothesis: namely, that inflection is strictly forbidden on the non-head member of compounds in Hiaki, and that reduplication can form a Left-Hand head. Neither of these facts seem to accord with the predictions made by the Strong Lexicalist theory proposed by DiSciullo and Williams.

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11. DiSciullo and Williams (1987) do not, apparently, regard examples such as **choirs-boy* or **rats-eater* to be ungrammatical, as their framework allows the free generation of such forms. However, a significant literature on when and why inflectional marking is (im)possible within English compounds, beginning with the level-ordering work of Kiparsky (1982), has been concerned with exactly how to rule out such cases, which seem flatly ungrammatical to most English speakers. It is perhaps worth noting that the Kiparsky level-ordering framework faces the same architectural issues as the Weak Lexicalist frameworks do with respect to the Hiaki data, since it posits a strict ordering between earlier level processes (such as compounding) and later inflectional processes (such as Hiaki aspectual reduplication).

5. Architectural accommodations

Both weakly-lexicalist word-based models and syntax-only models, then, face problems in coping with head-marking reduplication inside N–V and V–V compounds in Hiaki. Below, we review a proposal within the word-based Paradigm-Function Morphology (PFM) framework by Stump (2001) to accommodate similar cases in Sanskrit (§5.1); he introduces a distinction between Root-Root compounding and Word-Word compounding, which enables him to account for both edge-marking and head-marking inflectional behaviors. We then turn to consider what type of supplementation is needed in a syntax-based model to account for the Hiaki data above (§5.2), proposing that the operation of Local Dislocation (Embick & Noyer's (2007) updated implementation of Marantz's 1984 Morphological Merger) can provide the necessary tools to capture the patterns observed.

5.1 Word-based approaches: Stump (2001) and PFM

The most developed word-based approach to inflectional morphology is the general family of Word and Paradigm (WP) models. Several alternative versions of such models have been proposed, including prominent proposals by Mathews (1972) and Anderson (1992). We will consider here the more recent implementation developed by Stump (2001), Paradigm Function Morphology (PFM), which has an advantage over previous WP theories in that it provides a more satisfactory account for the morphological inflection of heads than earlier theories.

In PFM, word-forms are derived through the application of rules in a paradigm function to a lexeme, which generates inflected forms for the lexeme corresponding to each cell in a language's paradigm space. Stump introduces a three-way distinction between the types of rules which produce derived lexemes. The head-marking behavior (or lack thereof) in the inflected forms of a paradigm function applied to a given derived lexeme depends on the particular type of rule which produced the lexeme in the first place. "Word-to-word" rules derive lexemes which exhibit head-marking; "Root-to-Root" rules derive lexemes which exhibit edge-marking. A third type, "Word-to-Stem" rules, produce lexemes which exhibit double marking (i.e. the inflectional rules apply to both the head and the edge of the derived lexeme).[12]

12. These two patterns suggest a potentially larger typology of inflectional patterns: if edges and heads can each individually be marked, and they can also be marked simultaneously, one might in addition expect to see cases where *either* head, edge, or both could be marked for inflection. Such a case may be illustrated by the Pima reduplication data presented by Munro and Riggle (2004). In Pima nominal compounds marked for plural, reduplication can apparently target any member of the compound or any subset of members of the compound, up to

An example of a Root-to-Root derivative given in Stewart and Stump (2007, p. 407) are the Breton forms in *-ad* '-ful'; when a form like *ti-ad*, 'house-ful', is inflected for plural, the plural rule applies to the edge, giving *ti-ad-où*, 'house-ful-PL', rather than to the head, which would produce **tiez-ad*, 'house.PL-ful'. In contrast, Sanskrit preverb-verb compounding is a Word-to-Word rule. Hence after a preverb such as *vi-* 'away' is compounded with a verb like *gam*, 'go', to produce *vi-gam*, the derivative will exhibit head-marking behavior, so, e.g. the prefixal augment *a-* as well as tense/aspect inflection is attached to the head verb *-gam*, giving *vi-a-gacchat* 's/he goes away'. The intervention of the inflectional augment prefix inside the complex derivative is predicted by the fact that it was produced by a Word-to-Word rule.

With respect to inflectional reduplication, PFM thus predicts the pattern seen in Example (30) above, repeated below for convenience:

(38) *pary-a-**da**-dhat* < pari-dha- 'put around'
around-PRET.AUG-RED-put
'S/he was putting (it) around (something)'
(Stump 2001, p. 110; our translation)

Here, within a preverb-verb compound, prefixal reduplication applies to the verbal head, intervening between the preverb and the verb along with the prefixal augment *a-*. The Hiaki data are equally amenable to this approach. This analysis would entail that the N–V compounds, the V–V compounds, and the V-suffix derived forms which exhibit head-internal reduplication are all produced by Word-to-Word rules; their head-marking behavior with inflectional reduplication would then be expected.

While the PFM approach can indeed account for the basic patterns described above, certain of Stump's claims about the properties of head-marking within his framework may be called into question when additional data from Hiaki are considered. A central plank in the theoretical platform Stump espouses is the Paradigm Uniformity Generalization (PUG), according to which "head marking is an all-or-none phenomenon: If a root ever exhibits head marking in its inflectional paradigm, it always does" (Stump 2001, p. 109).

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and including each member of the compound. A 5-stem nominal compound like that illustrated in (i) below has, in theory, 31 possible plural forms. The form illustrated below shows the case in which all stems receive the inflectional marking:

(i) [*li**l**-mì**mi**da*] *-hoa**h**as-hà**ha**'a*] -[*dá**da**gkuanakud:*]
[glass] -[baskety-jar] -[wiper]
'glass dish cloth' (Pima, Munro & Riggle 2004, [18])

Interestingly, there are no scope effects for plural marking in Pima. Rather, there is free variation: reduplication of any or all of the stems in the compound makes the entire compound plural. We will not discuss this pattern further here except to note that it is not clear to us how the PFM account would extend to these facts.

For example, the inflectional paradigm function for the Sanskrit verb above specifies both inflectional reduplication and inflectional prefixation. Due to the PUG, both of those processes must apply to the verb which is the head of the complex lexeme. The PUG predicts that a form behaves uniformly with respect to all inflectional rules: one rule cannot head-mark while another edge-marks. Stump (2001, p. 133) is helpfully explicit about the type of evidence which would genuinely disconfirm the PUG. Such potential counterevidence is offered under the guise of Pseudo-Sanskrit, in which reduplication targets the verb while the augment *a-* targets the left edge of the complex form. If the PUG is a valid universal generalization about word-formation, and specifically the structure of inflectional paradigms, then this kind of disparate inflectional marking should be impossible. Stump illustrates this hypothetical illicit pattern with the following form:

(39) "*Pseudo-Sanskrit"
**a-pary-da-dhat* < pari-dha- 'put around'
PRET.AUG-around-RED-put
'S/he was putting (it) around (something)'

In fact, however, Hiaki compound verbs containing object clitics provide a case essentially identical to the Pseudo-Sanskrit counterexample above. In Hiaki, object clitics are inflectional elements which must appear prefixed to the main verb of the clause in which they occur, as illustrated in (40a). They may not be separated from the main verb by any nonverbal material (40b), even particles which are important to the entire predicate's meaning and which otherwise must appear adjacent to the main verb themselves (40c) (see discussion in Dedrick & Casad 1999, p. 269).

(40) a. *Vempo aman aa=vicha-k*
3.PL.NOM there 3.SG.OBJ =see-PERF
'They saw him/her over there.'

b. **Vempo aa=aman vicha-k*
3.PL.NOM 3.SG.OBJ =there see-PERF

c. *nat am=totta-ka*
on.top 3.PL.OBJ=pile-PPL
'piling them on top of one another' (Dedrick & Casad 1999, p. 271)

The object clitics, then, are inflectional elements which prefix to their verb, just like reduplication does; when attached to a non-compound verb form, both appear as prefixes to the verb stem, as expected:

(41) *Kat=ee unna kusisi aa=ʻe-ʻeta*
NEG.IMP=2.SG.NOM too loudly 3.SG.OBJ =RED-close
'Don't close it too loudly!'

However, when reduplication and an object clitic are attached simultaneously to a compound verb, they behave exactly like Pseudo-Sanskrit: i.e. the object clitic attaches to the left edge of the complex form while reduplication targets the head. We saw this pattern illustrated above in Example (16), which we repeat for convenience below as (42). The grammatical form in (42a) is equivalent to the Pseudo-Sanskrit example above. (42b) would be expected in a uniformly edge-marking Pseudo-Hiaki which conformed to the PUG; (42c) would be expected in a uniformly head-marking Pseudo-Hiaki, also conforming to the PUG; both are flatly ungrammatical.

(42) a. *Irene am=pan-**ho**-hoo-ria*
Irene 3.PL-bread-RED-make-APPL
'Irene is always making bread for them.'

b. **Irene am=**pa**(**n**)-pan-hoo-ria*
Irene 3.PL- RED-bread-make-APPL

c. **Irene pan-am=**ho**-hoo-ria.*
Irene bread-3.PL=RED-make-APPL

So, while the head-marking mechanism proposed by Stump can accommodate the basic Hiaki cases, assuming that the verb compounds are produced by a Word-to-Word rule,[13] the way the system interacts with paradigm functions would have to be relaxed in order to allow for some inflectional processes to be specified as edge-marking with even Word-to-Word derivatives, while others are specified as head-marking.

We conclude that the PUG cannot be maintained in its current form in the face of examples like (42). This represents a serious challenge to the PFM architecture, which conspires to derive the PUG as a sub-case of the Head Application Principle (HAP), a supposed universal of morphological structure. As Stump himself indicates, one can

13. Stump claims that both the root and the resulting derivative of a Word-to-Word Rule must be either both roots or both nonradical words (Stump 2001, p. 117). Nonradical words are forms extracted from the fully-inflected paradigm of a lexeme. In the case of most Hiaki examples, we assume that within PFM, the root and the derivative would themselves both have to be roots. However, in Example (24c) above, we exhibit a case where the root, as well as the derivative, exhibits reduplication as an inflectional marker of habitual aspect. In Stump's terminology, one can conclude that this case would have to involve two nonradical words; the inflected root form would be drawn from the output of the paradigm function applied to the basic root, which produces nonradical words. However, the leftmost member of this complex form is *not* a nonradical word itself; rather, it is still a bound form: *no-nok-*; the corresponding habitually inflected free form is *no-noka*, 'RED-speak'. This may prove puzzling for the definition of 'Word-to-Word Rule' in PFM.

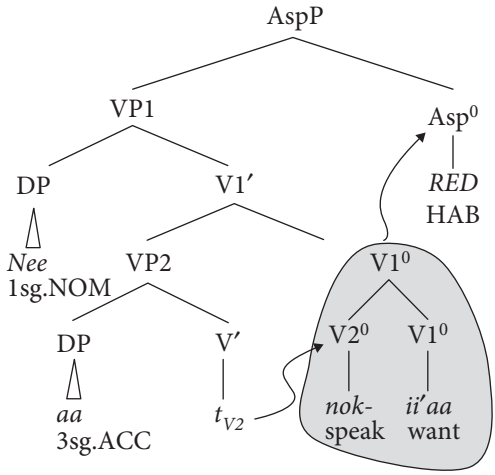
conceive of evidence which genuinely disconfirms the PUG, hence also the HAP. We submit that the Hiaki pattern of object cliticization and reduplication constitute such evidence. We therefore suggest that the PUG cannot be a universally valid generalization about the structure of inflectional paradigms.

We now turn to consider a potential account of this data in a syntacticocentric framework supplemented with certain purely morphological operations, Distributed Morphology (Halle & Marantz 1993 et seq.).

5.2 Syntacticocentric approaches: Distributed Morphology

Above, we sketched the syntactic account of noun incorporation proposed by Baker (1988), and showed that, like the Weak Lexicalist account, it too produces the incorrect prediction that reduplication in Hiaki should be edge-marking, rather than head-marking, since the incorporated N–V form is adjoined as a whole to the Asp^0 head realized by the RED prefix. The RED prefix should then attach to the entire N–V subconstituent, not just to the V. Similar remarks apply to the V–V compound and V-suffix cases in their interaction with reduplication. A Baker-style analysis of a V–V compound like that in (24a) above is illustrated below; the embedded verb raises to adjoin to the matrix verb, and again both verbs move to Asp^0, predicting edge-marking behavior:

(43)



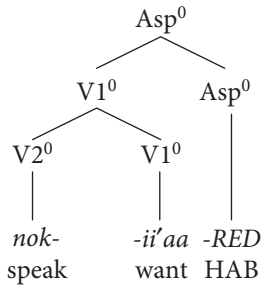
Nee *aa=nok-i'-ii'aa*
1SG.NOM 3SG.ACC=speak-RED-want
'I (habitually) want him to speak.'

We will propose that the interaction of reduplication and verb-compounding in Hiaki is best analyzed, within the Distributed Morphology framework (Halle & Marantz 1993, 1994; Harley & Noyer 1999; Embick & Noyer 2007, a.o.), as an example of the

post-syntactic operation Local Dislocation, of the type discussed in Embick and Noyer (2007).

Following head-to-head movement of the complex verb to Asp^0, the Asp^0 head will have the internal structure illustrated below:

(44)



At Morphology, this structure undergoes Vocabulary Insertion and Linearization. The insertion of the RED morpheme will trigger a morpheme-specific operation of Local Dislocation, in the sense of Embick and Noyer (2007). This operation prefixes the RED morpheme to the first lexical verb to its left. The structural operations within the complex Asp^0 head are represented in bracketed notation in (45) below:

(45)	a.	$[[V^0\ V^0]_{V^0}\ Asp^0]_{Asp^0}$	(Complex Asp^0 head – Output of syntax)
	b.	$[[nok\ [ii'aa\text{-}RED]]_{Asp^0}$	(Insertion of Vocabulary Items, Linearization)
	c.	$[[nok\ [RED\text{-}ii'aa]_{Asp^0}]_{Asp^0}$	(Local dislocation of RED and *ii'aa*)[14]
	d.	$[[nok\ [i'\text{-}ii'aa]]$	(Phonological content of RED computed by copying from the base.)

That is, in order to accommodate the Hiaki facts in a syntacticocentric approach, the syntax must be supplemented by some operations specific to the morphology component; syntax alone does not suffice. Under the version of the Y-model of grammar assumed by DM, (45a) is the output of syntax proper, while (45b) and (45c) occur

14. Within DM, this example illustrates an interesting feature of the relationship between the Headedness Parameter (see, e.g. Baker 2001), which linearizes syntactic terminal nodes, and the prefixal or suffixal status of particular Vocabulary Items (VIs), which we take to be specified by Alignment constraints operating on those specific VIs. Linearization must have applied before Local Dislocation so that the heads undergoing Local Dislocation are linearly adjacent. We conclude that the prefixal or suffixal status of an affix has its effect within a structured, morphological string that is already linearized, but the notions "prefix" or "suffix" do not drive linearization itself. That is, Alignment seems to be separate from Headedness, as we would expect: Hiaki is head-final (a general Linearization constraint), but RED is prefixal.

in the post-syntactic module of Morphological Structure. The operation in (45c), which, in conjunction with (45b), resolves the reduplicant linearization conundrum, is taken to be a PF operation.[15,16]

The same sequence of derivation can apply to derive the examples in (24b) and (24c) above, where reduplication applies to the embedded verb, on the assumption that in those cases, the complement to *-ii'aa* is not a VP, but instead includes an entire AspP with a habitual RED morpheme in its head. That embedded RED morpheme will scope only over the embedded verb, and will undergo local dislocation to the right of the embedded verb in such a case, deriving the patterns with low-scope reduplication on the leftmost element of the complex predicate, or (if there is habitual aspect in both the matrix and the embedded clauses) reduplication on both, interpreted, as indicated above, in both places.

Below we show the same series of operations as it would apply to our initial example of reduplication interacting with Noun Incorporation, in (13) above, based on the Baker-style tree in (35), *maso-peu-peute*, 'deer-RED-butchering':

(46)	a.	$[[N^0\ V^0]_{V^0}\ Asp^0]_{Asp^0}$	(Complex Asp^0 head – Output of syntax)
	b.	$[[\text{maso}\ [\text{peute-RED}]]_{Asp^0}$	(Insertion of Vocabulary Items, Linearization)
	c.	$[[\text{maso}\ [\text{RED-peute}]_{Asp^0}]_{Asp^0}$	(Local dislocation of RED and *peute*)
	d.	$[[\text{maso}\ [\text{peu-peute}]]$	(Phonological content of RED computed by copying from the base.)

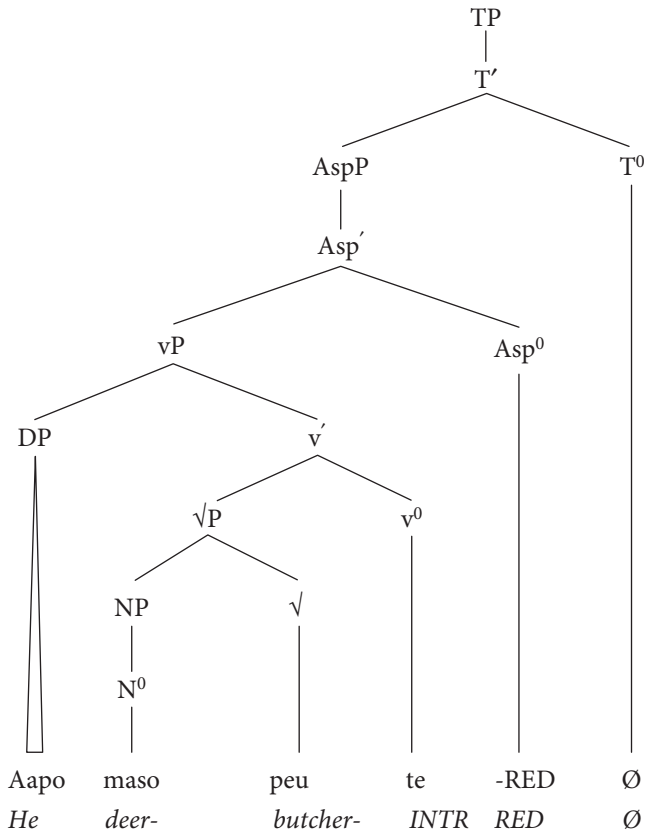
The tree illustrating the syntactic structure of the above example in (35) represents a much earlier view of phrase structure than is commonly assumed in syntacticocentric

15. In fact, different DM proposals distinguish several different operations similar to Local Dislocation, including "Merger Under Adjacency" (Bobaljik 1994), which itself is similar to Mithun's (1984) Compounding by Juxtaposition. The proposal in the text represents just one of several possible DM analyses of these constructions, each with its own set of consequences for the analysis of hyponymous objects, object clitics, etc. We will not consider alternatives here, but the proposal in the text represents the optimal account given the larger empirical picture, according to our best current understanding. See Harley (2010) for a review of some of the range of analytical possibilities made available by the interaction of these operations with syntactic head-movement.

16. In the end, then, our account does not ascribe 'head-marking' reduplication to Hiaki; rather, the reduplicant in Hiaki morphologically selects or aligns itself with the closest available root to its left. As shown by the *mochik* (in (50) below) case, the root need not in fact be verbal in character. The head of the constituent to which the aspectual meaning is attached is actually a v^0, projecting vP, in all of the above, while the √ that ends up bearing the inflection is itself further embedded.

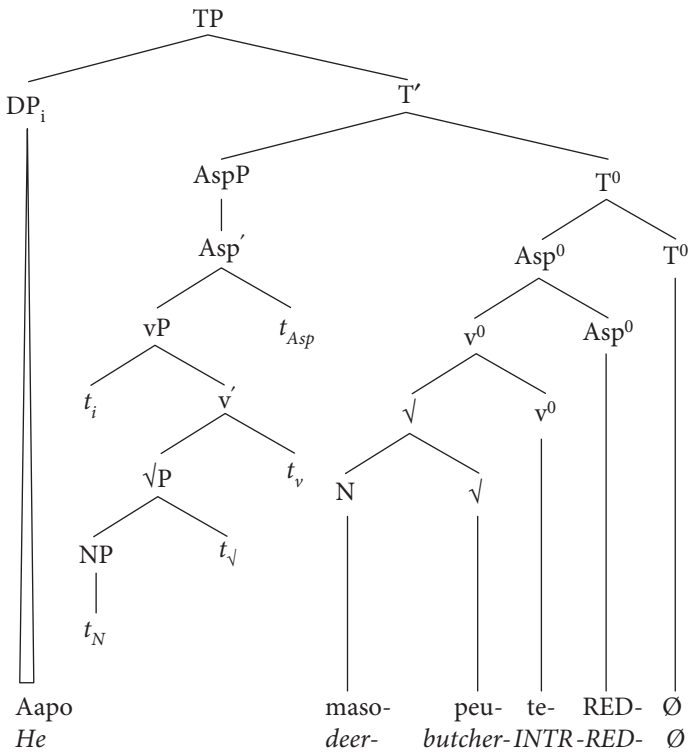
analyses today. Most importantly from our current point of view, the representation of *peute* as heading a simplex V node is inaccurate, given the considerable developments in the theory of argument structure syntax in the decades since Baker's original proposal. Agentive verbs are commonly now understood to consist of a minimum of two projections: a lexical root which selects the internal argument (corresponding to the original 'V'), and an external-argument introducing 'light verb' functional projection, which we will notate here as v^0. Indeed, the verb pair *peu-te/peu-ta* 'butcher-INTR/butcher-TR' contains an overt morpheme which itself is plausibly analyzed as an instantiation of that v^0 node (though see Jelinek 1998 and Tubino Blanco 2010 for more detailed discussion). That is, the actual base-generated structure, without any syntactic head-movement, in this approach, does not look like (35) but rather should minimally include the functional projections below:

(47)



Following movement of the various heads (and the subject for nominative case), the output of the syntax at Spell-Out, prior to Morphology, will have (minimally) the following form:

(48)



Of interest, of course, is the structure under the complex T^0 head, containing the result of head-movement through the verbal extended projection. The reduplicative morpheme, RED, which is inserted to realize the Asp^0 node, is subject to Local Dislocation. However, this dislocation does not apply to RED and its immediate neighbor, which is the light verbal morpheme *-te*. Rather, RED is dislocated leftward until it is prefixed to the first available lexical root morpheme, √*peu-*. In Footnote 14 above, we suggested that Local Dislocation could be conceived of as the application of a Vocabulary-Item-specific Alignment constraint; this would be a perspicuous implementation of what appears to be a straightforward subcategorization requirement of the RED morpheme: specifically, it requires a *lexical root* as its host.

This implementation also predicts that the RED affix will not necessarily be sensitive to the lexical category of the item which hosts it; under standard DM assumptions, it is looking for an acategorial lexical √ to attach to, not a particular syntactic category.[17]

17. Because of the syntactic and semantic requirements of the Asp^0 head which RED is the realization of, this RED morpheme will necessarily appear in predicative contexts in Hiaki; however, under this treatment, the RED vocabulary item itself does not select for verbs, but rather subcategorizes for/aligns with √ morphemes.

This prediction appears to be borne out in another interesting corner of Hiaki grammar: the possession/use construction. In this construction, a nominal root is inflected with verbal morphology, receiving an interpretation of 'possessed N'. An example is given in (49) below:

(49) *Huan mochik-e-k*
Juan turtle-P_{HAVE}-PERF
'Huan has a turtle/turtles.' (*Lit*: 'Huan is turtled'.)

Reduplication in this construction targets the √ of the nominal *mochik* 'turtle':

(50) *Huan mo-mochik-e*
Huan RED-turtle-P_{HAVE}
'Huan usually has turtles.' (Haugen 2004, p. 264)

This supports the notion that the RED affix subcategorizes for √ morphemes: when the closest available √ in the complex head happens to be a nominalized root, rather than a verbalized one, that is the √ with which RED undergoes Local Dislocation/Alignment.[18]

Under the present account, we can conclude that the difference between the verbal affixes which support reduplication such as *-ii'aa* 'want', described above in Section 3.2, and those such as *-tua* 'CAUS' or *-ria*, 'APPL', which do not, is that the former retain their lexical roots, despite being on a grammaticalization path which has restricted them to bound positions and which potentially could ultimately result in their reanalysis as heads of functional categories such as v^0. The latter affixes, which do not support independent reduplication, we presume to head functional projections in the synchronic grammar.[19]

The above analysis represents our current best understanding of the optimal approach to this complex array of facts within a syntacticocentric analysis. Other avenues of analysis obviously remain, but we hope to at least have shown that the interaction of reduplication and head-marking is amenable to treatment given reasonably non-contentious assumptions within such frameworks. The analytical key which the syntacticocentric approach makes available is that the internal structure of the

18. Note that within the DM framework's assumptions, all √s must occur within the scope of a categorizing morpheme. In many cases this morpheme is null, as is the case with the nominalizing head that presumably intervenes between the √ and the 'P_{HAVE}' marker here. In other cases, it is overt, as with the intransitive verbalizer *-te* in Hiaki *siute*, 'tear.intr' or English *-ify* as in *clarify, stupefy.*

19. These affixes most likely originally arose from independent lexical verbs which underwent this same grammaticalization process.

complex word-form remains accessible throughout the derivation, given the single-engine architecture of the framework.

6. Conclusion

It should be clear that important architectural issues ride on the correct theoretical approach to the range of facts described above, and on similar little-studied facts from languages around the world. Many questions and issues, however, remain open. Here we comment on some general and specific implications of and questions raised by the discussion above, and indicate briefly some future directions that the current line of analysis opens up.

We have considered how several distinct grammatical architectures could in principle approach the Hiaki facts. A Strong Lexicalist approach like that of DiSciullo and Williams (1987) seems to offer a set of tools which could allow an account of the interaction of the derivational and inflectional processes we are considering. The relevant feature of the Strong Lexicalist architecture is the lack of differentiation between derivational and inflectional processes, which allow us in principle to interleave the two. Interestingly, a unified approach to inflection and derivation is a feature which Strong Lexicalism shares with single-engine syntacticocentric analyses: i.e. all word-building operations, inflectional and derivational, occur in the same generative subcomponent of the grammar. Thus, architectures which group all types of word-formation operations into a single component do not encounter the problems that we have identified for Weak Lexicalist and word-based architectures.

In the latter frameworks, on the other hand, if derivation is treated as creating word-forms which are input to an inflectional word-formation process, such as a Paradigm Function, head-marking phenomena become difficult to account for. Given certain additional assumptions, such as those concerning the formation of derivatives that Stump (2001) puts forward, such frameworks can accommodate head-marking phenomena. The specific proposal of Stump, however, runs aground on the mixed character of inflection in Hiaki. Stump's PUG requires that a derived form will consistently head-mark or edge-mark (or doubly-mark) with respect to all inflectional processes of the language. Inflectional systems in which some inflection is head-marking and some edge-marking within the same form are outlawed. However, exactly such a case is presented by the Hiaki NI + reduplication cases in combination with the object cliticization properties of the language. Object cliticization is edge-marking in the very same forms in which reduplication is head-marking. Consequently, we conclude that a PFM analysis of these facts is untenable as things currently stand.

The syntacticocentric approach that we advocate also requires some supplemental assumptions in order to correctly position the inflectional reduplicant inside the

compound verb form. However, these assumptions that we utilize are not novel ones; rather, they are well-established mechanisms within the Distributed Morphology framework. The strength of a DM approach is that, like the Strong Lexicalist approach, derivational and inflectional affixation is accomplished in the same component – in the case of DM, this is the syntax. Hence, the internal structure of complex derived forms remains visible even following further inflectional affixation. In contrast to PFM, no requirement that complex forms are restricted to either head-marking or edge-marking behavior is either expressed or implied. The prefixation of the Hiaki object clitic to the finite tensed verb form, for example, can coexist simultaneously with the head-marking behavior of the reduplicative prefix. We assume, in fact, that Hiaki object clitics are positioned by a syntactic mechanism similar to that which positions Romance object clitics next to the tensed verb: i.e. syntactic clitic movement to TP and subsequent merger of the clitic with the T^0 root node (cf. Matushansky 2006) apparently captures the central facts concerning Hiaki object clitic distribution.

Unsurprisingly, many questions remain. One issue which we leave for future investigation is the status of reduplication as a process or an affix. We have assumed an affix-based approach here, following argumentation in Haugen (2008, 2010, 2011). However, an approach treating reduplication as a readjustment operation triggered by null affixation like that proposed in Raimy (2000) or Frampton (2009) could also be entertained. Under this latter view, the aspectual head involved in triggering reduplication would be realized by a null affix which would trigger stem readjustment.[20] Just as in the account proposed here, the stem readjustment approach would also have access to the internal structure of the derived verb form, and in fact it would require this: the null-affixation and stem-adjustment approach would still have to make reference to the 'left edge of the closest lexical root' as the domain for the relevant readjustment. We leave open here the ultimate question of which of these approaches to reduplication should be preferred within a syntacticocentric framework.

To conclude, the phenomena considered above graphically illustrate the importance of a 'big-picture' view of grammatical systems. Noun incorporation has traditionally (within generative grammar) been the province of morphosyntacticians, while reduplication has been investigated primarily from the perspective of morphophonology. The interaction of these two phenomena in a single language has significant implications that go beyond the narrow concerns of these two sub-domains, and bear much more broadly on the architecture of grammatical theory.

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20. Under Raimy's (2000) approach, this readjustment operation would involve re-linearization, i.e. altering the precedence relationships between segments of the stem. For Frampton (2009), the operation involves inserting 'duplication junctures' into the timing tier, ultimately resulting in multiple links to the segmental material of the stem.

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